

PROCEEDINGS

OF THE INTERNATIONAL SYMPOSIUM HERITAGE FOR PLANET EARTH® 2018



20TH 1998 | 2018

GENERAL ASSEMBLY
OF INTERNATIONAL EXPERTS
& SYMPOSIUM
HERITAGE FOR PLANET EARTH® 2018



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"WH Sites for Dialogue: Heritage for Planet Earth®"
Life Beyond Tourism® Movement, beyond Sustainable and Responsible Tourism



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SESSION 1

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TOURISM MARKET TRENDS: TO MANAGE OR TO BE MANAGED?

Chair: Giovanni Ruggieri

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SESSION 1

GIOVANNI RUGGIERI¹

MAIN CONCLUSIONS REPORTED BY THE CHAIRMEN OF THE THREE SESSIONS OF THE INTERNATIONAL SYMPOSIUM “HERITAGE FOR PLANET EARTH 2018”

1. To spur the local stakeholders awareness to manage the tourism market trends not to be victim of it
2. To improve the harmonisation between the historical part of the heritage sites and the new one from various points of view (infrastructure, inclusiveness, social life, etc.)
3. To improve the knowledge, to make the training become a sort of possibility of networking not just education, but improving the process
4. To emphasize the humanistic aspect of tourism, in particular reference to heritage and accessible tourist (disability but also lack of knowledge), to change and adapt the fruition of the heritage

1 President of the Observatory on Tourism in the European Islands -OTIE)

SUSTAINABLE TOURISM WITH AND FOR YOUNGER GENERATIONS: TWO BEST PRACTICES

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Centre for UNESCO in Florence, Florence, Italy

Abstract

2017 has been declared by United Nations the **International Year of Sustainable Tourism for Development**, drawing attention on the importance of international tourism “*in fostering better understanding among peoples everywhere, leading to a greater awareness of the rich heritage of various civilizations and bringing about a better appreciation of the inherent values of different cultures, thereby contributing to the strengthening of peace in the world*” (resolution A/RES/70/193 adopted by the General Assembly on 22 December 2015).

After 2017, Sustainable Tourism remains an issue strictly connected with 2030 Sustainable Development Goals which are at the very heart of mission of UNESCO, Italian National Commission for UNESCO and Clubs and Centres for UNESCO as well. Educate to sustainability means also educate young people, teachers and adult (since for UNESCO Education is intended to be lifelong) to be sensible to sustainability issues also when they are tourists.

The aim of the present joint paper is to provide two concrete examples of activities carried out by the Centres for UNESCO in Turin and Florence in raising awareness in younger generations on the importance of sustainable tourism.

Keywords: Heritage, Knowledge, Dialogue

1. Introduction

According to the World Tourism Organization's data, tourism represents about the 10% of the global economical activity. Every year, over 1.2 billion of people cross international borders, and currently 1 workplace of 11 refers to the tourism sector. Tourism has an enormous potential, but, if managed in an improper way, can have negative consequences at environmental, economic and social levels. Moreover, tourism is recognised as positive contributor, direct or indirect, for the realization of the 2030 Agenda for Sustainable Development.

Tourism, **to be called sustainable**, needs specific competences and actions, for example:

1. Knowledge of peculiarity and resources of touristic places;
2. Politics for the safeguard and accessibility of those places;
3. Collaboration between all the actors primarily active in the field;
4. Accountability and participation of local community;
5. Awareness of the culture role as a driver of exchange and inter-cultural dialogue.

UNESCO works, since its creation, to ensure that local communities are likely to have benefits from tourists who visit natural and cultural Sites declared World Heritage in their countries (currently 1.073 all over the world) and that the influx of visitors is managed in a compatible manner with the preservation of heritage itself. Actually, these places represent the past and present of everyone and, if well managed, can bring local economic development and long-term sustainability.

Several scientific and cultural UNESCO's programmes, since 1972, year of the adoption of the Convention Concerning the Protection of the World Cultural and Natural Heritage, outline the above mentioned practices as objectives to be attained and have been strongly reiterated in the UNESCO World Heritage and Sustainable Tourism Programme WH + ST. This Programme provides an international framework for cooperation aimed at strengthening “*the enabling environment by advocating policies and frameworks that support sustainable tourism as an important vehicle for managing cultural and natural heritage*”¹.

The Centre for UNESCO in Turin and the Centre for UNESCO in Florence, together with the other almost 140 Clubs and Centres member of the Italian Federation, which is a Training Institution officially recognized by the Italian Ministry of Education, are committed to carry out, on the territory, training initiatives with schools aimed at raising awareness on the safeguard of our common Heritage.

1 <http://whc.unesco.org/en/tourism/>

2. The 2017/2018 Training Programme for teachers and schools at all levels “Sustainable Tourism in Piedmont, starting from UNESCO’s Sites: Environment, Heritage and Economy” (Centre for Unesco in Turin)

In order to provide a concrete contribution to the International Year of Sustainable Tourism for Development, the Centre for UNESCO in Turin decided to focus its annual Training Programme for schools² on the theme “*Sustainable tourism in Piedmont, starting from UNESCO’s Sites: environment, heritage and economy*”.

50 schools of all levels (for a total of 1,000 students and teachers), from the entire Piedmont region, enrolled in this Programme, whose aims are: contributing to the knowledge of the meaning of “sustainable tourism”; raising awareness of actions taken at local, national and international levels from institutions and governments in favour of sustainable tourism contributing to the realization of the 17 Sustainable Development Goals of the Agenda 2030, in particular SDG 4 Quality Education and SDG 11 Sustainable Cities and Communities.

The **Opening Day** took place on **November 13th** at **Palazzo Madama**, one of the 22 Residences of the Royal House of Savoy, inscribed in the World Heritage List in 1997, with local authorities, experts and the President of the Centre for UNESCO in Turin who introduced the theme to a representative of teachers and students.



Afterwards, from November 2017 to February 2018, a 20-hour **training course**, addressed to teachers and parents, took place, structured in 4 meetings with the qualified interventions of national experts.

1. The first meeting took place on November 27th and it was focused on the subtheme “Environment”. **Paolo Castelnovi**, President of the Landscapefor Association, explained how to know UNESCO Sites through didactic activities, providing a concrete example with the use of Atlas, a georeferenced platform that allows to deepen the knowledge of places, initiatives and thematic archives. This is an example of how technology can help to spread information, particularly among younger generations. **Ippolito Ostellino**, Director of the Collina Po UNESCO Biosphere Reserve, presented UNESCO’s **Man and the Biosphere Programme (MAB)**, launched in 1971 “to establish a scientific basis for the improvement of relationships between people and their environments”³, and the Collina Po Reserve, designated in designated “UNESCO Biosphere Reserve” in 2016, the broader urbanised area recognized until now.
2. The second step, on December 18th, was dedicated to “Heritage” with the visit of the Stupinigi Hunting Lodge, another Residence of the Royal House of Savoy, in order to celebrate the 20th anniversary of their inscription on UNESCO’s World Heritage List. Guided by **Marta Fusi**, Director of the Stupinigi Palace, and by **Serena Fumero**, referent for educational activities, teachers had the opportunity to discover this wonderful place and relive the atmosphere of the court. This Palace was also the set of Cinderella movie.

2 The annual Training Programme for Schools is realized with the collaboration of the Assessorship of education in Piedmont and the regional office for schools in Piedmont. This collaboration has allowed to attain good results, in terms of increase in the number of schools, students and teachers involved (in 2014/2015 – 13 schools, 700 students and teachers involved, in 2015/2016 – 15 schools, 1000 students and teachers involved, in 2016/2017 – 30 schools, 2000 students and teachers involved), in speakers’ and students’ quality of work.

3 <http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/man-and-biosphere-programme/>

3. In order to develop the subtheme “Economy”, it was decided to make known two worthy ways of safeguarding and promoting World Heritage Sites. On January 15th, **Vittorio Gasparini**, President of the Centre for UNESCO in Florence, presented the “Florence the Right Way” project, together with some high school students directly involved in the project. **Roberto Cerrato**, Director of the Association for the Vineyard Landscape of Piedmont: Langhe-Roero and Monferrato, explained the management, promotion and accessibility to this site, recognized in 2014.
4. In the last course, held on February 19th, **Silvio Mele**, Lieutenant Colonel of Carabinieri, described the commitment of this force for the safeguard of Cultural Heritage and **Giovanna Segre**, Professor at the University of Turin, analysed the current Italian situation highlighting the paradox of abundance.

From February to April, **students and teachers work in their classrooms** and, during the closing day, to be held in May 2018, they will present their final results (posters, videos, papers, pictures, etc.) to other students and experts who will provide an overall evaluation of their works.

As far as **communication and diffusion of the results** is concerned, the Centre for UNESCO in Turin realizes two publications⁴: the first one including UN and UNESCO official documents on the theme (distributed during the Opening Day) and the second one containing all interventions held during the training course, students’ works and other general material proposed by students and teachers. This documentation is usually also sent to UNESCO Headquarters in Paris.

3. Firenzeperbene/Florence the right way (Centre for UNESCO in Florence)

The Centre for UNESCO in Florence went on with its experience of **Firenzeperbene/Florence the right way** of UNESCO Heritage Town office in schools and with European University.

The theme of Sustainable Tourism and Greenways/Blueways has been the ground of celebration of ICOMOS International Day of Monuments.

The experience of Centre for UNESCO of Florence as one of stakeholders of politics of sustainable tourism involving schools and Syracuse University in Florence in the project has been quoted in the report of ICOMOS UNESCO Advisory mission to the World Heritage site of The Historic Centre of Florence, officially presented in Florence on 30th October 2017.

In 2018, according to the issues of celebration of the Anniversary of inscription of Florence in the Heritage List (that took place last December) with a focus on religious heritage of the town (intended not only as Catholic Religious Heritage), Firenzeperbene is focused on the theme of discovering places of religious Heritage in Florence and the activity of work school students in Firenzeperbene project will be strictly connected with the theme of interreligious dialogue according to the UNESCO theme “learning to live together” and to the themes of 2030 Development Goals.

4. Conclusions

As shown by these two concrete examples, the Centre for UNESCO in Turin and the Centre for UNESCO in Florence carry out significant activities aimed at raising awareness in younger generations about the safeguard and promotion of World Heritage, also through the use of new technologies.

In order to provide a concrete contribution to the achievement of the Agenda 2030’s Sustainable Development Goals, the Centres for UNESCO in Turin and Florence chose the modality that belongs to Clubs and Centres for UNESCO member of the Italian Federation: develop SDG 4 “Quality Education” for all proposing specific contents. Dealing with sustainable development, SDG 4 was cross-referenced with SDG 11 “Sustainable Cities and Communities” in order to invite teachers and students of all ages, social level and school to work for the achievement of our common objective: the knowledge, promotion and safeguard of our cities, universal UNESCO heritage of mankind.

References

Centro per l’UNESCO di Torino, Percorso Formativo “Turismo Sostenibile in Piemonte, a partire dai Siti UNESCO: ambiente, patrimonio ed economia”, Collana Ricerca e Didattica, Sezione Quaderni di Lavoro, Centro per l’UNESCO di Torino

<https://www.wto.org/> (World Trade Organization)

<http://www.tourism4development2017.org/> (2017 International Year of Sustainable Tourism for Development)

<http://www.landscapefor.eu/> (Landscapefor Association)

⁴ The Research and Didactic” book series of the Centre for UNESCO in Turin counts, currently, 113 publications.

<http://www.parchipocollina.to.it/> (Parco Collina Po)

<http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/man-and-biosphere-programme/>
(UNESCO's Man and the Biosphere Programme)

<http://whc.unesco.org/> (UNESCO World Heritage List)

<http://www.ordinemauriziano.it/palazzina-di-caccia-stupinigi> (Stupinigi Hunting Lodge)

<http://www.firenzepatrimoniomondiale.it/en/firenze-perbene-2>

http://www.centrounescofi.it/?page_id=3250

<http://www.paesaggivitivinicoli.it/> (Association for the Vineyard Landscape of Piedmont)

<http://www.carabinieri.it/>

<http://www.est.unito.it/do/home.pl>

<http://www.centrounesco.to.it/> (Centre for UNESCO in Turin);

<http://www.ficlu.org/> (Italian Federation of Clubs and Centres for UNESCO);

<http://www.un.org/sustainabledevelopment/development-agenda/> (UN Agenda 2030)

TOURISM MARKET TRENDS: (TO MANAGE OR BE MANAGED)

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Abstract:

Tourism is not short of its own peculiar prophets: the green fields of Europe will shortly be covered with airports; the air will be filled with the noise of jets flying in jumbo-loads of tourists; our capitals will be submerged in a sea of new hotels; the roads congested with tourist coaches; historic buildings even more cluttered with culture-seeking visitors; streets populated with souvenir shops, boutiques and strip clubs. Pollution by tourists has already been coined.

Session: Tourism Market Trends

Tourism is increasingly an international phenomenon. The problems that it creates are due mainly to the relentless growth rate, but aggravated by seasonal and geographical concentration. It has also become a means by which cultures acquire a different dimension.

The major problem with tourism is that in some countries, it has grown faster than the country can absorb. The tourism market today is more heritage oriented, especially among the repeat visitors to the same country. Visitors evaluate the modern infrastructure being utilised in modern cities and their impact on the environment. Advanced bookings are now less necessary. The middleman between the customer and the airline or the hotel is no longer a requirement and has become cheaper to make direct contact. This made it a lot more possible for middle class visitors to embark on a holiday. The use of credit facilities made it more convenient with direct contact to the airline than with travel agents. The changing structure of the industry is squeezing out the middleman and tour operators and airlines are taking over from the travel agent to integrate vertically. This had become all the more important as all forms of reservations, and the use of credit cards made it more easy for passengers to issue themselves tickets, and with less worries.

All these factors made long haul destinations more possible for the average income visitors. A change being envisaged will in future be as regards tariffs. Market trends are sounding a key note on the distinction of rates between scheduled and charter fares as there are no longer a distinct market for the two types of flights. The public does not any longer understand the distinction or accept it. The need for an indicative tourist plan, on a national and international basis within which the different components of the industry can identify and fulfill their own particular roles will have to be decided upon and the indicators are, that the major operators are already planning their designs to cater for this trend in this segment.

Session: Digital technologies

With the ever changing and developing of techniques, the tourist authorities or Ministries of Tourism, instead of being promotional bodies aimed at securing the maximum tourist flows, they are more likely to become tourist development corporations over the next few years. They will have to act within the context of a national plan which identifies the role of tourism and which blends the requirement of both the tourist and the resident.

The initiative for many of the changes which are required will have to come from the local Government or Authority. It is at this level that the need for a solution is more pressing. Over the coming years, some of the more popular destinations will be saturated by tourists due to excessive national promotion campaigns which ignore the needs of the receiving end, or through inadequate understanding of the complex relationships between the growth of tourism and urban economics; or through inadequate machinery to enforce optimal tourist policies.

Residents complain that prices for commodities in touristic areas have become expensive for them when compared with rates paid by fellow citizens in areas where tourism is not rife. Locals are having to compete with tourists even for certain services. They have to live in a more dense area during the high season. Many complain that the character of their area have lost its identity; small shops are becoming less and less to be found, the 'local' tradesmen have disappeared and will have to move to another village for certain commodities. The local community has, in other words, become dissolved and is indistinguishable from that of fifty years ago. To make matters worse, modern technology and software made the world smaller for the visitor and in some cases, problematic for the resident. The local population has become displaced. However the advantages brought to the resident community is that through the influx of tourism, the need for modern technologies drove the local or central governments to install means of communications which would have taken a longer period to be made available to residents.

On a more positive note, one has to note the fact that people of different nations and cultures came closer together, could exchange knowledge, twin on matters of common interest, and made general knowledge far more accessible, made more possible to know about ones heritage and historical facts, is credit to modern technology and the different aspects of globalisation.

Session: Smart city and heritage conservation

It would be wrong to maintain that there is an inevitable conflict between the national interest which requires a growth in tourism numbers, and the interest – economy wise – of the region which have to absorb them. The best interests of both often collide or coincide. There are four main factors which determine the saturation level for a touristic area.

First the diversion of land varies from a region to another and from one country to another. It is more acute in capital cities and historic towns or villages. It is less acute in seaside resorts. Land in cities is at a premium. The increase of open spaces is desired, to reduce housing densities, to provide for urban motorways, new schools, hospitals and a host of important urban needs. Sensible use of land area is the concern of the entire populations and a balance between the competing demands. Money is required to maintain historic sites, on the other hand, development in the inner city core is prejudicing the fulfilment of other needs by locals.

The second factor is employment. The broader economic implications of a growing tourism related jobs can result in a depressing effect on regional economic growth. Employment in the hotel and catering industries offer tend to bring in a low status for the employees, as this segment is characterised by relatively low proportions of managerial, skilled and semi skilled jobs.

The third element of concern is that related to the general infrastructure. There is pressure on transport, on water supply, sewers, telephony, electricity consumption, police services. And this is almost due to bad planning ahead of opening up to an increase in tourism in some regions. The needs of the visitor in a city tend to be ignored vis-a-vis the locals if the local government plans are such that they reflect the equation between the needs of the city with the needs of the residents. The visitor has no vote, and when it comes to electing a new administration, the locals tend, more so nowadays, to evaluate what is best for them, rather than what is best for the region. One has to bear also in mind that the more tourists are visiting important sites, the heavier traffic is contributing to an unhealthy environment and health related matters are increasingly worrying residents that mother earth is being further contaminated, the quality of water and food is becoming worse and the quality of life is under pressure from these health hazards. All these factors contribute also to deterioration and the conservation of historical monuments and sites and as such has a boomerang effect on the population and income derived from tourism has to be redirected to maintenance of sites and the dire health situation of the populace.

This leads us to the fourth factor. Taking into account the three factors already referred to, the interaction of these factors lead to a psychological saturation level in the local resident and to the loss of their goodwill towards the visitors. Locals have to compete with tourists for the best vegetables and fish in town, they have to wait longer to get served in shops and longer to go from one place to another due to traffic congestion. It also means living in higher densities, in highly polluted environment. One remedy left is for the locals to be forced out of town, where the air is likely to be better, but it also means that the bill on provisions, on rent, and other needs tend to be higher than in the city core.

Unless appropriate locational policies and a positive strategic plan is devised, the interest of residents and those of the tourist cannot be resolved. While solutions are visible, none have as yet been sufficiently applied or developed. Tourism can be a blessing or a blight. But a concerted effort by all sectors of the population, whether locals or visitors have to be made to control not only our heritage on mother earth, but also not to continue to increase the unhealthy environment for future generations.

In the past, Malta enjoyed above international average growth rates in the number of tourist arrivals and satisfactory levels of foreign exchange earnings from tourism, and this despite acute competition and lower package prices from other resorts at shorter distances from our main market origins.

Main Indicators of Inbound Tourism to Malta

	2014	2015	2016	Change 2016/2015
Total inbound visitors ¹	1,714,533	1,799,213	1,988,447	10.5%
Inbound tourists	1,689,809	1,783,366	1,965,928	10.2%
Tourist guest nights	13,522,112	14,151,599	14,961,366	5.7%
Average length of stay	8.0	7.9	7.6	-4.1%
Tourist expenditure (€'000s)	1,528,572	1,639,067	1,708,952	4.3%

Source: NSO (Inbound Tourism)

¹incl. overnight cruise passengers

Table 1 - Main Indicators of Inbound Tourism to Malta

However in the last few years, Malta is experiencing a moderate growth rate of arrivals.

Massive expansion of tourism in Malta in the past two decades and the growth of a vast and highly competitive world market in international travel have had a major economic and social impact on the Island and have led in many cases to the development of tourist accomodation establishments targeted towards lower and medium quality package visitors.

Total Tourist Expenditure (€'000s)

	2014	2015	2016	Change 2016/2015
Package expenditure	516,339	540,965	505,820	-6.5%
Non-package expenditure	Air/sea fares	217,255	240,223	5.8%
	Accommodation	208,023	240,574	16.8%
Other expenditure	586,956	617,304	668,037	8.2%
Total	1,528,572	1,639,067	1,708,952	4.3%

Source: NSO (Inbound Tourism)

Table 2 - Total Tourist Expenditure

This led the Maltese Tourism Authority to take the initiative for the preparation of a long term Tourism Planned Strategy.

Apart from the maximization of economic benefits from Tourism, the sector was encouraged to respond to change in the international environment. Hence it became imperative to achieve a sustainable development of the Tourism sector in Malta not only to enhance the natural, cultural and social environment, but also to locally manage the upcoming trends. Growth brings a commitment with it on the part of the authorities to reflect about future plans, strategy and long term vision.

Having said this, one has to keep in mind from which level we kicked off. Tourism – by air or cruises – has thankfully rarely been a political playball in Malta.



Figure 1 -Cruise Liner entering the Maltese Grand Harbour

An unofficial political holy alliance has been adopted over the years in order to sustain this important economic pillar. In order to come to a concrete decision whether we should continue to manage the current trends or be managed by market forces, we have to make a flashback as to where we had set off over the past decades.

Cruise Passengers

	2014	2015	2016	Change 2016/2015
Transit	475,134	579,784	567,906	7.7%
Landed	46,620	70,372	58,176	-17.3%
Total number of passengers	471,554	600,156	626,082	4.3%
of which:				
EU nationals	367,435	455,115	465,986	2.4%
Non-EU nationals	104,119	145,041	160,096	10.4%
Passengers visiting Gozo	648	9,868	6,930	-29.8%
Passengers staying overnight	24,724	15,847	22,519	42.1%
Cruise liner calls	303	307	316	2.9%

Source: NSO (Cruise Passengers)

Table 3 -Cruise Passengers

We have inherited a deep neglect of our cultural heritage. Historical sites were vandalised or in use for domestic reasons.



Figure 2 -Vandalised gun hide in St.Paul`s Bay

We experienced a decline not only in the local resident population who mattered about the sad state of our unique sites, but also a deterioration of the historical cores and social fabric in the same regions. No investment of any sort was made, let alone maintenance and preservation of sites and artefacts. Over the years, however, Governments and the private sector became more conscious and concerned about this economic potential. Working independently of one another at times did not yield the desired aspirations and a public private partnership on a number of initiatives bore more fruit. Policies were aimed at establishing an improved attitude towards our cultural heritage. Government started to target its emphasis on **conservation** as against to **preservation** only.



Figure 3 - Fort St.Angelo in Birgu recently restored

We hence reached a stage where even the private enterprise started to show interest to contribute towards a conservation initiative for the possible reuse of historical elements in Malta to the benefit of the citizen and the country.



Figure 4 - Birgu residents initiative to embellish old residences

Private residents started to realise that by restoring their old houses back to their pristine glory they will not only be doing culture and patrimony the desired effect, but they can also enhance their immediate environment, which, in turn, for the business minded resident, may yield economic benefits.

We were proud and lucky that politicians of every hue acknowledge the fact that encouraging economic and physical regeneration of these areas can lead to wider improvement and will gather momentum in a self-sustaining manner.

We strongly believe, hence, that we should be managing our economy to the extent that, while we do not discourage foreign investment, we give the local entrepreneurs full support to invest and manage on behalf of, or in partnership with government entities, different aspects of the tourism industry.



Figure 5 - Tourism conference 2018 for local entrepreneurs

When the private sector realised that international competition led to a constant changing economy, they came forward to join the tourism bandwagon, and they reaped fruit on the financial investment they put in. In this volatile segment of our economy, we had to keep abreast with developments, and offer the best at the lowest price level as otherwise we will not have been able to sustain at a gradual step the required development in this sector. After all, market forces themselves – the exigencies themselves – demand it.

The National Tourism Authority in Malta since the mid-1960's realised that competition between tourist receiving nations and regions was high and all those interested in the niche markets had to brush up their skills on how best to manage this sector for their own benefit and for Malta in general. Malta, being what it is, with no raw materials of its own, still heavily dependent on a labour intensive job market, risk failure in its tourism-based economic development unless all tourism oriented projects are based on a well planned, developed and managed plan. We cannot ignore the fact that there is a saturation level for tourism in a given country or region and if this is exceeded the cost of tourism will begin to outweigh the benefits, to the detriment primarily of the locals. On this point, I believe we all agree. There is consensus that we do not want this to happen. It is imperative that we continue to rectify policies, adjourn the mechanisms being adopted to continue to achieve our set goals.



Figure 6 - Malta Tourism Authority logo

The Maltese Tourism Authority has a diverse role, but one which in essence is all about creating and fostering relationships with interested parties. The current Authority was set up formally by the enabling law in 1999 and clearly defines its role as one that extends beyond that of international marketing and includes domestic, motivating, directional, co-ordinating and a regulatory one. The Act strengthens the public and private partnership in tourism through greater and more direct participation by the private sector in national planning and development of the industry. The Tourism Authority is the tourism industry's regulator and motivator, its business partner, the country's brand promoter and maintains and manage meaningful partnerships with all tourism stakeholders. It has the all important task of ensuring the highest standards and quality of the Island's tourism product and foster relations with local and international media.



Figure 7 - Airmalta's commitment in diversifying tourist markets

With the main airlines nowadays doing the job of the tour operating process themselves, the market is vertically managed by them. But this does not mean that the tourist perception of Malta has changed. It is still considered as a safe place to stay; it has a relaxing atmosphere, a friendly and warm feeling. These are positive ingredients which contributed to the steady increase in arrivals. The total expenditure of the tourists in Malta during 2017, as reported by the Maltese National Statistics Office and the Tourism Authority official sources, exceeded 2.3 million Euros. Malta had a 16% increase in tourist arrivals during 2017 over the previous year.



Figure 8 - Inbound visitors 2014-2017

With 2.3 million tourists and the national airline reaching sharing agreements with other national airlines to enable tourists easier

access to Malta, it is likely that even this year will see a continued increase in arrivals and more commitments from the sector to keep abreast with the demands by those choosing their destination and in full view of the competitiveness by neighbouring destinations. Bear in mind that we are talking about an Island country of 316 square kilometers having a resident population of 435,000. There are currently 5,600 full time employees in the accomodation sector and 3,500 part time, while in the food and beverage sector 5,300 are full time employees with almost 7000 in part time employment.



Figure 9 - Air borne restaurant



Figure 10 - Eating out in Malta

This means, that while Malta prefers to manage this sector, certain segments are managed by the airlines themselves.

In this context, the action plan adopted was for government entities to oversee that the base product is enhanced, cultural heritage and historical sites upgraded and placed under the auspices of different Foundations. Sustainable development of the historical product embarked upon led to even greater appreciation by locals and in turn, local private enterprise contributed to further investment in this field, thereby infrastructural development became a sensitive issue and placed under an Authority so that zones which are prone to development are monitored and do not impinge on areas that need to be protected for the benefit of our national heritage.

Meanwhile one has to bear in mind that all investment in the tourism sector came at a cost both to the locals and the visitors. In this respect, excesses in the profit margin by investors was checked so that this volatile segment will be closely monitored and services offered have to be charged according to the category the Tourism Authority registers them. The local population saw an increase in their cost of living in certain areas and so these measures were intended also not to force the locals out of their habitual place of residence due to higher costs impinged upon when purchasing daily needs and services. On the other hand those who owned property had it marked up in value.



Figure 11 -Tourism conference in Malta

So sustainable development has been welcomed, policies which helped to manage the ratio between local and foreign investment were welcomed but it also had its positive element. Through the income derived from tourism, historical city cores were upgraded, old historical buildings came back to life, locals had their property restored and revalued and today they are proud owners of shops of different genre and their standard of living ameliorated.

The negative effect of areas being managed by the private sector, be it local or foreign owned, is that sometimes control on prices is difficult to implement. This led to studies being carried out over the years to identify the new strategic direction of tourism in Malta taking into account the opportunities and the threats of the international tourism environment as well as the strengths and weaknesses of the local tourist product. A process of extensive consultations with all stakeholders and organised groups in tourism as well as Government Departments, Local Authorities and the public at large to ensure consensus and ownership of the strategic goals was adopted over the years.



Figure 12 - Birgu Yacht Marina

This had happened in my home city by the Central Government when the city changed its status from a military base to a tourism-oriented yacht marina and a cradle of historical edifices in Malta.

Modern exigencies do not seem, at certain instances, to harmonize with the change of use desired for historical artifacts and sites. And it is this sphere of conservation and current needs that is difficult to reconcile. Those who are entrusted to manage this sector have to watch those who are not interested in this area of our national heritage as they may cause invaluable harm to the patrimony we are so proud of. On the other hand, by conserving a country's character we will be attracting honest private sector interest to enable us to enhance the state of our historical and heritage patrimony.



Figure 13 - Interior Inquistors Palace in Birgu

Our success story came along as a result of a collective effort based on a long term plan. Success in tourism is neither guaranteed nor permanent. It is volatile. We have to ascertain ourselves as to how to avoid a disaster in this sector that can grow or shrink from time to time according to the market forces prevailing, or according to how much stable the state of the economy in Malta, in Europe and in the whole regions of the world, prevails.

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References

Birgu Local Council Librarian;
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SUSTAINABLE TOURISM AND EARTH PROTECTION

Mounir Bouchenaki

Special Adviser to the Director General of UNESCO, Paris, France

Introduction :

Dear President Paolo Del Bianco,

Dear Secretary General,

Honorable Delegates,

Ladies and Gentlemen,

Dear Friends,

It is indeed a great honor for me to participate to this 20th General Assembly and I would like to start by expressing my deep gratitude to President Paolo Del Bianco and his gracious team (and in particular his kind and dedicated family) for the very kind invitation extended to me to come another time to Florence, this marvelous historic city inscribed as you can imagine on the UNESCO World Heritage List since more than 25 years !

I also want to say that my first contact with Romualdo Del Bianco Foundation is dating back to end 2005 when I was elected and appointed Director General of ICCROM in Rome, and where the first briefing I received was from my predecessor Professor Andrej Tomazewski, advising me to meet as soon as possible President Paolo Del Bianco. And this is what I did and how the relations between ICCROM and the Foundation were pursued and reinforced with a permanent dialogue about the role and place of Tourism and its relation with the protection of Cultural Heritage.

The World Tourism Organization declared the Year 2017 «International Year for Sustainable Tourism». The main reason of this proclamation is due to the fact that more and more attention should be paid to the management of the natural and cultural resources in order to ensure continuity and resilience in Tourism activity together with building positive impact within the communities who should benefit in both terms, economic and cultural.

This is also the aim of the Romualdo Del Bianco Foundation in Florence which is well known for spending great efforts in her role as a respected Non-Governmental Organization with a very specific logo «Life beyond Tourism» and an important topic to be discussed during this session : "Sustainable Tourism and Earth Protection".

In several fora, it was pointed out that Tourism is effectively bearing negative impacts on Earth and its Natural wealth: fresh waters are over utilized by tourists in areas where there is a shortage of water resources for the local populations. This is becoming with the present additional effect of the Climate Change a serious issue that should be addressed.

I want to quote from a report established by the UN and shared by UNESCO the following`:

Tourism is one of the largest and fastest growing industries in the world, wrote Frederico Neto from the United Nations. It is an increasingly important source of income, employment and wealth in many countries. International tourism now accounts for a larger share of foreign exchange receipts and export earnings than any other industry in the world. But, while tourism provides considerable economic benefits for many countries, regions and communities, its rapid expansion has also had detrimental environmental and socio-cultural impacts. Natural resource depletion and environmental degradation associated with tourism, for example, are often serious problems in tourism-rich regions. The paper argues that the promotion of sustainable tourism development is essential for maximizing its socio-economic benefits and minimizing its environmental impact.

Furthermore, the uncontrolled urban expansion, both in historic places and on sea shores associated with the massive flux of visitors, is bringing a number of negative consequences with a very high level of waste of plastics in particular which are polluting the soil and the bed sea with an unknow time span for their absorption by Nature.

While tourism provides considerable economic benefits for many countries, regions and communities, its rapid expansion can also be responsible for adverse environmental (and sociocultural) impacts. Natural resource depletion and environmental degradation associated with tourism activities are sometimes serious problems in tourism-rich regions. The management of natural resources to reverse this trend is thus one of the most difficult challenges for governments at different levels. The fact that most tourists chose to maintain their relatively high patterns of consumption (and waste generation) when they reach their destinations can be a particularly serious problem for developing countries and regions without the appropriate means for protecting their natural resources and local ecosystems from the pressures of mass tourism. The main environmental impacts of tourism are

- (a) pressure on natural resources,
- (b) pollution and waste generation and
- (c) damage to ecosystems.

Furthermore, it is now widely recognized that not only uncontrolled tourism expansion is likely to lead to environmental degradation, but also that environmental degradation, in turn, poses a serious threat to tourism.

In addition to pressure on the availability and prices of resources consumed by local residents – such as energy, food and basic raw materials – the main natural resources at risk from tourism development are land, freshwater and marine resources. Without careful land-use planning, for instance, rapid tourism development can intensify competition for land resources with other uses and lead to rising land prices and increased pressure to build on agricultural land. Intensive tourism development can also threaten natural landscapes, notably through deforestation, loss of wetlands and soil erosion. Tourism development in coastal areas – including hotel, airport and road construction – is a matter for increasing concern worldwide as it can lead to sand mining, beach erosion and land degradation.

Besides the consumption of large amounts of natural and other local resources, the tourism industry also generates considerable waste and pollution. Improper disposal of liquid and solid waste generated by the tourism industry has become a particular problem for many developing countries and regions that lack the capacity to treat these waste materials properly. Disposal of such untreated waste has, in turn, contributed to reducing availability of the above-mentioned resources at the local level.

Uncontrolled tourism activities can lead to the severe disruption of wildlife habitats and increased pressure on endangered species. As it has been widely documented, it can also disrupt wildlife behaviour, such as, tourist vehicles in Africa's national parks that approach wild cats and thus distract them from hunting and breeding; tour boat operators in the Caribbean Sea that feed sharks to ensure that they remain in tourist areas; and whale-watching boat crews around the world that pursue whales and dolphins and even encourage petting, which tends to alter the animals' feeding and behaviour. Tourism can also lead to the indiscriminate clearance of native vegetation for the development of new facilities, increased demand for fuelwood and even forest fires. Ecologically fragile areas, such as rain forests, wetlands and mangroves, are also threatened by intensive or irresponsible tourist activity. Moreover, as will be discussed below, it is increasingly recognized that, the rapid expansion of nature tourism (or 'ecotourism') may also pose a threat to ecologically fragile areas, including natural world heritage sites, if not properly managed and monitored.

In addition, tourism in many destinations could be particularly threatened by global environmental problems, notably the potential threat of 'global warming'. There is increasing scientific evidence that human activity has begun to change the average temperature on the Earth's surface. According to the authoritative United Nations Intergovernmental Panel on Climate Change (IPCC), this process of global warming has been caused by several factors associated with the intensification of economic activities, including the emissions of 'greenhouse gases', such as carbon dioxide produced by burning fossil fuels and forests`.

A number of historic places as well as natural sceneries are suffering from these negative impacts and we can see that some local residents, like in Barcelona and in Venice, demonstrating against the presence of too many tourists.

We can see that the UNWTO is also keen in stressing on the sustainability of Tourism with respect to environment, a quoted below:

«Sustainable tourism should:

Make optimal use of environmental resources that constitute a key element in tourism development, maintaining essential ecological processes and helping to conserve natural heritage and biodiversity».

From its side, UNEP is also reminding the importance of protecting the natural environment. Ecotourism is of special interest to UNEP for its relationship with conservation, sustainability, and biological diversity. It is recommending:

- «The conservation of biological and cultural diversity, by strengthening protected area management and increasing the value of ecosystems;
- The promotion of the sustainable use of biodiversity, by generating income, jobs and business opportunities in ecotourism and related business networks».

In this general context studied and analyzed by International Agencies, we must admit that Tourism is confronted today to a number of challenges in the world. For the next decades there is a real need of raising awareness and sensitization in order to reduce the negative effects of Tourism industry on climate, forests, deserts, fauna and flora as well as rivers and lakes, and not to forget the air that is more and more polluted.

It is therefore urgent to study carefully all these phenomena and reinforce the measures to be taken on the basis of strategies based on a new philosophy and a new approach for a human and respectful tourism to our Mother Earth, as it is now promoted by Fondazione Del Bianco and its visionary President.

I am pleased to wish all success to this General Assembly.

PLANNING OF VISITS TO THE FORTIFIED ARCHITECTURE OF TUSCANY ON THE COAST AND ON THE TYRRHENIAN SEA

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Tourism can be organized in planning visits to the islands of the Tuscan Archipelago and in which there are architectures of particular interest; it is worth mentioning fortified castles currently destined for prison offices or already prison premises. Every year the Italian Institute of Castles organizes the National Castles Days.

Their programming can be formulated by organizing groups at various levels; important will be to arouse interest in schools of any grade. The Fortified Architecture of Tuscany on the coast and the Tyrrhenian Sea from Bocca di Magra up to Ansedonia can be considered an analysis of the consistency of the heritage of the Fortified Architecture and includes the first sighting towers of Lombard-Franciscan origin and the grandiose fortresses of the “Radiation” of Italian school “and” Spanish “. The fortifications of the Tuscan coast and the archipelago of the Tyrrhenian Sea are part of a larger system, which included up to the Unification of Italy, a state like the Grand Duchy and in the southern part the fortified system of a nation like Spain - the State of the Presidi - which had condominium control of the Strait of Piombino and much of the Tyrrhenian Sea. However, the variety and completeness of the various architectures that are in this particular geographical position can give a precise and exhaustive vision, not only of the heritage of this specialist architecture, but how important it was to defend and control this part of the Mediterranean Sea, especially in traffic between the south and north and in the international relations that bound these coasts with the rest of Europe from Spain with the Kingdom of the two Sicilies up to the French Provence and in many respects also in the contributions with the Spedalieri of the island of Malta, the north of Africa with Tunisia and even with England, not to mention the middle (extreme) East. The knowledge of these architectures is an essential point of reference not only for a particular historical-political reason, but it is also an opportunity to leave an important mark in the methodological operations of safeguarding and enhancing the coast, the islands and entire areas of earth (cultural and tourist recovery, etc.) to which these various architectures, which in most cases were points for the safety of the existence of innumerable strata of the population and of interests of important European States.



Fortezza di Portoferraio (disegno di R. Corazzi)

This year the Tuscany section of the Italian Institute of Castles on the occasion of the month of the castle, on May 20, organizes a visit to the castle of the Emperor of Prato and a description is given.

The Emperor's castle is located in Prato in Piazza delle Carceri, next to the church of Santa Maria delle Carceri and the Church of San Francesco and was built by Emperor Frederick II of Swabia.

On the site where the castle is located stood in ancient times the fort of the Alberti di Prato, which was almost completely razed to the ground in 1107 during the siege of the troops of Matilde di Canossa; in its place another palace, called "Palazzolo", was rebuilt to house the nuncios of the emperors Arrigo VI di Svevia and Ottone di Brunswick, of which two towers remain. Arrigo VI of Swabia and Brass of Brunswick of which two towers remain. The commission of the building was given in 1240 by Federico II to Riccardo da Lentini. The castle was surrounded by a moat and connected to the Albertian prisons. Once completed it should have been used as an important garrison of the empire, as evidence of the emperor's presence on the northern possessions.

With the untimely death of the emperor occurred around 1250 the construction was interrupted.

During the fourteenth century, under the Florentine dominion, the castle was connected to the third circle of walls through a covered corridor called "Corridore del Cassero". Over the centuries some houses were built in and around the castle that were demolished under the Fascist government in the thirty. The opening of Viale Piave led to the demolition of a large part of the structure of the Cassero, of which two trunks remain. The remains of the hospital and of the corresponding church of San Giovanni Gerosolimitano (or of the knights of Malta), built in the mid-twelfth century and now abandoned, are also interesting on the back of the castle itself. In 1944 the castle was used by the fascists to lock up the hundreds of prisoners arrested for the March strike. Also in 1944, between 6 and 7 September, after the occupation of the city by the partisans, there was a round-up for the city, where fascists were arrested and presumed such, and once led to the castle, were shot. Currently the castle of the emperor is used by the municipality as a place for events or cultural events, such as shows, concerts or the so-called "cinema under the stars" or place of film projections in the summer that gather an increasing number of spectators.

SAINT PETERSBURG IN THE WORLD HERITAGE SYSTEM “SILVER NECKLACE OF LENOBLAST”: TO MANAGE, FACING CHALLENGES

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Abstract

The facts about St.Petersburg as a part of the world heritage system in the global tourist flows according to the 2017 data are briefly presented. St.Petersburg State University of Culture (SPbGIC of the RF Ministry of Culture) with its socio-cultural project development centre is shown as an example of a higher institution centre dealing with tourism and travel routes development integrating domestic heritage territories routes into the European tourism routes network securing intercultural dialogue. One of the major national and SPbGIC developments is, in particular, a famous “Silver Necklace” set of routes of Lenoblast - the administrative unit, responsible for the immediate vicinity and distant territories around St.Petersburg.

Keywords: travel routes, heritage, intercultural dialogue

Introduction

This paper helps to understand the brightest phenomenon of St. Petersburg, St.Petersburg city, State University of Culture (SPbGIC) activities in the sphere of tourism. Lastly, it looks at a famous newly-developed tourism product “Silver necklace Russia”. The format of the publication is too small to discuss terminological or other aspects of tourism and its features. Here we use both terms – tourism and travel, understanding that the position of Romualdo Del Bianco, enjoying cooperation with “Life Beyond Tourism” institute. The preferable term and notion is “travel” which equals a humanistic idea and has good perspectives.

2.Recent Trends

2.1. St.Petersburg

Last year in 2017 Russia’s Northern Capital was the victor in the “Best European City Direction 2017” nomination. “Tourism is an excellent means of communication between countries and peoples, it makes our world brighter and kinder,” said Georgy Poltavchenko, Governor of St. Petersburg. The award ceremony of the most prestigious international tourism competition, the World Travel Awards, took place at the Ethnographic Museum in St. Petersburg. The city received the right to host the ceremony due to the fact that it had already won prizes in the competition twice before. The historic center of St. Petersburg and its associated groups of monuments include 36 components. As a result of a retrospective inventory conducted by UNESCO in 2005-2014 years, nearly all the items were approved, reflecting good heritage management practices of St. Petersburg government. The territory of St. Petersburg has 780 objects of cultural heritage of federal importance and 1349 objects of cultural heritage, the preservation of which is the responsibility of the local authorities (historical and cultural monuments, ensembles, places of interest, etc.). In addition, Saint Petersburg has a unique combination of two components: urban and natural environments (for example, the Neva river mouth and Peter and Paul Fortress).



Figure 1 - White nights in St.Petersburg, Russia

The following Tables 1, 2 show the growth of travel flows to St.Petersburg explaining the awards given to St.Petersburg. The biggest consistent quantities of tourists in 2016 are from China (1, 289 mln) and Korea (161 thousand).

Table 1 Rating of foreign countries-leaders in terms of tourist arrivals to Saint-Petersburg 6 months of 2017
(+ more than 30% compared to 2016)

Citizenship	% of 2016	Citizenship	% of 2016
Turkey	+302	Poland	+50
Indonesia	+101	Hong Kong	+48
Chili	+100	Croatia	+37
Romania	+ 95	Australia	+34
Thailand	+76	Brazil	+34
Iran	+71	Argentina	+32
Taiwan	+52	Mexico	+31

Table 2 Arrivals (hundred thousand) to St.Petersburg in 2015-2016

Citizenship	2015	2016	Growth %
Peoples Republic of China	1121	1289	+10
S. Korea	136	161	+18
Iran	041	060	+63
India	034	047	+40
Vietnam	029	036	+24

2.2. Saint-Petersburg State University of Culture developments

SPbGIC takes part in the development of the tourist /travel routes resources of St. Petersburg and Leningrad Oblast (LenOblast – administrative unit, responsible for the territories in the vicinity and around St. Petersburg), carrying out the ideas stated in the documents of United Nations World Tourism Organisation - UNWTO. Following the goals of UN WTO and in particular the International Year of sustainable Tourism for Development (World, 2018)

SPbGIC takes part in the research of tourist routs potential and resources to integrate into European cultural space. 4 European cultural heritage sphere macro-regions are viewed upon as priority directions (Baltic, Danube, Adriatic, Ionic, Alpine). The selection of cultural routes is made taking into account European Council 4 priorities (Jul 2015):

- consolidate the image and profile of Europe as a collection of sustainable and promote the development of sustainable, responsible and high-quality tourism;
- simulate competitiveness in the European tourism sector;
- maximise the potential of EU financial policies and instruments for developing high quality destinations; tourism.

Under these priority areas, the Commission foresaw a number of actions. In the area of competitiveness, it proposed, for example, to develop innovation and the use of information and communication technologies, improve professional skills and encourage the extension of the tourist season (e.g. by coordinating school holidays). In the area of sustainable, responsible and high-quality tourism, the Commission proposed to monitor sustainable management of tourism destinations and protect the heritage of tourism destinations. The Commission aimed also to strengthen EU cooperation with emerging countries and Mediterranean countries. In order to consolidate the image and profile of Europe, the Commission proposed to create a 'Europe brand' which could help European destinations to stand out when compared to other international tourist destinations. Lastly, the Commission stated its intention to ensure better integration of tourism in other EU policies and to maximise the potential of EU financial support instruments and programmes in favour of tourism. and cultural regional features. So far the institutions of the macro-region offered the projects, which are being developed, in particular the Baltic sea region: contemporary architecture and design, "iron curtain" path; older kings roads from Stockholm to St.Petersburg.

2.3. Socio-cultural project development centre (SCPDC)

Accordingly SPbGIC SCPDC takes as a basis the principals of global approach, consistency and historicity of cultural routes. SCPDC is a research and creative laboratory for which the European project is a journey through territorial and conceptual boundaries. In 2016 SCPDC got in touch with the European research project in cooperation with the European Institute of Cultural Routes European Information network. It is important for establishing institutional communication between research groups from different countries and regions.

2.4. Phenomenon of the interest growth to the cultural heritage

There are important changes in the cultural heritage policies that are taking place in Russia at both regional and national levels. It is becoming clear that the cultural heritage and its preservation are among the most priority resources for sustainable development. Much work has recently been done in St. Petersburg to promote cultural tourism and cultural routes integrated into the pan-European system. Its special role is connected with investment attraction, contributing to the regions development, cultural heritage conservation-restoration, workplaces availability. Along with those facts cultural tourism unites peoples, secures intercultural dialogue, shapes international communication, which, we think, is a more efficient mechanism for intercultural and interconfessional integration than contemporary version of European politics of tolerance and multiculturalism (Devel & Lisitsyn 2017). Domestic cultural tourism percentage growth equals 40% of tourism in general. Now we have a term “cultural line” : a lot of people got interested in cultural heritage. “Vizantine across centuries” exhibition in the Hermitage, for example was attended by 500’000 visitors.



Figure 2 – lining up to the Russian museum to see Ivan K. Aivazovsky (Russian artist, 1817-1900) in St.Petersburg

2.6. “Silver necklace of Russia”

Today 31 cultural routes, being of European format, have been structured within the territory of the Russian Federation. Russia together with the Council of Europe takes part in certifying them. Famous routes set called “Silver Necklace” consists of a complex of trails and covers 11 regions of north-west Russia: Republic of Komi and Karelia, St. Petersburg, Leningrad, Arkhangelsk, Vologda, Kaliningrad, Murmansk, Pskov, Novgorod Oblast and Nenets Autonomous Okrug. It has been recently presented in London, at the VI St.Petersburg International Cultural Forum in 2017 (33’000 participants) (St.Petersburg 2017), in Rome in February 2018.

2.7. “Silver necklace of LenOblast”



Figure 3 – Vyborg medieval castle (1293) knight fights performance on a island Linnan-Saari off the Baltic coast



Figure 4 – The burial mound (VIII-X archeology monument) of Prophetic Oleg in Old Ladoga – ancient capital of Rus.



Figure 5 – Russian Orthodox Tikhvin Assumption monastery-fortress (1560)



Figure 6 – Dressing Room for Count Orlov, a favourite of Catherinell in Great Gatchina Palace (1766–1781)

One of the routes goes through Saint-Petersburg and Leningrad Oblast/(LenOblast). SPbGIC, the authorities of Saint-Petersburg and LenoOblast and in particular Lenoblast Committee on tourism take part in working out “Silver Necklace LenOblast” – the local variety of the mentioned above. “Silver necklace Lenoblast” consists of the set of 10 topical interregional heritage travel routes including UNESCO and other monuments and sites (historical, cultural, natural), special objects representing centuries long history of Russia starting from ancient Rus till contemporary times, palaces and cultural landscapes, samples of wooden architecture, nobility estates, middle ages fortresses and temples etc. (10 routes... 2018) 3,5 mln tourists visited LenOblast travel routes in 2017. In LenOblast one can find unknown wildlife places, sacred places, Imperial road, Russian North-Western fortifications, ‘Life road’, military honor towns. On the basis of the above quoted routes further work is carried out. New routes are : Peter’s towns, ethnominorities cultural heritage route (Visit to the Veps), creative project “Kaikino 10” (Contemporary Culture and Art Centre), “Tikhvin – the town of music and fairy tales”, gastronomy tour “Russian cuisine in tsarist chamber and in peasant hut” and so on. Some of them go up to Finland, identifying intercultural dialogue.



Figure 7 – LenOblast /Leningrad Oblast/
Leningradskaya Oblast on a bigger picture (on the left)



Figure 8 - LenOblast on the map of Russia (see in red; 84,500 km²)

Conclusions

Obviously facing facts and figures one can conclude that St.Petersburg is going to stay on top place of the list of one of the most visited places. SPbGIC socio-cultural project development centre has promising future. There are good perspectives for cooperation with more European institutions and to develop more cultural historic routes within the framework of “Silver necklace of LenOblast”. Surely in one small paper we cannot give details like tourist profiles and behaviour, or any others unfortunately. Hopefully here it is shown that the development of such routes requires both management aspect, covering the methodology of the routes working out, and administration technology and it means to manage facing challenges.

Acknowledgments

Our thanks to Paulo Del Bianco who visited SPbGIC last November 2017, had talks on the cultural heritage with the SPbGIC people and also spoke at the section of Tourism at the VIth Saint-Petersburg International Cultural Forum.

Special thanks to SPbGIC Rector A.S. Turgaev for the support of the given work.

References

Paolo Del Bianco (2011) *Cultural Heritage for Intercultural Dialogue with Life beyond Tourism®* in “The Image of Heritage. Changing Perception, Permanent Responsibilities”, Proceedings of the International Conference of the ICOMOS International Scientific Committee for the Theory and Philosophy of Conservation and Restoration (6-8 March 2009 Florence, Italy), ed. by Tomaszewsky, Polistampa, 2011, pp.37.

Juul M. (2015) *European Union Strategy In-Depth Analysis*. In *Tourism and European Union. Recent trends and Policy Developments*. EPRS - European Parliamentary Research Service. European Council. 2015. P. 16. [Electronic resource]. URL: [http://www.europarl.europa.eu/RegData/etudes/IDAN/2015/568343/EPRS_IDA\(2015\)568343_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/IDAN/2015/568343/EPRS_IDA(2015)568343_EN.pdf) (18.02.18)

World Travel & Tourism Council. *Declaration for the International Year of Sustainable Tourism for Development 2017*[electronic resource] URL: <https://www.wttc.org/advocacy/declaration-for-the-international-year-of-sustainable-tourism-for-development-2017/> (19.02.2018)

Devel L.A., Lisitsyn P.G. (2017) *November, 2018 Florentine Mosaic Conference, Efficient Youth Intercultural Dialogue Workshop, Saint-Petersburg International Cultural Forum to the Benefit of the Planet We All Share* in *Centro congressi al duomo*. Firenze. Fondazione Romualdo Del Bianco. 2017. P. 86.

10 tourist routes of “Russian Necklace LenOblast ” (2018) [Electronic resource]. URL: <https://ivbg.ru/7869270-serebry-anoe-ozherele-rossii-popolnilos-marshrutami-iz-lenoblasti.html> (18.02.2018)

St.Petersburg International cultural Forum (2017) [Electronic resource]. URL: <http://www.visit-petersburg.ru/en/event/3136/>

CULTURAL HERITAGE OF RUSTAVI MUNICIPALITY AS MEANS OF CREATING THE CONCEPT OF TOURISTICALLY ATTRACTIVE AND SMART CITY

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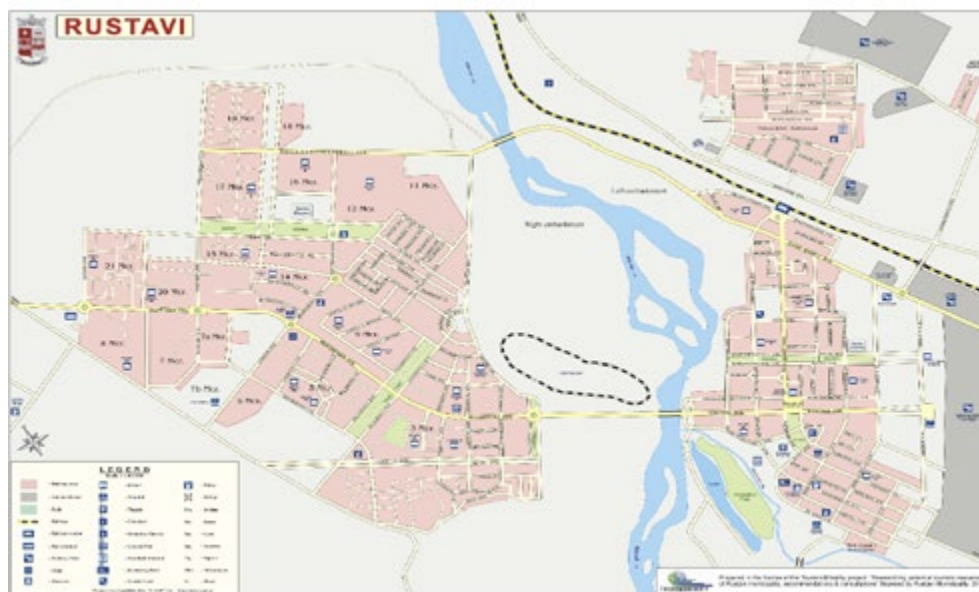
Abstract

The article is about the research results of the project implemented in Rustavi in 2017. The history of Rustavi municipality covers two stages: an Early history from ancient times until the city was destroyed and modern from the Soviet era up to a present. A new city was developed after the World War II with the establishment of a large iron and steel works that supplied rolled steel to the entire Transcaucasus region, which still is a key challenge for Rustavians. Archaeological excavations in Rustavi had started in 1944. The number of imported production proves that Rustavi was closely linked to the important trade route that connected Tbilisi to Iran. Despite the interesting history and valuable cultural heritage, Rustavi has never been a target for travel agencies in order to be involved in tours. Due to the problems raised and cause of the challenges the project was set up. The study was aimed at identifying tourism potential resources, creating a database, promoting tourism products and positioning Rustavi as a touristically attractive destination.

Keywords: Rustavi, cultural heritage, tourism, tours

1. Introduction

1.1. Brief Overview (Rustavi Municipality)



Source: www.tourismreality.ge

Rustavi is the administrative unit of Kvemo Kartli region in the Republic of Georgia. Its total area is 73,6 km², population 126 300 (2017). The river Mtkvari divides the city into 2 parts (Right and left banks, old and new Rustavi). The international highway S4, also known as „Tbilisi Red Bridge” is one of the major roads that pass through Rustavi and coincides the European highway E60, 28km (Former silk road). The history of Rustavi municipality covers two stages: an Early history from ancient times until the city was destroyed and modern from the Soviet era up to a present.

In the period of establishment of the Kingdom of Kartli (BC IV-III cc) Rustavi was known as a „Bostan” city („Vostan” in Persian: a Royal Hall). An irrigation canal streaming from the river Mtkvari was built in the second half of the 4th century. Cause of the fact they consider that the name of the city is derived from the Georgian word „Ru”(An outfall of a stream).

Archeological excavations in Rustavi started in 1944, the exponents (Artificial ceramics, glassware, coins and etc.) are a con-

firmation of city's strong urban economy. Discoveries of numerous imported production prove that Rustavi was closely linked to the important trade route that connected Tbilisi to Iran.

In 1940, the government of the Soviet Union decided to build a metallurgical plant in the town of Rustavi. This decision was based upon the presence of raw materials in the region.

2.2. The aim and stages of the study

The research project: „Tourism potential resources of Rustavi municipality, recommendations, and services” (Supported by Rustavi Municipality and implemented by the LNGO, **Tourism & Reality**) was aimed at researching less-known/less investigated touristic destinations (Cultural heritage) and promoting them as preconditions for creating the concept of a touristically attractive and smart city.

The study covered 3 stages:

Stage I. Collecting and analyzing the data gained

Stage II. Working out tourism products for travel agencies

Stage III. Training/workshop sessions and field visits for target beneficiaries.

The methodology used: selecting data (Telephone interviews, face to face meetings, surveys/questionnaires, snowball method for identifying target figures, SWOT analyze).

2.3. SWOT Analyze (Rustavi Municipality)

Strength	Weakness
<ul style="list-style-type: none"> • Support of local state authorities - encouraging new initiatives, attracting investments/funds • Geographical location • Rustavi Diocese- churches/temples/chapels • Archeological monuments (fortress and etc.) • Culture and recreation park, artificial lake, amphitheater • Rustavi Historical Museum • Architectural buildings • Cultural heritage (Arts, traditions) • German culture and heritage • Soviet ology (Soviet culture and heritage) • Rustavi auto market • Proximity - Tbilisi International Airport (20km) and borders of Armenia/Azerbaijan • Railway station • Community (Multinational population) 	<ul style="list-style-type: none"> • Imperfect and not well-planned tourism development strategy • Inadequate tourism infrastructure (Hotels, roads and etc.) • Informational vacuum • Language barrier • Low level of service • No marking signs in touristic areas and destinations • No access for individuals with disabilities • The lack of advertising and PR campaigns focused on potential touristic resources • Lack of vocational schools • Less number of travel agencies and low interest and motivation to involve Rustavi in tours • Less motivated young generation

Opportunities

- Development of a long-term strategy and an action plan for tourism development
- Improving touristic infrastructure
- Improvement of service
- Attracting investors
- Increasing the flows of visitors
- Developing joint tourism projects and programs with neighborhood countries.
- Involvement of local population in small businesses. Training and workshop opportunities
- Strengthening community participation and volunteerism
- To rehabilitate recreational areas (Squares, parks and etc.)
- To conserve historical and cultural monuments (Restoration of Rustavi fortress)
- To place road marks, street names in Georgian and English languages
- Raising public awareness
- Establishing a tourist center
- To celebrate special occasions: traditional fests, sports' competitions, festivals, fairs and etc.
- To stimulate souvenir production businesses
- To establish tourism vocational schools
- To identify, award and encourage the best individuals or companies/organizations working in tourism field
- PR company

Threats

- Unstable (economic, political) environment
- Insufficient investments
- Passive attitude from the government side
- Less interest from the local population
- Monopoly took by large companies
- Migration- young generations' outflow
- Fewer employment opportunities
- Deterioration of ecological environment

On the bases of SWOT analyze we were able to have a full-circle list of advantages and disadvantages that Rustavi faces or faced in the tourism field, accordingly it was easier to predict the main challenges and determine the ways for further solution.

4. Activities according to stages

The database in Georgian and English languages including information about hotels, travel agencies, cultural heritage sites, architectural buildings, vocational schools, higher institutions, galleries, clubs together with a photo and video materials were prepared and disseminated via websites and social networks. With the help of the data gained 1 or 2-day tours were worked out. Specifically, the focus was on those exclusive, niche products that have never been studied or offered as tourism products. The leaflets and flyers were designed and distributed at schools and universities (See the picture #1).



Figure 1

The national fest: "Rustavkalakoba" is annually celebrated in Rustavi. September 16, 2017, was neither an exception. The event was opened with the official meeting of delegates from Rustavi twin cities (The Ukraine, Poland, Azerbaijan, Lithuania, Philippines). Rustavi history museum hosted the Expo of Rustavi cultural heritage. Tourism organizations functioning in Rustavi had a chance to display tourism products and services, there were represented 10 companies: Logistic company-GN logistic, Travel agency, "Wind tour", multi-profile company "Wind life", Rustavi teaching University, restaurant "Samefo". Hotel "Prestige", supermarket "Bostankalaki", Qeti's art studio", Rustavi dancing ensemble "Kavkasioni", and florist's "Ninka". Company heads and representatives were able to share ideas and meet foreign delegates. The day was followed by a tour in Bolnisi: "Katerinenfeld – German culture and heritage".

The final stage of the project implied training/workshop sessions for direct beneficiaries, who were able to get basic knowledge about the ABC in tourism business and guides' functions. Project writing workshop availability was the chance to gain more skills and be able to create startup projects in tourism field in future (See the table #1)

Direct beneficiaries - Table #1

Training/workshop	City/ region	Direct BNFs	Organizations	Men	Women	Age
ABC in Tourism Business	Rustavi (Kvemo Kartli)	16	Hotel, Rustavi" staff members, Wind tour" director, GN logistics office manager, Rustavi Teaching University tourism club director and the dean of the tourism school	9	7	28-55
Art of Guide (Functions)		27	Representatives of Rustavi municipality	6	20	25-50
Project writing		10	Representatives of Rustavi municipality, hotel, Rustavi" staff members	3	7	30-58

5. Results gained

- One of the best achievements for Rustavi was the opportunity of uploading the data gained on centralized geo-database that is accessible for 70 countries in Georgian, Russian and English Languages. It is an irreplaceable tool – after choosing the desired tour, a visitor is able to follow the route and see geographic, photo and textual information on the interactive map. Information contains details such as necessary attributes, condition of roads, touristic objects and their history (www.travelgis.ge).
- The Facebook page "Cultural heritage of Rustavi municipality" was created, research results (photo and video materials) were uploaded, link was shared <https://www.facebook.com/Cultural-Heritage-of-Rustavi-Municipality422359584832262/>
- The event, "Rustavkalakoba" was nominated for the award category: "The best festival or event award 2017" that is opened annually by Welcome to Georgia! National Tourism Awards, supported by a government of the Republic of Georgia and private businesses. National Tourism Administration of Georgia was a co-organizer of this project, the Ministry of Economics and Sustainable Development of Georgia and Tbilisi City Hall were Official Supporters.
- Info tours were organized for tourism school students.
- Report on study results was prepared and disseminated among interested parties.

Conclusion

In order to gain and maintain the image on tourism market, local authority representatives of Rustavi municipality should do their best to preserve the valuable cultural heritage and strengthen the idea that Rustavi very peculiar with its old and new history (Historical town is a good scenography for touristic offers) requires to be managed properly and promoted worldwide. Tourism development strategy and well-developed policy automatically will guarantee the success. The synergy between local, state and private entities must be reinforced. Niche products of Rustavi municipality will foster the awareness of spirit of places (destinations and attractions).

Acknowledgement

The authors thank authorities of Rustavi municipality (Rustavi historical museum) for the financial support provided, also express gratitude towards tourism certificate course students of European University and tourism school (Bachelor) students of the University of Georgia who were eager to be involved in the study process voluntarily. Special thanks to companies participating in Tourism Expo and LNGO Tourism&Reality staff members for their invaluable contribution.

References

T. Akubardia, N. Archvadze, N. Karalashvili, M. Vardoshvili, T. Bliadze „City Rustavi, Rustavi Municipality, Kvemo Kartli”, Tbilisi, Georgia, 2017, pp3-198

N. Pachikashvili, “Ancient Rustavi”, Tbilisi, Georgia, 2015 pp3-184

“Kvemo Kartli touristic potential”, NELP Kvemo Kartli Inter-ethnic unity, Bolnisi, Georgia, 2017, pp 2-20

Eka Devidze, Lali Mikeladze, the article: „Increasing the flows of tourists and support to tourism development in Bolnisi and Rustavi municipalities through German culture and heritage promotion, as niche products”, International journal of arts and sciences, IJAS academic conference, Freiburg, Germany, 2017

www.economy.ge

www.tourismreality.ge

www.rustavi.gov.ge

www.georgianmuseums.ge

www.rustavimuseum.wordpress.com/home

www.gnta.ge

www.travelgis.ge

www.travelingeorgia.ge

www.klio.ge

“THE HOLY PLACES OF UNDIVIDED CHRISTIANITY” ROUTE CONCEPT (WITHIN THE FRAMEWORK OF THE CULTURAL ROUTES OF THE COUNCIL OF EUROPE PROGRAM)

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Abstract

The article describes the concept of the Route “The Holy Places of Undivided Christianity”, its objects and ideas for its practical implementation. The Route is supposed to attract the attention of Christians as well as the representatives of other religions and people who do not identify themselves with any religious tradition. The objects of the Route are located not only in Russia, but also in such European countries as Austria, Serbia, Croatia etc.

Keywords: cultural route, Christianity, Europe, Russia, route

1. Relevance

The split of the Christian Church into the Eastern and Western branches, which occurred in 1054, became a turning point in the history of humanity. The issue of rapprochement and, in the long view, re-establishment of union between the Orthodox Christians and Catholics has been discussed for centuries. On the part of the Eastern Christianity (the Orthodox ecumene comprises 15 Local Churches which have different administrative centers, but share the same doctrine) the leading position is occupied by the Russian Orthodox Church – the largest and the most powerful among the “sisterly churches”. In contrast to a number of other Orthodox Churches, the Moscow Patriarchate approached the Roman-Catholic Church with great caution. Realistic conditions for the first meeting of the Primates of the largest Christian churches – the Pope and the Patriarch of Moscow and All Russia – emerged only in the mid-1990s. Many believers, experts and mass media have been waiting for this meeting for more than 20 years.

The historic talks between the Pope Francis and Patriarch Kirill which took place in Havana (Cuba) in February 2016 drew worldwide attention. After the meeting behind closed doors the leaders publicly signed a Joint declaration summarizing the issues which the Roman-Catholic and the Russian Orthodox Church are ready to agree upon. Section 16 says: “The process of European integration, which began after centuries of blood-soaked conflicts, was welcomed by many with hope, as a guarantee of peace and security. Nonetheless, we invite vigilance against an integration that is devoid of respect for religious identities. While remaining open to the contribution of other religions to our civilization, it is our conviction that Europe must remain faithful to its Christian roots. We call upon Christians of Eastern and Western Europe to unite in their shared witness to Christ and the Gospel, so that Europe may preserve its soul, shaped by two thousand years of Christian tradition.”

The meeting of Pope Francis and Patriarch Kirill has propelled the discussion of inter-Christian rapprochement to the new level. Given the complicated international environment (tensions in Russian-European relations, Brexit and other crisis phenomena in the EU, conflicts in the Middle East affecting Christians), religions factor and cooperation of Christians of different faiths become particularly important. It is obvious that Christianity in Europe has always been the basis for nurturing culture, forming concepts of social and civil structures and national mentality.

2. Potential audience

There are 1,25 billion of Catholics and 225 million of Orthodox today. The majority of them are living in Europe. There is a huge number of temples and monasteries there, that contain the Christian saints relics, which are common for all the Christians, who lived before the Great Schism in 1054. In addition numerous temples and monasteries are named after these saints. Today pilgrimage remains one of the largest touristic directions. It suffices to recall the excitement caused by the particles of the relics of Saint Nicholas, which were brought to Moscow and Saint Petersburg, as he is one of the most famous and revered Christian saint. For the first time in 930 years the relics left the Italian city of Bari. More than 2 million people came to bow to them in Russia.

It is important to mention that the Holy places in question have not only religious but also cultural, historical and aesthetic interest. They attract the attention of Christians as well as the representatives of other religions and people who do not identify themselves with any religious tradition.

3. Description of the objects

Up to this moment Austria, Bosnia and Herzegovina, Bulgaria, Vatican, Greece, Macedonia, Russia, Serbia, Slovakia, Slovenia, Turkey, Croatia and the Czech Republic have expressed their willingness to participate in the Route. Undoubtedly we do not see the Route without the participation of Italy and we hope we could agree on the inclusion of Italian touristic objects in the Route as well.

One of the Italian objects that presents a particular interest for us is The Chapel of the Holy Shroud in Turin which is an astonishing construction, a major monument of Italian Baroque architecture and its architect – Guarino Guarini – is among the great figures of the Italian Seicento, together with Bernini and Borromini. Not only is it an architectural treasure, but also a home for the Shroud of Turin, a length of linen cloth bearing the image of a man who is alleged to be Jesus of Nazareth. It measures 442 cm long by 113 cm high plus a 8 cm strip sewed lengthwise. On the tissue there is a faint impression of an image, the frontal and dorsal one of a man who suffered the death of crucifixion.



Figure 1 – The image of the Shroud of Turin, Turin, Italy

Another Italian object we find a particular interest in is Basilica della Santa Casa or the Basilica of the Holy House in the town of Loreto, Italy. As Pope John Paul put it “The Loreto Holy House is the first Sanctuary of International importance dedicated to the Virgin and the true Marian heart of Christianity”. On the basis of a former ancient tradition and latter historical and archeological researches, it is confirmed indeed that the Loreto Sanctuary keeps the Nazarene House of Mary. When in 1291 the crusaders were driven out from Palestine, the walls of the house of Mary were brought first to Illyria (to Tersatto, the present Croatia) and then to Loreto (10 December 1294). The Holy House in its original core is composed only by three walls.



Figure 2 –The image of the Basilica of the Holy House, Loreto, Italy

It is impossible to speak of Italy without speaking about its beautiful capital city of Rome. It contains many architectural and religious treasures. For instance, in its catacombs the early Christians buried their Christian brothers and sisters. The catacombs were a safe place, where the pagans could not vandalize the tombs, and the Christians could act their rituals and have a protected gathering place.



Figure 3 –The image of Roman Catacombs, Rome, Italy

As for the Russian objects, we selected the Kiy Cross of Patriarch Nikon. In memory of his miraculous saving Nikon found the Cross Monastery on the Kiy-Island (in the 17th century)-one of the three monasteries, founded by his personal initiative and being a symbol of his power and the place where the church reform began. The most revered relic of the monastery was the "Kiy Cross", made of cypress by Nikon's order. The Cross was to be equal to the size of the Cross of the Crucifixion, containing 300 different shrines.

Another object that has been selected is The Holy Dormition Pskovo-Pechersky Monastery, which is one of the largest and most famous monasteries in Russia with a long history. It is one of the most valuable and interesting historical and architectural complexes in the country. It is located on the south-eastern outskirts of the town of Pechora in the Pskov region, near the border with Estonia.

There are ten churches in the monastery. It is in the oldest gold-domed Dormition church that one can see and venerate the miracle-working icon of the Dormition of the Most Pure Mother of God and the relics of the Holy Martyr Cornelius.



Figure 4 – The image of the Cross of Kiy, Kiy-island, Russia

One of the places that is associated with Christianity as well is Greece. Mount Athos commonly referred to in Greek as the "Holy Mountain", which is located there, is an important centre of Eastern Orthodox monasticism. Mount Athos is home to 20 monasteries under the direct jurisdiction of the Ecumenical Patriarch of Constantinople. The Athonite monasteries feature a rich collection of well-preserved artifacts, rare books, ancient documents, and artworks of immense historical value, and Mount Athos has been listed as a World Heritage Site since 1988.



Figure 5 – The image of the Mount Athos, Greece

4. Project implementation

The first stage that is needed to be implemented is scientific research. In order to determine the points of “The Holy places of Undivided Christianity” route and to gather information about them, it is necessary to refer to numerous sources and literature. The fact, that the project will be submitted to The Council of Europe for consideration and certification imposes particular responsibility. Due to that a serious and profound research needs to be conducted. The Library for Foreign Literature, the author and the developer of the route, requires assistance of 4-5 scientific partners.

The following step is the creation of a comprehensive and illustrated catalogue of the points with the description of their historical, cultural and spiritual significance.

The final step is to develop a logically arranged destination visiting plan. The final version of “The Holy places of Undivided Christianity” route will present united spiritual and cultural space of Europe, a solid foundation for preservation of European unity and settlement of international and domestic conflicts.

5. Creation of the catalogue

Based on the materials of the research, the world's first catalog with a detailed description of The Holy Places of Undivided Christianity will be created.

One of the main ideas of the catalogue is interactivity with various platforms. For instance, the traveler wants to book a hotel. Together with the options for choosing a hotel, he is able to see that one of the objects of the route is close to the area he wants to stay in. He can click on the picture and proceed directly to the catalogue.

In the catalogue, the traveler can learn about the history of the place, get all the contact details and information about the hotels, see the remaining points of the route and build their own route using the route designer. The catalogue is supposed to contain built-in media such as video and infographics.

Having built their own route, the travelers will be able to book hotels, tours and other services directly on the catalogue website due to integration with partner services.

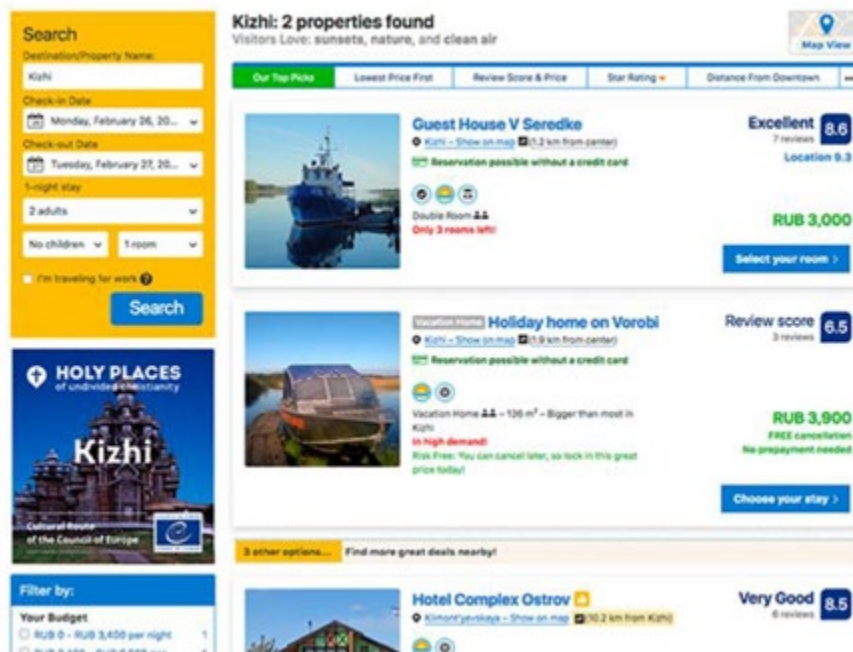


Figure 6 –The image of an example of cross-platform integration of the Route

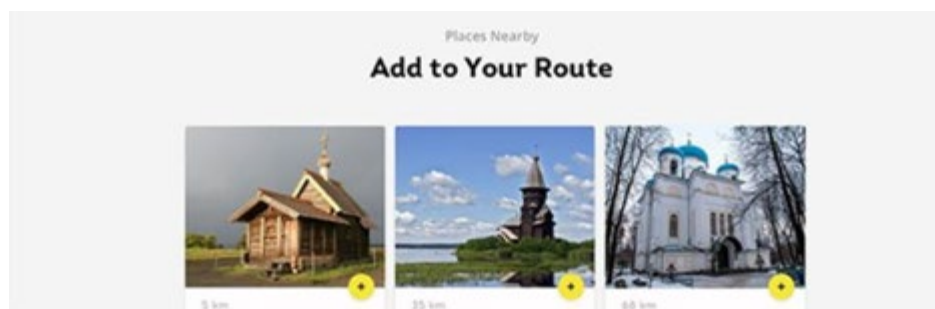


Figure 7 –The image of a concept of interactive catalogue features

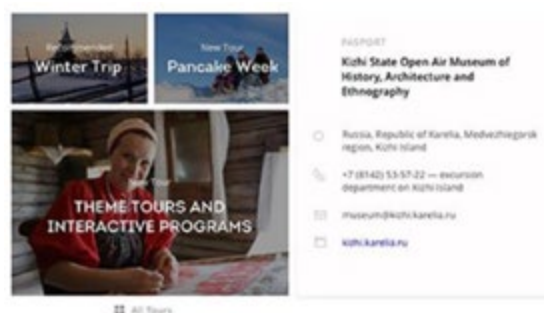




Figure 8 –The image of a concept of Route catalogue website

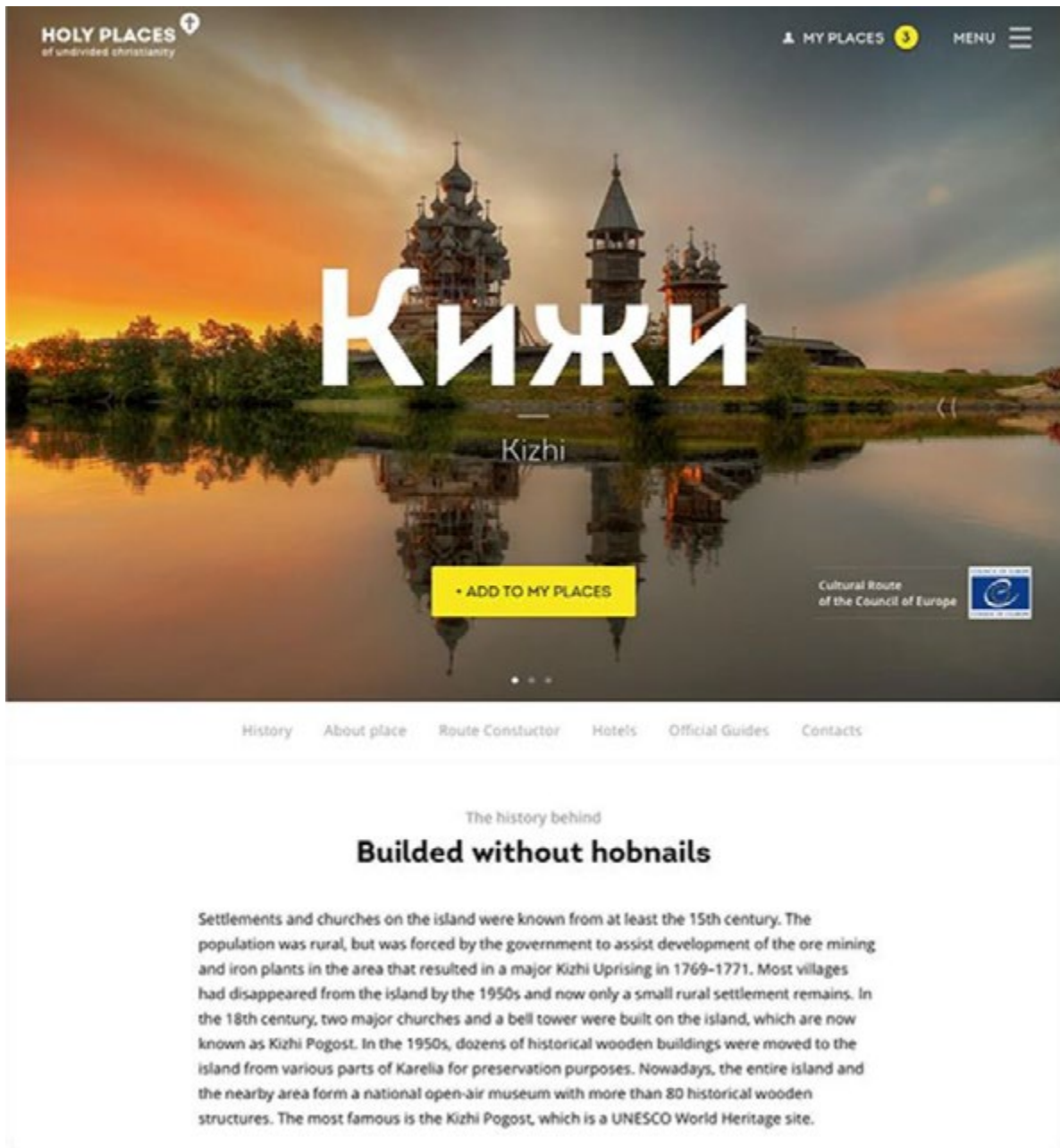


Figure 9 –The image of a concept of Route catalogue website

IVANOVO REGION AS A PEARL OF CENTRAL RUSSIA: TRADITIONAL AND INNOVATIVE TOURISM ROUTES

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Abstract

The article is aimed at disclosing the significance of Ivanovo region as a promising tourist destination in Central Russia. Despite being one of the smallest in the country, Ivanovo region resembles a treasure chest of Russia. It has everything in it – towns of the world-known Golden Ring of Russia, famous Ivanovo chintz, far-famed Palekh lacquer boxes, Shuya harmonicas, picturesque Plyos on the Volga River, etc. Each city, provincial town or small settlement in the rural area has its own myth or is associated with something meaningful to the Russian soul, each one is peculiar in a way and worth visiting. Step by step, all of them retrieve their historical memory and increase tourist popularity. The article describes both traditional and innovative technologies in tourism industry of the region.

Keywords: Ivanovo region, central Russia, Golden Ring of Russia, cultural tourism, ecotourism, agrotourism, event tourism, cruise tourism, sport tourism, folk crafts centres, lacquer miniature painting, folklore festivals

Ivanovo region located in central Russia is one of the smallest Russian regions in terms of its territory. Nevertheless, it does not mean there is nothing to see in it. On the contrary, it has become a busy tourist destination in the past few years. From a historical viewpoint, the region was formed not long ago, in 1918, on the basis of the former Kostroma, Yaroslavl and Vladimir provinces. 2018 is a jubilee year for the region when it celebrates its 100th anniversary.

Local textile factories have always been a hallmark of Ivanovo region. Over a dozen of folk arts and crafts are still found in the region to form the mainstay of ethnographic interest and make up the supply of authentic souvenir products. The region occupies one of the leading positions in central Russia in the development of handicraft industry. Besides world-known lacquer miniatures of Palekh and Kholuy, Ivanovo region is famous for its pattern weaving, hand painting of fabrics, hand embroidery, needle work, jewelry, Shuya squeeze-boxes (harmonicas) and, of course, Ivanovo printed cottons and Russian flax of which local designers make inimitable fashionable clothes with original interpretation of Russian national traditions. Some other folk crafts, such as willow weaving, felt boots making, artistic woodwork, pottery, crocheting, etc. are being revived nowadays.

Tourism is considered one of the most important resources of Ivanovo region development. Special attention of the local government is paid to formation of a unique image of regional tourism, clear segmentation of markets and consumers, and effective management. According to the local Department of culture and tourism, there are 1660 objects of cultural heritage, 384 objects of religious significance, 3 historical settlements of federal significance (the towns of Shuya, Kineshma and Plyos), over 20 state and nearly 100 private museums, 5 tourist information centres and 23 tourist organizations in the region. Natural resources and rich cultural and historical heritage make it possible to develop cultural, experiential, pilgrimage, primary wellness, cruise, sport and ecotourism. Immersion travel that focuses on experiencing a country, city or particular place by connecting to its history, culture, people and food is one of the major market trends in modern regional tourism industry. Event, religious, health and recreation, agro- and gasrotourism are going mainstream as well. Various events for tourists are annually organized in all the municipalities. Thus, the regional event calendar comprises over 70 thematic items throughout the year.

As stated by the analytical agency Turstat (Tourist Statistics), in 2017 the inner tourist flow in Ivanovo region surpassed 1,3 million people. Ivanovo ranks 23rd in the Top 50 of the most popular tourist regions in Russia (<http://turstat.com/travelrussia2017>). The most attended events held in Ivanovo region in 2017 were International fashion festival *Plyos on the Volga. Flax Palette*, interregional festivals of folklore choirs *Volga Dawns* and of folk programmes *June Carrousel*, regional festival *Savior of the Apple Feast Day*, festival-contest of bard singers *Vysokovsky String*, festivals *Podozersk Strawberry* in Komsomolsk and *Bream Day* in Vichuga, folk gastronomic festival *Kukhon* in Yuzha, *Soap Day* in Shuya, harvest festival *Oh, those Onions!* In Lukh, *Tikhonov Trade Fair* in Kineshma and many others.

Ivanovo is included in the world-known tourist route *The Golden Ring of Russia*. In 2017, Russia celebrated the 50th anniversary of this famous tourist brand. The author of the term and the idea of a ring route is a famous journalist, literary man, art expert and honorary member of the All-Russia Association for historical and cultural monuments conservation Yuriy Bychkov. In November 1967, Yuriy Bychkov set on a car journey starting from Moscow to Sergiev Posad, then to Pereslavl Zalessky, Rostov, Yaroslavl, Kostroma, Ivanovo, Suzdal, Vladimir and coming back to Moscow. Thus, he made a kind of ring tour of the ancient towns with inestimable monuments and unique culture. Later on, in December 1967, the newspaper *Soviet Culture* published a series of Bychkov's sketches about Old Russian towns under a general heading *The Golden Ring*. Each sketch was supplied with a map of the route the author had chosen. *The Golden Ring* series was received by public at large as an invitation to travel to the towns of

historical northeastern Russia. This was the start of the presently well-liked tourist trail.

During 50 years of its existence, *The Golden Ring of Russia* has not lost its popularity; quite the opposite, each year it attracts more and more tourists from Russia and other countries. Travelling to the towns of the Golden Ring is the best way to try and find out the traits of the mysterious Russian soul, to learn the pivotal moments of the Russian history and to feel the inimitable lifestyle of the Russian province. The route originally included 8 ancient towns of Vladimir, Ivanovo, Kostroma, Tula, Moscow, Yaroslavl regions, areas that once gave birth to the Russian state. Quite recently, several other towns and settlements were added to the Ring. Over 2 thousand tourist operators include the famous route in their programmes, and almost 18 million people annually take it.

Ivanovo has always been known as a calico capital, textile capital of Russia, Russian or Red Manchester. It is a living monument to the textile, a place where one can trace back the history of flax and cotton cloth production starting from spinning wheels, wooden looms and hand block printing up to automatic multiple shuttle looms. It is here that the first Russian cotton-printing manufactures appeared in the late XVII century. The stats reported that in the Soviet times every fourth metre of printed cotton was produced at the numerous factories and self-contained mills in Ivanovo. As the main employees of the textile industry have always been women, Ivanovo – thanks to some journalist's good grace – started to be called a City of brides.

Ivanovo is a conservancy area for the best samples of the Soviet architecture of the 1930s known as avant-garde and constructivism. Ivanovo guests can get aboard the house-ship or look from above at the house in the shape of a bird with outspread wings; they can see the house-bullet or try their luck touching the house-horseshoe. Industrial architecture is also worth mentioning: several textile factories of pre-revolutionary times are still kept in almost pristine condition. Nearly all the churches and cathedrals in Ivanovo were destroyed in the Soviet times, with only five being preserved as architectural monuments. Some of them date back to the early XIX century; they have been restored to their original form and now function on a regular basis.

Ivanovo views itself as a centre of youth culture. With its seven universities, it is a huge educational hub, a city of students. According to statistics, every fourth citizen is a representative of the younger generation. The total body of students exceeds 40 thousand. Since the region has vast experience in organizing festivals and contests of all levels, including international standing, Ivanovo can easily become a wonderful place to host various international youth forums and develop youth and students travel. The year of 2021, when Ivanovo celebrates its 150th anniversary, will witness a grand International Youth Festival, which will definitely stimulate the youth policy in the region and patriotic upbringing of the younger generation as well as foster international and intercultural dialogue. The general aims of the Festival are claimed to be getting together young talents, leaders and innovators, uniting young people with the help of business initiatives and inventions, searching for global problems solutions. According to the organizers, the Festival participants will have an opportunity to present their own projects in scientific, cultural, sport, mass media, social and other spheres. A whole range of significant projects are to be carried out beforehand, including the Youth Delphic Games to celebrate artistic human diversity. Numerous sites for co-working, creative activity, sport and leisure will have been opened by this time. It is very important that the organizers suggest placing some Festival objects in the historical buildings of the textile factories, which will give the second life to the old architectural monuments.

Nowadays the elaboration of interactive tours for children and teenagers is in the focus of attention of the regional authorities. Natural Science Museum and Educational Center "Litos-CLIO" is a fine example of a cultural institution that meets the requirements. It offers both excursions to watch a unique collection of stones and minerals and a wide range of educational services for young people, schoolchildren particularly. Litos-CLIO Museum has been delighting its visitors for over 20 years already. It started in a faraway 1986, when a club of history lovers was organized by a few local enthusiasts. Having started with an archeological investigation of the region, later they made expeditions to different parts of Russia to find numerous stone artefacts bearing imprints of different historical epochs. 30 operational seasons and over 80 expeditions of the club members resulted in a rich collection worth being called a museum. Now over 20`thousand minerals are displayed in the exhibition halls. Various interactive thematic excursions are offered to the visitors: *Stone in Culture, Art and History; Literature and Stone; Stone: Paints, Medicine, Poisons; Fairy-tales and Stones; History of Geology*, to mention just a few. Professional guides, true lovers of their work, can tell impressive stories of the past and future reflected in stones and minerals. There is a very important thing about Litos-CLIO: many of its educational projects are implemented on a volunteer basis.

As mentioned above, since olden times various folk crafts have been flourishing in Ivanovo region. The two main centres known all over Russia and abroad are Palekh and Kholuy. In ornate Palekh, for centuries, they have been making lacquer-work miniature and black boxes. In serious Kholuy they still keep secrets of local icon painting. Kholuy icon painters have always depicted fair and serene holy faces less strictly than the canons dictate thus making the saints' faces more alive and appealing. Unfortunately, after the Great October revolution of 1917, this kind of art turned out unclaimed and the painters had to switch over to lacquer miniature production. True connoisseurs say that Palekh and Kholuy miniatures differ in as much as ballet and opera do: Palekh miniature is graceful and magical while Kholuy miniature is ceremonial and rich.

In 1959, enthusiasts initiated a State Museum of Kholuy Art. The current collection of 5000 items includes lacquer boxes and panel pictures, ancient icons and handwritten books, house utensils and church plate, unique wooden sculptures of the XVII century, embroidered tablecloths and table napkins, quilt blankets and other objects. Many of the icons bear the authors'

signatures and exact dates, thus making it possible to trace back the history of Kholuy icon painting. It is worth saying that traditional Kholuy embroidery executed in white silk thread over white fabric is no less famous than its lacquer miniatures: there are good reasons why Kholuy mistresses of needlework once embroidered the Kremlin curtains. The subject matters of Kholuy lacquer miniature are quite diverse: they are mostly based on Russian fairy-tales, heroic epic songs and legends, historical events, nature landscapes and peculiar architectural scenery. The museum also contains a working room of a typical Kholuy lacquer miniaturist that reconstructs the whole process of lacquer miniature painting.

Another reason to visit Kholuy is its spring spate. In many travel guidebooks this small settlement is often called Venice of Central Russia. After winter frosts the Teza River divides the settlement into two parts and people have to use boats. Kholuy might not be a very comfort zone to travel to at this time of the year, but it is definitely the most peaceful and picturesque site. The secret of local painters' productivity might be concealed in the fact that people of this backwater district, still unaffected by the civilization, try to keep the inspiring atmosphere of rural colouring.

Academic Palekh, a museum settlement, also enchants its visitors with calm and beauty of the Central Russian landscapes. But what really won it its world-wide glory is the unique icon painting that dates back to the XVI century. Palekh icons are unrivalled for their subtle mode of execution, with egg yolk tempera and gold used in depicting saints' raiment. Long ago, thanks to numerous pedlars Palekh icons spread all over Russia and abroad, to Serbia, Bulgaria, Turkish and Austrian lands. Palekh artisans were also known as experts in monumental fresco painting. They restored magnificent frescos we can see today in the ancient cathedrals of Vladimir and Moscow Kremlin; at the same time, they did not think it contemptible to decorate even the most modest provincial cathedrals in the neighbouring towns. In the Soviet times, icon painting was put under a ban, and painters had to seek for some new ways to expertize their artistic skills. They created a new style of miniature painting on papier-mache distinguished by its fine artistic devices. In the 1920s, the former icon painters organized a cooperative association of ancient painting. They did not give up their usual techniques and kept conventionality of forms typical of icon painting. They painted their miniatures on different objects – boxes, plates, panels, brooches, powder-cases, etc.

In 1935, a State Museum of Palekh Art was opened and now it consists of six different museums – of lacquer miniature, of icon painting, and four historical art studios of Palekh art founders. Local painters were actively involved in the museum formation and contributed their works to the collection. Nowadays it is one of the most impressive museums in Russia. Palekh painters create limited-edition or even unique pieces of art, thus setting these handmade self-contained and inherently valued objects against mass production of goods and souvenirs. Visitors can watch all the stages of a lengthy process of a masterpiece birth – making a papier-mache blank, pressing into shapes, oil bathing, precoating, base lacquering, airtight oven drying, egg tempera paints preparation, hand painting, gilding, polishing gold with a wolf's tooth, clear lacquering, fine polishing by a mechanical wheel covered with velvet and finally by hand. The most inquisitive attendees can try to fulfill some of the operations to understand what a painstaking process lacquer miniature painting is.

Regional tourist routes include not only well-known sites of folk arts and crafts, but also monuments of orthodox culture and places where outstanding people once lived and worked. A famous Russian poet of the Silver Age Konstantin Balmont spent his childhood and youth in Shuya; a genius Russian artist Isaak Levitan deliberately came to Plyos to get inspiration from nature and create his masterpieces; a talented poetess Marina Tsvetaeva lived in Novo-Talitsy; talented architects brothers Vesnins were born in Yurevets, a prominent dramatist Nikolay Ostrovsky had an estate near Kineshma where he liked to rest and write his plays, a celebrated admiral and traveler Gennady Nevelskoy spent his last years in Kineshma area, a distinguished singer Fyodor Shalyapin visited and enjoyed Plyos, a notable scientist Nikolay Bernardos made many of his technical inventions when he lived in Lkh in his mother's old family seat.

A small town of Yurevets is the motherland of the preeminent filmmaker Andrei Tarkovsky hailed by many as the most important director of all time. His *Ivan's Childhood* (1962), *Andrei Rublev* (1966), *Solaris* (1972), *Stalker* (1979) won international acclaim and were awarded top prizes at the world-wide film festivals. It is notable that Andrei Tarkovsky's life was connected with Italy, Florence in particular. He shot a documentary *Voyage in Time* while travelling in Italy in 1979 together with his long-time friend Torino Guerra. Later on, in 1982-1983, with financial support provided by the Italian RAI, he completed the script and shot the film *Nostalgia* in Florence surroundings. There is a plaque on a modest house, 91 Via San Niccolo, in Florence, which reads, "Andrei Tarkovsky, a peerless film director on spiritual themes, an exile in Florence, spent the final years of his life in this house. A`guest and Honourable Citizen of the city of Florence."

In order to continue and develop the traditions of the great Russian director, philosopher and artist, in 2007, Ivanovo regional government set up an annual international film festival "Zerkalo" (Mirror) named after Andrei Tarkovsky. In its ten-year history, the festival found a special place in modern cultural life of Russia. It was attended by many renowned filmmakers from Great Britain, Greece, the US, Poland, Korea, Romania, Slovenia, Iran, Iceland, Finland, Italy, Georgia, France, Croatia, etc. Its eventful programme encompassing over 25`thousand people each year includes an international feature film contest, special screenings, film retrospectives, animation, students' movies, celebrities stakeouts with movie-goers and other activities.

A Museum Centre of Andrei Tarkovsky was opened in Yurevets in 1996 in the house built in the early XX century where Andrei used to live in his childhood. Now there is an architectural composition on the territory of the museum yard comprising a fragment of the destroyed cathedral wall with a face image of Andrei Rublev in its niche and a well as a symbol of sacral

treatment of water in Tarkovsky's films. In 2007, "Zerkalo" Festival participants laid out a garden of apple-trees symbolizing spiritual renewal of Russia. In the same year, a Cultural Centre named after Andrei Tarkovsky was established to commemorate the filmmaker's 75th anniversary. It consists of a small cinema theatre, a multimedia centre, an exposition on Tarkovsky's creative works, a library, and an exhibition of local artists. The centre frequently hosts public meetings with painters, poets, musicians and people of art. The most exciting thing about the centre is that a cinematography school for young people started working there at the initiative of Russian documentary film directors. As to Tarkovsky Museum, along with traditional excursions it offers various quests popular among children and teenagers. Thus, in the form of a game, *Touching the Destiny* quest makes its participants answer various questions on the life of the filmmaker, find exhibits and learn their history, get acquainted with Tarkovsky's biography and masterpieces.

Each municipality of Ivanovo region tries to invent something unique to attract various types of tourists. For instance, hunters can enjoy a weekend tour *Following the Path of the Deerslayer* in Yuzha. Kineshma promotes its own tourist routes: *Orthodox Sanctuaries of Kineshma County*, *The Time of Troubles: from Kineshma to Reshma*, *In the Land of Craftsmen* and *Oh, those Russian felt boots!* In Privolzhsk they offer a tour called *The Pearl* to get acquainted with the jewelry industry and attend a master-class in jewelry making. The secrets of soap-making are unveiled to tourists in Shuya. Many people enjoy event tours, such as *Fish Day* in Yurevets (Yurevets, July 8) or *Help Yourself to Ostretsovo Sandwich* (Rodniki, July 4). Folk festivals are celebrated with much éclat and feasting so that people can taste high quality products from local farmers.

The most ancient and beautiful towns are situated along the Volga River – Kineshma, Yurevets, and Plyos. These unpretentious towns still keep their old merchant buildings of the XIX century, many of which are historical and cultural monuments. Over there, cruise tourism is getting more popular, with navigation open during summer time. At the present moment, the leader of the regional tourist industry is Plyos annually attended by over 120 thousand guests. From the very first minute visitors to Plyos feel as if they had lived there before and had finally returned home. It might be explained by the fact that not once Plyos was depicted in feature films as an ideal Russian provincial place – clean, cozy, modest and trouble-free. There are a lot of museums in the town – of fine arts, of historic government agencies, of an Old Russian family, of wedding, of primeval hunting and fishing, etc. They are of interest to both adults and children as they re-create the pictures of our ancestors' everyday life and do not attack visitors with mere dates and facts. In Kineshma, they have a Museum of felt boots. Some of the exhibits are listed in the Russian Book of Records: a felt boot less than a millimeter high and a huge one over 2,05 metres. There are sequined and bugled felt boots and those decorated with inkle, lace or fur. One can see age-old fulling equipment and attend a master class in felting.

Massive development of tourism industry in Russia resulted in the fact that tourist products adapted to specific needs of the consumers are coming to the fore. Ivanovo region is not an exception and backs the trend. As aviation sport is well developed in the region those who are fond of active leisure time can use the facilities of the sport aerodrome in Ivanovo surroundings. For extreme sports lovers they built a mountain ski and snowboarding resort in Plyos. It has excellent infrastructure facilities, several pistes of various difficulty levels, a funicular and a system of artificial snow-making.

Ivanovo region is abundant in places with unique ecological cleanness. There are some territories where you can drink water right from the river and its cleanness is testified by sanitary and epidemiological authorities. Yuzha district is one of the most promising places for ecotourism development. Having lots of big and small lakes and rivers as well as dense forests, the territory is called Middle Russian Karelia. People from far away come here to go fishing, mushrooming and picking berries. Tourists can stay in guesthouses, enjoying meals of self-made products. Annually thousands of people undergo medical treatment in health and habilitation centres situated in ecologically favourable areas. Medical centres and resorts usually have their own mineral springs which curative effect helps regain strength after a hectic and stressful working season.

One of the self-standing segments of tourism market not yet deservedly recognized in the region is hunting tourism. Hunting in the region is based on natural game resources and a strong hunting culture. The total area of hunting lands in the region is over 20,5 square kilometers. 30 game reserves can boast of valuable harvested species of animals and birds (elks, wild boars, bears, foxes, hares, beavers, grouses, hazel hens, wild ducks and geese, etc.). Forage conditions let it maintain a high density of game animals. In order to realize the touristic potential of Ivanovo region and to use the synergetic effect of the ecotourism development, the local authorities consider it prosperous to create a tourist recreation cluster *Along the Hunters' Paths of Ivanovo Region*. By the end of 2018, three tourist complexes for year-round rest (for both hunters and anglers and outdoor enthusiasts) will have been built with private investors' financial support. These complexes will have all the necessary infrastructure for hunting and fishing – a machinery park, hiking outfit and gear, rangers' services, organization of various types of hunting (waterfowling, hoofed and fur-bearing animals hunting), taxidermy, dog training, etc. The X-factor of the cluster will be tourist paths with aviaries for interaction with animals, campfire sites and observation decks.

There is now a need to evaluate the sustainability of the hunting tourism sector and its potential in providing a livelihood in the region. Since hunting is a delicate issue and the stakeholders are passionate about their cause, social sustainability of the sector is the key sustainability element in developing the sector. Biological resources set a clear limit to hunting. The hunting tourism sector requires tools to estimate appropriate harvesting levels. Hunting tourism companies need to demonstrate the ecological sustainability of their operations and prepare for population fluctuations. This can be done by monitoring the game populations and acquiring up-to-date information about population levels.

The future agrotourist cluster in Gavrilov Posad aims at the maintenance of a comfortable infrastructure in the rural areas of Ivanovo region. The project realization will surely counteract demolishing of the institute of farming and agricultural business and contribute to the increase in population employment. The cluster will be located on the territory of 100 hectares and will take advantage of intensively developing agriculture, favourable ecology, water accessibility, woods, vast fields, untouched beauty of the nature to develop high quality tourism with variability of services to offer. There are plans to build a hotel complex, an open-air arena, to open horse-riding routes and bike tracks, to stock a mini dairy, a bakery and a vegetable farm.

For a long time tourists coming to our region could not get a complex information support. That is why several tourist informational centres were established in Ivanovo to provide information and directory services and carry out an active advertising policy. The tourist portal must provide all the necessary facts about the region. It is obvious nowadays that modern tourists never start a trip without searching the Internet for interesting routes to follow and objects to see. Thus, it is necessary to create a comprehensive tourist navigation in the region. All the objects interesting from a tourist's point of view should be specifically marked and grouped in an interactive map.

Much has already been done in Ivanovo region to meet the needs of domestic and inbound tourists; still much more is to be done in years to come. We hope that Ivanovo region will finally become one of the most attractive destinations on the tourist map of Russia.

PROBLEMS OF PRESERVATION OF ARCHITECTURAL HERITAGE AT THE PRESENT STAGE. HISTORICAL SHEKI TOWN OF AZERBAIJAN

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Abstract

Sheki is one of the most picturesque and ancient towns of Azerbaijan with the great number of architectural monuments preserved up to now from different historical stages and concentrated in Architectural- historical Preserve “Yukhary Bash”- “The upper part”. There is certain integrity of the architectural image in Sheki due to the simultaneous construction of the town in the 18-th century. Today, almost all architectural monuments of the Architectural- historical Preserve have been restored and are in use in accordance with the original function or adapted to new ones. Unfortunately, tourism affects the historical part in very strong and tangible way. This article highlight the current situation with the protection of the architectural heritage of the town of Sheki and suggests the ways of preservation of the historical integrity, development of the management plan for Sheki town to stop the negative influence of the tourism on the historical part.

Keywords: historical town regeneration, preservation of the architectural heritage

1. Introduction

Sheki is an ancient town in the North-Western region of Azerbaijan which was rebuilt at a new place after the mud flow of 1772 and preserved its ancient monuments and significant part of planning structure. This town was planned in accordance with the natural and climatic conditions and local topography and urban structure of the town was preserved without substantial changes as it was at the time of its creation.

Sheki is one of the most picturesque and ancient towns of Azerbaijan. It is one of the mostly visited towns in the country because of the great number of architectural monuments preserved up to now from different historical stages. The architectural monuments are deeply traditional for the town (built in the centuries-old local construction techniques) and typical for this period of town development when it was the capital of the first khanate on the territory of Azerbaijan - Sheki khanate. Mostly interesting architectural monuments are placed in Architectural- historical Preserve “Yukhary Bash”- “The upper part”: there are fortress walls, the Palace of Sheki Khans, the House of Shekikhanovs, 5 mosques, 2 separately stand-alone minarets, round temple, 2 caravan-sarays, 3 *hamam*- bath houses, bridges, residential houses, shops, warehouses, mills and etc. The most prominent among them is the Palace of Sheki Khans, which is the brightest example of the local traditional residential architecture.

Despite more than two centuries of the history, numerous political and economic changes, the urban structure of the historical part of Sheki has not changed significantly. There is certain integrity of the architectural image in Sheki due to the simultaneous construction of the town in the 18-th century in the area limited with the mountains. That is why almost all the architectural monuments of Sheki are concentrated on the main arterial road along with the river. The town developed not within the city wall, as it was in Islamic towns but extended along the river because it was limited by the spurs of the Great Caucasus from all sides (*fig.1*).

The climate influenced the shape of the town buildings - due to the abundance of precipitation the roofs were sloped, covered with flat tiles. Such a decision is characteristic not only for residential buildings, but also for mosques, bath-houses, caravan-sarays. One could say that all kinds of public buildings including the mosques primarily bear the imprint of traditional houses. The abundance of rivers has provided local residents with the main building material- cobble-stone and clay for bricks manufacturing. High seismicity of the territory resulted in the need to use more soft brick as seismic belt. Such a combination of the river stones and bricks in the masonry of all the buildings of Sheki creates a special coloring in architecture of the town.



Figure 1 - Panorama of Sheki



Figure 2 - Sheki fortress

2. Architectural monuments of Sheki

Sheki fortress, located in the upper north-eastern part of the town was built in the 18th century (fig.2). One can mention the fortress as the planning center of Sheki. Due to the relief of the fortress area, the outlines of fortified walls are rather cut off. The location of the fortress is favorable not only from a military strategic point of view but also because of the positive microclimate in this part of the town. Following Sheki's joining to Russia, erections inside the fortress were used for the purpose of the military garrison stationed in Sheki. Under the military plan of 1853, there were about 40 multifunctional objects on the territory of the fortress. A palace complex, numerous housing structures, pools, fountains, etc. were integrated into the design. Originally there were various chambers of Khan family members, as well as 9 pools shown in the layout with water pipe lines. Prior to the 20th century, the fortress remained destroyed, but it was restored from 1958 to 1963. There is only the Palace of Shekikhans' with a big park in front of it and few buildings of different purposes preserved up to now [Salamzade A.R., Mamedzade K.M.1987]. Some parts of the fortress were restored recently.

It was the use of local building materials – baked brick and river cobblestone to trim facades, and wider application of wood in the interior that predetermined the architectural-spatial arrangement of *mosques*. The layout of mosques is, most frequently, an elongated rectangular with open gallery or portico, behind which there is a meeting-room divided by stony or wooden pillars to overlap a bigger bay. An important place in the design of cult erections belongs to minarets against the background of abundant verdure of gardens and not high residential houses [Useynov M.A., Bretanitskiy L.S., Salamzadeh A.R. 1963, p. 290]. As a rule, minarets are separately standing erections located on an area, at a distance of 8-15 m from the mosque. However, there are mosques with minarets constituting a major space of the building (Juma mosque). An ornamental design, covering the surface of minarets, imports an inimitable local color. Balconies for muezzins, crowning verticals of minarets, are overlapped by polyhedral wooden roofs on pillars. The design of internal space of cult erections, including Juma-mosque, is meager. Mihrabs, the sole elements of interior décor, bear no imprint of trimming. “*Khan mosque*”, the *central Juma-mosque*, the *mosque of Omar Efendi*, *mosques in Gyshlaq* are bright examples of mosque's architecture of Sheki (fig.3 a,b).



Figure 3a,b - The mosques of Omar Efendi and Gyshlaq in Sheki

Traditionally, a *dwelling house* in Sheki is composed of several rooms stretched along the axis of a balcony (fig.4 a,b). Features of the traditional Sheki house are: Deep “*eyvans*” - verandahs decorated with brick or “*gya*” - stucco and consisting of high sloping roofs supported by columns. Different niches for household goods and the fireplace “*Bukhary*” with finely drawn decorative elements, formed the architecture of interiors. Like dwelling houses of other eastern countries, the Sheki type's facade has always been orientated towards the courtyard. Severe and blind facades, facing the street, have no openings. However, a tendency arose at the end of the 19th century to face main facades towards the street which, finally, resulted in plastic and spatial changes of the surface, modified the layout structure of the town as a whole [Useynov M.A., Bretanitskiy L.S., Salamzadeh A.R. 1963, p. 111]. Houses of Dadanovs, Alidjanbekovs, Zulfugarovs, Farhadbekovs emerged with a local design and composition. Under the effect of decorative elements, patterns and murals having been introduced in the practice of construction, there sprang up erections of semi-palace and palace types, for instance, the house of Shekikhanovs and the Palace of Sheki khans.



Figure 4 a,b - The dwelling houses in Sheki

The house of Shekikhanov's is notable for its decorations, a monument as an intermediate link between dwelling and palace buildings (fig.5 a,b,c). Strongly elongated, the rectangular layout draws a distinction between office premises and residential space. Thus, there are three large halls and two small rooms with stairs on each floor. Facing the street, the facade has no openings at all. Of particular interest is a main facade of the house of Shekikhanovs which look toward the courtyard. Five-part stained out the central axis of the facade. The lower part of the facade is rather modest with all the details having been thoroughly thought out. The artistic value of the house is in the trimming of its inner surfaces. No ornaments are available in the lower floor, while the interior of the second floor is of particular interest. Splendidly painted "bukhary" serves as the central axis of the interior. Symmetrically placed rectangular niches are entirely covered with pictures, depicting heroes of the poems of the greatest Azerbaijani poet Nizami Gyandjevi "Seven beauties", "Leyli and Madjnun", overlapped by stalactites from the top. Note that the stalactite cornice also supports a traditional Sheki shelf "ref", placed above openings and niches. Structurally complex mirror stalactites compose the cornice beneath the ceiling. From an artistic point of view, of interest are small niches "takhcha" with gabled completion, depictions of birds and animals, as well as remaining surfaces of three walls of the hall covered with picturesque ornamental patterns. The fourth, outward wall is covered with *shebeke*.-a geometrical wooden pattern filled by colored glass. A plafond of the hall is richly decorated. A complex stylized pattern depicting verdure and female figures with colored wings is typical for the plafond. Unfortunately incorrect use of the monument at the end of 20th century led to some parts being demolished. This monument was restored in 2013 by specialists from "Azerberpa"- Azerbaijan Scientific Research and Projection Institute under Ministry of Culture and Tourism of Azerbaijan Republic.



Figure 5 a - House of Shekikhanov's. Main facade

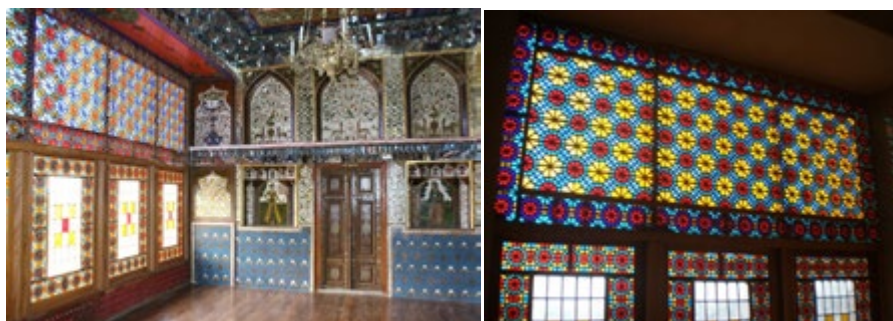


Figure 5 b,c - House of Shekikhanov's. Interior decoration and window filling "shebeke"

Of particular interest among the architectural monuments of Sheki is the *Palace of Sheki khans* (fig.6 a,b,c,d,e). Built in the 18th century in the upper part of the town, the Palace had once been a part of the greater complex. Judging by descriptions of the Russian Major Lisanevich in 1819, the palace once was a vast ensemble, which besides the building of the Palace included many rooms, harem, bath, mosque, cellars, stables, barns and other service premises. Following accession of Sheki to Russia, the facilities located inside the fortress and belonging to the Palace were rebuilt and used for the needs of the military garrison stationed in Sheki. The barracks and prison were located there. At present, just a pool and ancient trees have survived as a part of the complex.

The Palace of Sheki khans is a two-storeyed building facing the south. Layouts of the floors repeat each other, three large premises alternate to rank with antechambers. In all probability, the first floor was designed for official receptions. The second floor was used by khan family members. An eloquent testimony is the lack of internal connection between floors: an outward staircase leads to the second floor.



Figure 6 a,b. - Palace of Sheki khans

The most interesting facade of the Palace is southern. Its design and decorative division are reflective of the internal layout of the building, halls and antechambers. The design of the central part of the facade is an entire vitrification covered with a geometrical wooden pattern “shebeke” filled by colored glass. Each square meter of shebeke is composed of 5,000 elements fastened together with no nails. Thus, a carpet of colored shebeke is used as the southern wall of entrance halls of both floors. The same approach is used in the decoration of lateral halls. Entrances into the first floor are composed of deep portals with mirror stalactite vaults. A distinctive feature is a combination of colored glass shebeke with portals, as well as an all-round ornamentation which covers the remaining surfaces of walls. Of particular interest are interiors of the monument, notable for wall paintings of the 18-19th centuries. There are paintings in the halls of both floors and two side rooms of the second floor. They are scattered on the surfaces of the walls, niches, stalactite passages, plafonds. Note that the plafond of the hall on the first floor is made of wooden elements with geometrical ornament. Among the murals of the Palace of Sheki khans, research indicated a preference to geometrical and pictures of nature, sometimes with depictions of birds. Particularly interesting are paintings depicting various hunting and battle sketches, placed in the hall of the second floor in the form of breeze between niches. Paintings of the Palace of Sheki khans are characterized by richness of colors and particularly, wider use of the gold color. The Palace of Sheki khans has been restored several times; the last restoration operations were done in the beginning of the 21st century (Mammadova G.H., Abdullayev T.A., Hajiyeva S.Kh., Agamaliyeva Y.Ch. 2002).

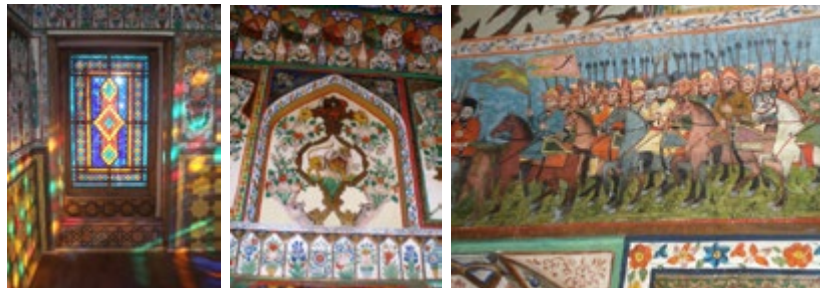


Figure 6 b,c,d - Palace of Sheki khans. Window filling “shebeke”. Interior’s decoration

The fact that Sheki has been the center of handicrafts and trade accounted for a great number of markets and caravansaries here. Like everywhere, the *caravan-saries* of Sheki, designed for sheltering caravans or travelers, were built to comply with their intended use. The general layout is as follows: a well-organized courtyard surrounded by rooms – cells for wayfarers. Located within the bounds of the town, the two caravansaries had, in addition to lodgings for the night, commercial premises as well. At present, just two caravansaries out of five, which were active in the 18-19th centuries, have survived these were the upper and lower caravansarais (fig.7 a,b). Of interest is the fact that the above-mentioned caravanserais of the 18th century, active in Sheki, are largest of the entire territory of Transcaucasia through their layout, dimensions, and conveniences.



Figure 7 a,b - The upper caravanserai in Sheki

Bath-houses of Sheki, like in other Eastern countries, served not only for bathing but also as a meeting place for the residents of the town to discuss the latest news and exchange opinions (fig.8 a,b). Besides, bath-houses were to perform Sharia-stipulated functions, i.e. ritual ablution in specially designed pools. A number of medieval bath-houses still operate in Sheki. A group of

rooms serve as cloak-rooms known as “chol” (“outside”), and another group, consisting of a hall and subsidiary premises, termed “icheri” (“inside”), is designed for bathing. The two types of space are incorporated into a system of subsidiary premises. A cloak-room is supplied with all conveniences, including niches to keep clothes and toilet-bathing articles.



Figure 8 a,b - Bath-houses (hamams) in Sheki

3. Tourism influence on the Sheki preservation

Concentration of the main monuments along one street facilitates the protection of the historical ambience of the town of Sheki. But despite of such an advantageous location the appearance of Sheki was repeatedly changed. The biggest changes was done to monuments inside the fortress walls at the beginning of the 19-th century, after the Sheki Khanate was included into Russian Empire that caused the destruction of buildings belonging to the Sheki khans' Palace complex. Many monuments were restored several times and reused in the 20-th century. The project of a protected zone for Sheki was drawn up in 1990. The project specified several zones such as: a building regulation zone, a protected landscape zone plus others. The main idea of the project was height restriction of new buildings due to the artistic interrelation of silhouettes of the historical and newly constructed buildings. Unfortunately the project was not realized because of unexpected political reasons (change of formation, gaining of independence etc.) and the problems connected to them. However, the project was renewed recently and took into account all modern requirements [Hajiyeva S.X. 2011]. Today, almost all the architectural monuments of the Architectural-historical Preserve have been restored and used in accordance with the original function or adapted to new ones. The widest possible exposure of the monuments and the total prohibition of any new construction in buffer zones were accepted key planning stipulations.

Town is very visited by tourists and that increased the requirements for tourist service facilities. Favorable nature, concentration of multifunctional architectural monuments built in a single traditional style in Sheki, development of crafts and applied arts is a reason for permanent interest to the town. One of the main factors of high interest to the Sheki from tourists is handicrafts preserved up to now. Throughout its history the city of Sheki was one of the largest silkworm breeding, folk art and craft centers in the South Caucasus centers. Currently, employment in these areas also has not lost its significance, although it has smaller volume. Silk breeding has been one of traditional types of employment of population here after the silk was brought from China. Currently there are 1000 employees are continuing to work at the silk factory and they produce the silkworm, silk carpets and fabrics. In the private workshops they sew and paint national shawls - “kelagayi” and scarves that are known not only in Sheki but are appreciated throughout Azerbaijan and are one of the best souvenirs of Azerbaijan.

Unfortunately, tourism affects the historical part of the town in very strong and tangible way. Several hotels were built on the territory of reserved area but they do not meet the shape proportion and architectural solution of the buildings of historical centre. Taking into consideration the urgent need for convenient accommodation for tourists in such a tourist town as Sheki, restoration and adaptation of both preserved caravan-sarays on the trade street in the reserved area “Yukhary Bash” as the hotels should be considered as positive solution. In addition to servicing the guests, there should also be allocated the places for handicraftsmen shops.

The new construction already began to destroy the image of Sheki. Local authorities cannot resist the new construction in the historical area and sometimes do not even understand the real danger of that to the preservation of the monuments. In the result of that historical ambience is destroyed in order to satisfy the tourism market's requirements. One can say that there are no buffer zones for monuments. A very big problem is the fact that despite all prohibitions, a new construction is taking place right in the historic protected area. The biggest change to the historical monuments on the main road should be considered the construction of two new hotels (Fig.9).



Figure 9 - Construction of new hotel in front of upper caravansaray

Due to the lack of appropriate rules of construction in historical area, some new residential buildings do not meet the requirements of the shape, proportion, architectural solution and materials used. Appropriate technical and institutional regulations with regard to the development, approval, coordination of projects and implementation of works related to the reconstruction and building in the historical district are being developed to resolve the problem.

4. Conclusion

The analysis of the above-listed architectural monuments, which form an insignificant part of the architectural heritage of the town infers that throughout its century-long history, the town of Sheki, silkworm breeding and commercial center of Azerbaijan, has not lost ancient traditions of popular construction which found the parallels in numerous public and cult buildings, palace structures and residential houses. Surviving buildings are illustrative of the highest engineering mastery, skillful use of local building materials, and peculiar methods of architectural design.

This ancient land, located in the wonderful region of Azerbaijan, attracting numerous tourists from all over the world, is sure to be inscribed on international tourist itineraries. The main task now is to preserve the historical environment of Sheki, and protect it against any negative effects of contemporary development processes. Thus, our major mission is to preserve century-old architectural-artistic national wealth and pass it over to the future generations. Today the “Azerberpa”- Azerbaijan Scientific Research and Projection Institute under Ministry of Culture and Tourism of Azerbaijan Republic together with the local authorities are working on the Management plan of the preservation of the historical part of Sheki. We do hope that management plan will cover all the problematic situation and in few years all the problems of Sheki historical- architectural preserve will be solved.

References

- Bretanitskiy L.S., Datiyev S.I, Mamikonov L.G, Motis D.A. (1948). *Nuxa (Azerbaijan)-in Russian/ Nukha (Azerbaijan)/* Publishing house of Academy of Architecture of SSSR, Moscow
- Hajiyeva S.X. (2011). *Arxitektura Sheki- Zagatalskoy zoni Azerbajjana. Istoricheskaya levoberejnaya Kavkazskaya Albania- severo-zapadnyy reghion Azerbajjanskloy Respubliki / Architecture of the Sheki- Zagatala district of Azerbaijan. Historical left-side Caucasian Albania- the north-western region of Azerbaijan Republic/* Elm, Baku
- Mamedzade K.M.(1983). *Stroitelnoe iskusstvo Azerbaidjana (in Russian)/ Construction art of Azerbaijan/* Elm, Baku
- Mammadova G.H. (1997) *Kultovoe zodchestvo Kavkazskoy Albanii (in Russian) Cult architecture of Caucasian Albania/* “Elm”, Baku
- Mammadova G.H., Abdullayev T.A., Hajiyeva S.Kh. (2001). *Kish- outstanding monument of Caucasian Albania (in Azeri, English, Russian)/* 21-st century, Baku
- Mammadova G.H., Abdullayev T.A., Hajiyeva S.Kh., Agamaliyeva Y.Ch. (2002). *Architectural monuments of Sheki (in Azeri, English, Russian)/* Chashioglu, Baku
- Salamzade A.R., Mamedzade K.M.(1987). *Arxitekturniye pamyatniki Sheki (in Russian) Architectural monuments of Sheki/* Elm, Baku
- List of monuments of History and Culture of Azerbaijan Republic divided in accordance with their significance, approved by the decree # 132 of Azerbaijan Republic Cabinet of Ministers, 02/08/2001*
- Useynov M.A., Bretanitskiy L.S., Salamzadeh A.R. (1963) *Istoria arxitekturi Azerbajjana (Russian)/ History of Azerbaijan architecture, Nauka, Moscow*
- Fatullayev Sh. (1986) *Gradostroitelstvo I arxitektura Azerbajjana 19-nachala 20 vekov (Russian)/ Town planning and architecture of Azerbaijan of the 19th-early 20th centuries, Stroyizdat, Leningrad*

FLUIDITY, DISPLACEMENT AND HEDONISM: TRAVEL FLOWS AND THE POSITION OF CULTURAL HERITAGE IN CONTEMPORARY DESIGN METHODOLOGIES IN THE CASE OF THE FIRST INDUSTRIAL ZONE IN BELGRADE

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Abstract

The aim of this paper is to present relations between contemporary travel fluidity and the position of cultural heritage, The First industrial zone in Belgrade, as a context for new architectural methods and design principles. The main idea of this paper is to explore the new qualities and potentials of contemporary state, relying on cultural and aesthetic reading of travel fluidity and its spatial perspective in architecture. This paper is based on cultural and aesthetic theories which consider phenomena of dematerialization of physical architectural values into fluid, dynamic, vivid and hedonistic experience effects of contemporary society of consumerism. Position of cultural heritage in contemporary architectural design principles in the unique historical context of Belgrade is presented with the aim to research the relation between cultural values, identities, aesthetic experiences and the new criteria of architectural creation referring to the contemporary phenomena of contextual fluidity.

Keywords: fluidity, travel, heritage

1. Introduction

The main idea of this paper is to research potentials and methods of preservation and improvements of The First industrial zone in Belgrade analyzing the Master graduate projects from University of Belgrade – Faculty of Architecture mentored by assistant professor Nebojša Fotirić and teaching assistant Bojana Jerković-Babović. The aim of this paper is to present the relations contemporary travel fluidity and the position of industrial heritage as a context for new architectural methods and design principles. Contemporary, dynamic context of global networks and consumerism, characterized by constant processes of exchange and changes of material basis of everydayness, problematizes static position of local – cultural heritage. Fluid, variable, intense processes of population travel and mobility through information exchanges phenomena change contemporary urban and architectural aesthetic experience. In this paper fluidity is positioned as the main contemporary conceptual phenomenon, simultaneously causing and manifesting in contemporary transformations of social and spatial conditions into a constant process of interacting flows. Tourism ranks high in world's industry in the contemporary era of globalization, neoliberal capitalism and the society of spectacle, leisure and consumption, where needs for an increased flow of people, money and information transform architectural aesthetic values into relational, intersubjective and communicational experiences. These contemporary contextual phenomena cause specific social and cultural re-fragmentation on the global and local level in fluidity of exchange networks. New global-local relations are manifested through separation of local symbolic meaning, program and new ways of spatial appropriation.

Contemporary individual, living in a constant movement, searches for sensualities outside the utilitarian interests. Therefore, cultural objects and places propose creation of flowing and variable experiences, at the same time autonomous and authentic. Touristic experience, aesthetical itself, perceptual and receptive, opens new possibilities in architectural approach according to requirements and aesthetics of contemporary culture, which transform meaning of architecture into infrastructure of fluid perceptual displacement effects. Accordingly, the idea presented in this paper is to research contemporary concepts and methodologies in architecture that affirm cultural heritage as an integral element and context in the contemporary architectural design.

2. Questioning the position of heritage in contemporary architectural context of dynamic travel flows

The contemporary networked context is characterized by increasing effects of globalization such as transnational, transcultural exchanges and constant flows of money, goods, people, tourists, migrants, information, ideas etc. Technological and cultural changes are simultaneously affected by issues of an increased transportation of population. Transfer and transport networks become the communicative devices of modern life (Castells 2009) Furthermore, cities are consisted of places and flows relations that shape the contemporary everyday experience, increasingly articulated globally and manifested in simultaneous assimilation and transgression of local heritage identities. Relations in the networked context are constructed with both technical and social connections, especially manifested in touristic and transcultural flows. Postmodern socio-spatial context transformed notions of mobility into the new fluidity aspects, manifested in dynamic, flowing, variable and constantly changing experiences of everydayness. Theory of the capitalistic consumer society considers ideas of consumption as a mode of meaning exchange and the act of identity expression (Baudrillard 1996). Therefore, postmodernism invoked the new attention to the tourism and cultural exchange as a mode of perceiving the aesthetical experiences in the state of being in constant travel flow.

Architecture is an expression of lifestyle and spirit of the time and culture in which it arises. More specifically, architectural role

in such context manifests in spatial boundaries dispersion and perceptual transmutation, sensual displacement and hedonistic programs of pleasure. The development of tourism appears as a logical consequence of modern world subject for rest, leisure and recreation by which the consumer culture shapes the modern system of values (Urry 2002). Architecture in tourism becomes a catalyst of cultural constructions of a different world than work and everydayness, in which aesthetic experience are projected through amusement, leisure and hedonism (Michaud 2004). Tourism fulfills aesthetical interest, hedonistic above all, so the tourist is a contemporary individual with an accelerated life, who is in a need to encounter new identities, artistic and cultural elements of exchange (Ibid). Contemporary aesthetic experience of the city proposes modernisation of architectural programs and typologies in inherited and historical spatial contexts, as a result, problematizing position and preservation of a cultural good. These contemporary contextual phenomena cause specific social and cultural re-fragmentation on the global and local level in fluidity of exchange networks. New global-local relations are manifested through separation of local symbolic meaning, program and new ways of spatial appropriation. Architecture in tourism has both the power of attraction itself and contextual experience emphasize. Accordingly, the potentials of architectural design unfold in the creation of experience diversity, with methods of perceptual and contextual assimilation, stratification and assemblage in the process of shaping the unique spatial connections between modern vividness and heritage static position.

3. Post-industrial faze of the First industrial zone in belgrade and its interpretation in contemporary architectural design methodologies

The First industrial zone in Belgrade is the place with the longest continuity of industrial function in Belgrade. Therefore, it enabled expansion of the city along the Danube coast, development of the living areas and Belgrade railway. Existing objects represent continuity of discontinued physical and cultural layers. Accordingly, diversity, inhomogeneity and multiplicity of material testimony of this place represent the specific value of contemporary Belgrade context. Creative potentials of this heritage preservation, affirmation or assimilation in contemporary architectural design methodologies are complex issue, problematizing relations between contemporary dynamic socio-spatial context and static heritage position.

3.1. Historical urban development of The First industrial zone in Belgrade

Historical development of The First industrial zone in Belgrade is characterized by constant transformations of cultural and spatial conditions, creating transit, stratified place with lots of material and nonmaterial traces of colorful and turbulent history. Cultural traces date from prehistoric time. Old roman ceramics and middle age tools indicate early forms of habitation which existed until the Turkish conquests in 16th century (Škalamera and Popović 1978). The main habitation conditions were communication flows and directions that connected this area with Kalemegdan fortress, center of the antic and medieval Belgrade. After Turkish conquest in 16th century this area has been called *Dorćol*, meaning crossroad, as the main transit and commercial zone in Belgrade. Accordingly, in 16th century started increasing development of commercial activities, craftsmanship of the entire city, fish market *Balik Bazaar* and the oldest customs duty (Ibid). Furthermore, after Austro-Hungarian and Turkish wars from 1688 to 1717 the reconstruction of this zone had begun, from its spontaneous, oriental, organic form into western, baroque urban system. Ship traffic had been the most significant factor in this area development (Mihajlov 2011). Occupation shifts, diverse influences, wars and many cultural migrations in Belgrade created continuity of discontinuous cultural layers and developed specific mixtures of formal and functional principles. Belgrade industrialization begun in 19th century with food, textile, wood and chemical factories simultaneously developing with 6km long railway. After First world war Belgrade has changed its border position into the new administrative, cultural, commercial and industrial center. Accordingly, transit, fluid character of this area continued with new meaning and significance. The First industrial zone in Belgrade became the main river traffic zone and railway crossroad. In 1932 The first and biggest power plant *Snaga i svetlost* was built, today in the status of cultural good. During Second world war Belgrade and its industrial zone was destroyed in a large degree. Therefore, after German occupation most of the industrial and cultural heritage had to be renewed and adapted for new socialist regime Yugoslavia had transformed into. New socialism brought the values and belief in progress and industrial growth. Therefore, new facilities, depository and factory complexes were built as well as Port of Belgrade in 1961. (Mihajlov 2011).

The First industrial zone in Belgrade has the longest industrial and transit tradition which conditioned physical, economic and cultural development of Belgrade, especially its riverside, railway network and urban settlements. Today, the First industrial zone has the status of the previous protection according to the Institute for the Protection of Cultural Monuments in Belgrade, while some of the former industrial objects have status of cultural good.

3.2. Current situation: Master Plan of Belgrade to 2021

The Master Plan of Belgrade to 2021 prepared by the Urban Planning Institute of Belgrade was adopted by the Assembly of the City of Belgrade on September 27th, 2003. According to this Plan complete relocation of the industrial and economic activities from this area is planned, with the aim of its complete transformation into commercial activities, housing, public services, public facilities, sports facilities and green areas. Such a situation opens up very complex questions regarding the position of The First industrial zone in contemporary Belgrade visions. Therefore, physical and functional urban changes and contemporary tourism development strategies assume methods of erasure, assimilation or complete transformation of this area. Accordingly, the

aim of this paper is to present research in the field of architectural design throughout creative potentials and methodologies referring both to tourism development and heritage affirmation in architectural design.

3.3. Diploma Master studio projects: University of Belgrade – Faculty of Architecture

The research in this paper is focused on architectural design methodologies at University of Belgrade – Faculty of architecture in diploma Master studio mentored by assistant professor Nebojša Fotirić and teaching assistant Bojana Jerković-Babović. Topic defined as post-industrial faze of the First industrial zone in Belgrade refers to research of the potentials and possibilities in morphological and programmatic shaping of Belgrade riverside questioning the position of industrial heritage. Students were supposed to define individual specific research topics in accordance to contemporary contextual situation. Diploma Master studio is conceived in two parts – theoretical research in Master thesis and architectural-urbanistic design research project.

3.3.1. New models of living in the context of travel fluidity

Master thesis and project titled “Territory of the border” by student Jelena Stojić researches topic of territory autonomy in the city, conceptualizing phenomenon of border gap occurring along former railway corridor. Through several case studies architectural methods are created with the aim of transforming border line into the surface, then into semipermeable volume. Therefore, semipermeable volume connects *Dorćol* housing and Danube riverside. Architectural-urbanistic project integrates transit infrastructure, accommodation and commercial touristic programs into one coherent formal whole. Furthermore, this new border territory becomes autonomous but integrated entity transforming border into connection.



Figure 1 – “Territory of the border”

Master thesis and the project “Neo-colonization of the Port of Belgrade territory – international zone for housing and business”, by student Strahinja Petrović, deals with the contemporary phenomenon of migration of the population, immigrants in Belgrade and issues of identity of the cultural context in the process of constant changes of the place of residence. The context of The First industrial zone in this paper is recognized as the context of a constant transition and explores the phenomena of migration, identification and the spatial phenomena of enclaves, boundaries and colonization. The project encompasses the transit area between Pancevo Bridge and the Port of Belgrade as one of the most important transit zones in Belgrade and foresees a camp for immigrants that will manifest architectural interpretations of the local identity context issues and architecture in the new territory in the process of neo-colonization.



Figure 2 – “Neo-colonization of the Port of Belgrade territory – international zone for housing and business”

3.3.2. Cultural objects and displacement

Master thesis and the project “Non-space mimesis - contextual regeneration of the industrial zone” by student Denis Turanović explores methods and techniques in architecture that formally imitate the quality of abandoned architecture in the area of The First industrial zone in Belgrade. Throughout the theoretical research of mimesis and non-space, the historical and contemporary context is merged into an architectural project that reconstructed and transformed the facility of the *Snaga i svetlost* into a modern church. The exceptional ambient and formal values of the power plant, which are fully preserved in its original form but ambient interpreted and converted into the spiritual program, are recognized in this paper. The methods of imitation of formal elements from the context, accompanying commercial and catering content emphasize the *Snaga i svetlost* visibility and attract visitors.



Figure 3 – “Non-space mimesis - contextual regeneration of the industrial zone”

Master thesis and the project “Museum of ruins - Memorial complex and affirmation of the ruined area of the industrial zone” by student Dušan Kitanović, explores the topic of a contemporary use of ruins and museum programs by problematizing abandoned industrial objects through museum exhibits. The project’s methodology refers to the mapping of abandoned industrial objects and the analysis of their formal qualities that would be exhibited and used in the form of fragments through the unified whole. The system of replicas of historical fragments that become showpiece includes an abandoned power plant *Snaga i svetlost* which appearance and interior space are treated as a museum piece. Facilitating the examination of selected abandoned industrial objects elements of the architecture, such as roofs and structural elements, is the basic method in an innovative approach to the preservation and affirmation of the cultural and industrial heritage.



Figure 4 – “Museum of ruins - Memorial complex and affirmation of the ruined area of the industrial zone”

3.3.3. *Objects of fun and hedonistic experiences*

Master thesis and project titled “Expo – industry of contemporaneity” by student Petar Ječmenica researches the topic of expo centers in contemporary cultural context of amusement, leisure, spectacle and consumption. Through historical research of expo industry development, this project connects all abandoned industrial heritage into one system of expo pavilions and diverse exhibitions critically interpreting contemporary industry of events, effects and touristic spectacle.



Figure 5 – “Expo – industry of contemporaneity”

Master thesis and project titled “Industry of fun – resort in post-industrial zones” by student Luka Kitanović researches topics of hyperreal, allusion, illusion and simulacrum in contemporary culture of travel, consumption and society of spectacle. Furthermore, in this research architectural design methods and technics are created with the aim of designing resort with luxury accommodation and perceptual effects of hedonistic experiences. This research is critically positioned in relation to contemporary phenomena of isolation and alienation, conceptually connected to current character of the zone. This resort is created through recycling of former industrial objects and perceptual illusions of hedonism and luxury.



Figure 4 – “Industry of fun – resort in post-industrial zones”

Conclusions

The main idea of this paper was to present creative potentials of heritage position in contemporary design methodologies in architecture. Vivid history of The First industrial zone in Belgrade represented by complexity and stratification, remained

symbol of the former industry as well as its cultural importance in Belgrade development. Accordingly, issues of preservation, appropriation or transformation of this industrial heritage in contemporary urban development visions remain complex.

According to functional recommendations in The`Master Plan of Belgrade to 2021`and individual creativity in design process students' projects presented in this paper could be divided into three groups: 1. new models of living in socio-spatial context of fluidity, 2. cultural objects and concepts of displacement and 3. objects of fun and hedonistic experiences. Selected diploma Master projects represent diversity of architectural methods and principles in contemporary architectural design throughout architectural methods and creative potentials of assimilation, affirmation, hybridization and critical positioning in relation to contemporary cultural and socio-spatial context.

References

Manuel Castells (2009) *The Rise of The Networked Society, With a New Preface: Volume I: The Information Age: Economy, Society and Culture*, London, John Willey and Sons, 2009;

Jean Baudrillard (1996) *The System of Objects*, translated by James Benedict, London, Verso, 1996;

Yves Michaud (2004) *Umjetnost u plinovitu stanju*, translated by Jagoda Milinković, Zagreb, Ljevak, 2004;

John Urry (2002) *Tourist gaze*, London, SAGE, 2002;

Željko Škalamera, Marko Popović (1978) „Urbani razvoj Dorćola“ in *Godišnjak grada Beograda XXV*, Beograd, Muzej grada Beograda, 1978, pp. 214-218;

Saša Mihajlov (2011) „Nastanak i razvoj industrijske zone na desnoj obali Dunava u Beogradu od kraja 19. do sredine 20.veka“, *Nasleđe XII*, Beograd, Zavod za zaštitu spomenika kulture grada Beograda, 2011, pp. 93;

THE DEVELOPMENT OF “LVIV ARCHITECTURE PROJECT”

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Abstract

The article is dedicated to the «Lviv Architecture» project, organized by the authors of the article in order to popularize the idea of the value of Lviv architecture and the need for its preservation. The aim and tasks of the project are highlighted, the events, carried out within the project, are considered. Besides, we present the concept of creation of the Museum of Architecture and Construction of Lviv named after T. Obmynskyi in cooperation with the Scientific and Technical Library of Lviv Polytechnic National University as a cultural, educational and recreational centre for residents and guests of Lviv.

Keywords: “Lviv Architecture” Project, preservation of historical architecture, Museum of Architecture and Construction of Lviv named after T. Obmynskyi

1. Introduction

Lviv is an ancient Ukrainian city that was the part of the Austro-Hungarian Empire and Poland, and is now the cultural capital of Ukraine. Thanks to the unique architecture of the 13th – the first third of the 20th centuries, located on a picturesque relief, the historical part of Lviv is included in the UNESCO World Heritage List. Nevertheless, the historical architecture of Lviv needs protection. That’s why, the authors created the project “Lviv Architecture”, the main purpose of which is to popularize the value of Lviv historical architecture and the need for its preservation, both among residents and among the guests of Lviv.

2. The Main Theoretical Part

2.1. The tasks and events of “Lviv Architecture” project

Our project covers a variety of topics within the historical architecture of Lviv: the architecture of ensembles and town-planning complexes, urban planning and landscape architecture, the architecture of individual buildings, architectural and artistic details and building materials, the creativity of individual architects, artists, sculptors, and restorers.

Within the project, we conduct weekly events, namely lectures, excursions, sketches and exhibitions for each of these events dedicated to Lviv architecture. Our project attracts more specialists, fans of Lviv and attention of local authorities. Some of the topics raised by us are discussed in the media, and most importantly, more and more Lviv residents expect from us the following interesting events.

The project activities can be found on its facebook page facebook.com/LvivArchitecture. The project “Lviv Architecture” also includes work on the projects “Lviv in Painting”, “Old Lviv Advertising”, “Lviv Sculpture”, “Old Parks and Gardens of Lviv”, “Lviv Museums”, as well as virtual museums of Ivan Levynskyi, Tadeush Obmynskyi, Ivan Dolynskyi and Art Nouveau Museum.

We started our project on September 2017 and 29 weekly meetings has already been held: 1) Excursion to Ivan Levynskyi’s factory and discussing the possibility of creating a Museum there; 2) Excursion to the “Yulietka” villa history, architecture, study of wooded plants; 3) “Inventory checking” and restoration of floor tiles of the factory of Ivan Levynskyi; 4) Sketches and photographing of the villa on 34 Lysenko Street (by Ivan Levynskyi); 5) Excursion on Lysenko Street. The value of the villa on the 34 Lysenko Street; 6) Excursion to the Segal’s house – the potential Secession (Art Nouveau) Museum; 7) Lecture and discussion “Passage of Mikoljash – History and Perspectives”; 8) Lecture “Life and work of Tadeusz Obmynskyi”; 9) Excursion to the secession buildings with paintings; 10) Lecture “Ivan Levynskyi and his building firm: the chronicle of the 1910s” and ceramic floor tiles exhibitions; 11) Lecture-discussion “Museum of secession - from virtual to real”; 12) Sketches of a unique secession interior with paintings (33, Lysenko St.); 13) Sketches of polychrome in the Dominican monastery; 14) Excursion “Creativity of Ivan Dolynskyi”; 15) Sketches of the Renaissance interior polychromy of the Bandinelli Palace; 16) Excursion “Sanatorium of Kazymyr Soletskyi”; 17) Sketches of classical interiors in the Korniyak palace; 18) Seminar “Preservation of the authenticity of historical Lviv”; 19) Seminar “Julian Zakhariievych Architecture, Design”; 20) Seminar “Preservation of the authenticity of villas and palaces of Lviv”; 21) Summary of the 2017 year. New Year at the Villa-Museum of M. Hrushevskyi; 22) New Year and Christmas sketches at the Museum of M. Hrushevskyi; 23) Walking tour on the Lychakiv cemetery - to the birthday of Lviv restorer Kost Prisyazhnyi; 24) Lecture “Gardens and Parks of Lviv and their Creators K. Bauer, A. Rering”; 25) Lecture and exhibition “Historical brick in the architecture of Lviv: brands and manufacturers”; 26) Lecture and exhibition “Art Déco in Lviv”; 27) Lecture “History of the brick business in Lviv”; 28) Lecture and a surprise “Three romantic stories in Hrushevsky’s house”, “Love in Lviv architecture”; 29) Excursion in the building of the Scientific and Technical Library of Lviv National Polytechnic University. Virtually every one of these events were presented on YouTube, so there is the opportunity to see lectures or go on tours at any time.

Activity of the project “Architecture of Lviv” has the following main functions: 1) educational and popularizing – conducting regular events (lectures, excursions, sketches, exhibitions, workshops, etc.) in order to popularize knowledge on the history of architecture and construction of Lviv; 2) scientific-historical and architectural studies of Lviv architecture; 3) protection of monuments – preparation of documents for registration of buildings in the List of architectural monuments; 4) advertising – the publication of leaflets (and other promotional items) with drawings of Lviv architecture and important information about buildings.

The project “Lviv Architecture” is open to cooperation with scientific, cultural, educational and museum institutions of Lviv. The project found support at the Museum of M. Hrushevskyi in Lviv where three important events were held and at the “Shtuka” Art Cafe where two events were held. The project actively cooperates with the Scientific and Technical Library of Lviv National Polytechnic University, in which nine events were held. The library not only provides a comfortable large room in a historic building in the city centre for events, but also prepares exhibitions for each event of “Lviv Architecture” project, provides informative support (old and modern editions, including rare ones).

2.2. Creation of the Museum of Architecture and Construction of Lviv named after T. Obminskyi

Significant development of the city with the construction of objects in the style of Historicism, Art Nouveau, Art Déco and Functionalism took place in the late nineteenth and first third of the twentieth century. Significant role in this process was played by the architectural school of Lviv Polytechnic, which was formed by Julian Zakhariyevych (its founder and the architect of the main building of the Polytechnic University), Ivan Levynskyi (the godfather of the Lviv construction business), as well as Gustav Bizantz, Tadeusz Obminskyi, Edgar Kovach, Witold Minkiewicz, Eugeniusz Chervinskyi, Ivan Bagenskyi and others.

One of the key figures of the Lviv architectural school is the architect-practitioner, teacher, restorer, researcher, artist Tadeusz Obminsky who actively worked in the late nineteenth – first third of the twentieth century in close connection with leading architects and builders of that time. Being a pupil of Julian Zakhariyevych, Tadeusz Obminsky became the successor of Gustav Bizantz as head of the Department of Construction; he made a significant part of his most important projects in a professional partnership with Ivan Levynsky, and also fruitfully cooperated with the pioneer of reinforced concrete construction Alfred Zakhariyevych (Technological Institute, Chamber of Commerce and Industry). Tadeusz Obminsky should be considered a prominent architect who made the most contribution to the introduction of the style of Secession (Art Nouveau) in the architecture of Lviv in the first decade of the twentieth century by developing a model of the Secession facade (the house of Segal, houses on Bohomoltsia, Pavlova, Kostyushko Street). Based on sketches and research of folk wooden art of the Eastern Galicia Tadeusz Obminskyi played a significant role in creating a typical style of buildings that were home to the most important Ukrainian institutions (“Dnister”, Academic House, and People’s Hotel). T. Obminskyi worked fruitfully in the interwar period, creating projects in particular such prominent objects as the Church of the Our Lady of the Gate of Dawn and the Scientific and Technical Library of Lviv National Polytechnic University. Tadeusz Obminskyi held high executive positions, being a rector and professor of Polytechnic, as well as a Vice-Mayor of Lviv. Tadeusz Obminskyi left a great scientific, architectural and artistic heritage preserved largely.

The creation of Lviv Museum of Architecture and Construction aims primarily at highlighting the creativity of the key figures of the Lviv architectural school, and the figure of Tadeusz Obminskyi, to whom the museum is dedicated, can be considered as the creator of the architectural-stylistic and construction paradigm of Lviv’s architecture of the third part of the twentieth century. The dedication to the museum by T. Obminskyi is also due to the location of the Museum in one of the most prominent buildings under the project of Tadeusz Obminskyi – the Scientific and Technical Library of Lviv Polytechnic National University.

The creation of such a museum is also necessary for the promotion of knowledge about the Lviv architectural school among students and professors of the Polytechnic, as well as Lviv residents and guests of the city. The organization of iconographic and bibliographic material about the Lviv architectural school in one building commemorates the memory of Tadeusz Obminskyi as an outstanding Lviv architect and teacher of Lviv Polytechnic. Such Museum revitalizes the Library, in particular, raising its socio-cultural significance, recreational attraction both among Lviv residents and the tourists, as well as the formation of cultural and educational centre. The foundation of the museum in the Library’s premises transforms it into a creative space for museum activities such as lectures, exhibitions, master classes, studios that can be held not only in the museum’s premises but also in the reading room and hall. The Library in turn will provide information support and will provide scientific advice in accordance with Museum’s activities. The fruitful cooperation of the Scientific and Technical Library of Lviv Polytechnic National University with the project “Lviv Architecture” proved the possibility of such cooperation at a high level. Such a creative symbiosis, focused on communication and the combination of the roles of different institutions, will facilitate the perfect functioning of both institutions with the efficient use of all resources.

The exposition of the museum will be divided into permanent and variable. Materials concerning with the way of life and creativity of leading architects of the Lviv architectural school – Julian Zakhariyevych, Ivan Levynskyi, Tadeusz Obminskyi relate to the permanent exposition, and materials concerning to other architects of the Lviv architectural school relate to the variable exposition.

Both the permanent and variable exposition will contain: 1) iconographic materials (author’s drawings and sketches); 2)

bibliographic materials (author's articles and books, articles about architects in old and contemporary scientific publications, advertising, brochures, booklets and cinema, photo and audio documents); 3) artefacts (architectural and artistic details from Lviv buildings, personal belongings, photocopies, epistolary inheritance, correspondence, memoirs, materials from family archives); 4) subsidiary fund (historical furniture, household and artistic subjects).

Informativity of exposition will be enhanced by modern technical means. So on the touch screen it will be possible to get acquainted with the buildings of leading contemporary architects, including Julian Zakhariyevych, Ivan Levynskiy, Tadeusz Obminskiy on the map of Lviv and the region. Each object will be provided with historical and architectural information, iconographic materials. It will also be possible to circulate in virtual form the scientific literature of the time, advertising, etc. In addition, there will be a projector in the premises, where films about certain architects, architecture of Lviv of this age will be shown and so on.

In aim to increase the attractiveness of the Museum the visitors can create on the touch screen their own facade or interior from the elements of the buildings of the chosen architect, or to draw a picture of a certain architectural detail (ceramic tile, mosaic, stained glass). Therefore the visitors have received a humorous diploma (for example, a student of Y. Zahariyevych, I. Levynskiy, T. Obminskiy). In addition, the visitors can take pictures in hats and dresses of that age in the historic interior. It will be possible to buy souvenirs in the museum (leaflets, booklets, t-shirts, magnets, eco-wallets). The museum will offer workshops for the production of architectural models, stained glass windows, ceramic tiles, etc. Within the museum activity it will be possible to take a course (or separate classes) on architectural sketches, history of architecture and art of Lviv.

3. Conclusions

The project "Lviv Architecture" allows uniting professionals and associates to study the historical architecture of Lviv and popularize the idea of its value and the importance of preservation among residents and guests of the city. Within the project "Lviv Architecture», weekly events are held - tours, lectures, sketches, exhibitions, and in the total number about 30 events were held already (fig. 1-7). The Museum of Architecture and Construction of Lviv named after T. Obminskiy is organized as a creative symbiosis of the project "Lviv Architecture" and the Scientific and Technical Library of Lviv National Polytechnic University, which will enable the creation of a cultural and educational centre with a high recreational attraction both for the residents of Lviv and for tourists.

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References

- Sergii Lieonov & Tetiana Kazantseva. Webpage "Lviv Architecture" (2018) [facebook.com/LvivArchitecture](https://www.facebook.com/LvivArchitecture)
- Sergii Lieonov & Tetiana Kazantseva. Webpage "Lviv in Paintings" (2018) [facebook.com/LvivPaintings](https://www.facebook.com/LvivPaintings)
- Sergii Lieonov & Tetiana Kazantseva. Webpage "Old Lviv Advertising" (2018) [facebook.com/OldLvivAdvertising](https://www.facebook.com/OldLvivAdvertising)
- Roman Metelskyi. Website "Photographs of Old Lviv". Website (2018) <http://photo-lviv.in.ua>
- State Memorial Mykhailo Grushevskiy Museum in Lviv. (2018) Website <http://dmh.lviv.ua>
- Scientific and Technical Library of Lviv National Polytechnic University. Website (2018) <http://library.lp.edu.ua/>



Figure 1 – Photographs of some events of «Lviv Architecture» project: excursions, sketches, floor tiles restoration, lectures, exhibitions. September 2017 – February 2018, 29 events



Figure 2 - Exhibitions of books, artefacts and postcards, which are held in the Scientific and Technical Library of Lviv National Polytechnic University during the events of “Lviv Architecture” project



Figure 3 - The monograph by Tetiana Kazantseva “Polychromy in Lviv Architecture” (2018), in which polychrome techniques, materials and coloured palette with the architects and manufacturers, which used them in Lviv buildings of the 13th – the first third of the 20th centuries were researched

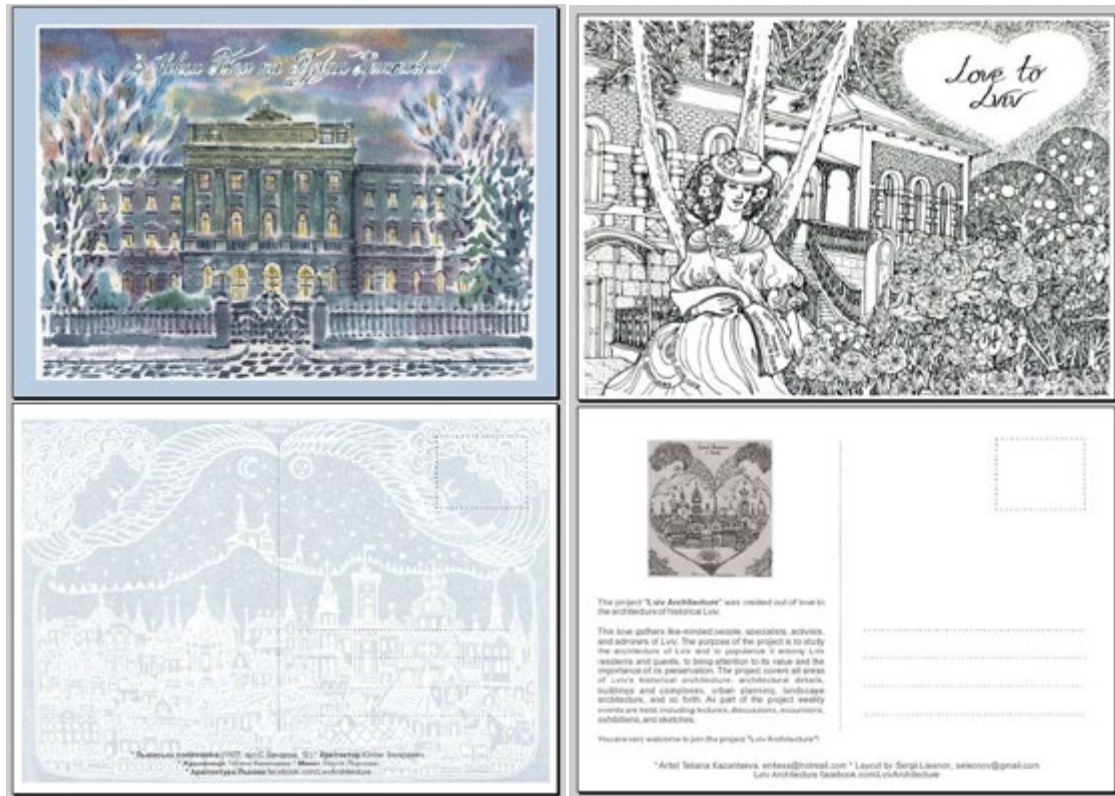


Figure 4 – New Year and St. Valentine Postcards for residents and guests of Lviv. Published by “Lviv Architecture” project (artist Tetiana Kazantseva, layout by Sergii Lieonov)

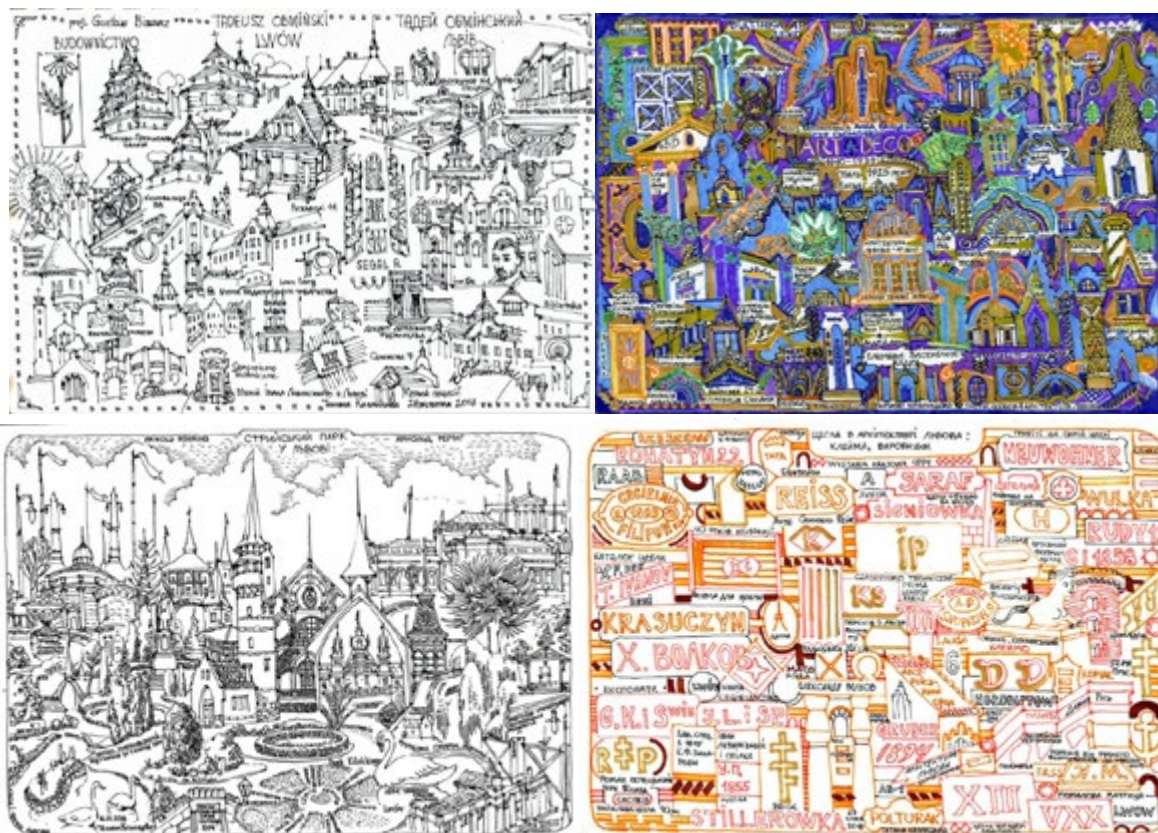


Figure 5 – Few sketches from events of “Lviv Architecture” Project. Artist Tetiana Kazantseva

CULTURAL TOURISM AND CULTURAL HERITAGE, AS AN INSTRUMENT FOR CONFIDENCE-BUILDING AND RECONCILIATION

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Abstract

Nowadays nobody agrees on the issue that culture and intercultural dialogue mostly influence on the development of tourism. Also it is a powerful instrument for all countries' economic development. On the other hand, cultural and natural heritage of country, development of creative industry, connects to the popularization of country and attracts investments.

According to research, most of tourists attract cultural heritage. Due to this the data of the UN organization of tourism (UNWTO) informs that 40% from the world's tourism is cultural tourism. Cultural tourism influences on the education, development and future of the country. By the assessing of the World Bank, by 2030 culture will play an important role in people's life beyond the poverty.

Tourism development is one of the priorities of Georgian Government. Tourism and especially cultural tourism is a significant indicator of country's economic and it connects to the welfare of the society, education and healthcare.

Keywords: intercultural, tourism, Georgia

1. World and Georgian Cultural Heritage

Culture, part of the human life, influences on the development of the life, habits, traditions, formation of the public identity. Culture may also define as an important instrument for the process of confidence-building, reconciliation and intercultural dialogue.

In the technologically changeable era, culture was able to take over the obstacles and became global in nature. By doing so, it showed us all the strength for sustainable development. It's a base of the welfare society and plays a great role in the world.

It's important to highlight that international community recognized the key role of culture for sustainable development and in the process of enhancement of economic, social and ecological sphere. It plays a great role to resolve the issues defined by the agenda of UN global development, especially, deal with reduce of poverty, improvement of education, effective management of environment resources, cities development, social unit and involvement of community.

There are 16 different religion confessions in Georgia and it's clear to see how societies from different interesting cultures have relationship with each other and they guess Georgia as their motherland.

For our country Georgia (with 3 717 200 population), having ancient cultural heritage, is important that Georgian culture will be considered as an meaningful part of the European culture due to significant steps towards Euro integration and there is an effort to become a member of the great European family.

For example, some of them may be nominated:

1.1. Georgian wine

Georgian wine – inseparable part of Georgia, vine and wine took serious place in religion, the bread and the wine received at the Eucharist, is associated with the blood of Christ. Vine is exposed also in the legends connected to the Georgia's converted to Christianity. Georgian writer Aka Morchiladze said, "I believe that Georgia would not be without wine".

We'd like to mention, that the doors of Georgian churches were made by the vine, motives of vine were used in the building of the churches and monasteries. You can often see vine ornament on the churches, that's the evidence that the oldest wine was discovered in Georgia. According to the new researches, near the capital of Georgia-Tbilisi (50 kilometres away) by the result of archaeological excavation, a wine jar and clay dishes with wine were discovered which dates back 80 centuries. This is more than 1000 years after begging production of wine. Scientists unanimously agree on the fact, that Georgia is the motherland of the cultural vine.

1.2 Georgian manuscripts

Georgian manuscripts – eight ancient Georgian manuscripts were displayed in UNESCO memory the world international register. The tenth century psalms confirm that in the tenth century there were already many translation and catalogues of psalm, which points at the high culture of the literature of Georgia and active relationship with foreign powerful cultural area.

Three species of Georgian alphabet live culture were included in the list of UNESCO intangible culture. The decision was made in March 19, 2015.

The Mokvi Gospel (XIII-XIV) saved in the National Centre of Manuscripts of Georgia is an outstanding specimen of Georgian calligraphic art and miniature painted.

The manuscript is quite damaged due to not to save in the suitable condition. The Mokvi Gospel has gone a difficult path up to date. It has been copied in 1300, at the Mokvi Cathedral in Abkhazia by the order of Daniel, bishop of Mokvi.

According to the evaluation of specialist, the Mokvi Gospel is significant spiritual and tangible monument of the world cultural heritage, whose analogy almost does not exist in the world.

Nowadays, by the help of UNESCO the Mokvi Gospel is restored and travellers or tourists can see this unique monument at the exhibition.

Rewriting was considered as a handicraft in the ancient Georgia. Rewriter together with the creator of parchment, painter, binder, embosser was creating unique specimens of calligraphy. This was quiet² hard work from IV century to XVIII century before founded the printing-house, only books rewritten by hand were spread. These books were in great demand.

Calligraphy – write beautiful, is the character of the three species of Georgian Alphabet – Asomtavruli, Nuskhuri and Mkhedruli, they differ from each other with graphic and each of them has its esthetical charm. Georgian calligraphy was writing on the papyrus, leather and paper. Georgian calligraphy books were not created in the space paralyzed from the world civilization.

In the later mediaeval ages, tradition of Georgian calligraphy, directed attention to the European tendency and experience. Relations with European culture promoted development of engraved and printed Georgian calligraphy books. There are more than 11 thousand copies of the Georgian calligraphy books, which are saved in the Georgian and foreign countries' libraries.

In October, 2011, Georgian manuscripts were displayed in the list of UNESCO world document registry. About 500 Georgian manuscripts were among seven new monuments. It should be noted, that UNESO program "world memory registry" includes 245 manuscripts from the different countries of the world.

1.3 Georgian felt

Georgian felt – felt is one of the oldest methods of cloth treatment, it is ancient heritage of Georgian folk. It plays a great role in Georgian cultural and economic development. Cloth made with woollen has a long tradition in Georgia, which used these materials to sew Georgian national cloth. Also carpets and rugs, in the modern art they are treated again with new artistic values.

Nowadays, travellers are interested in the felt patterns made by Georgian master. There are Sunday schools of felt, ceramics, draw, sew, folk musical instruments. They are the main directions which are the ancient monuments and youth has close contact with them due to protect and respect this cultural heritage, oldness for new generations.

2. Peaceful Tourism

It's important that all countries use their cultural heritage, cultural tourism as an instrument for peace initiatives and intercultural dialogue to worm aggression which is in the world at present and play the role of mediator. The slogan "peace through tourism" must be supported openly.

What must be the main purpose of the peace tourism? The main is to manage de-escalation of violence through involvement of people and institutions and to do this it's possible to use widely practice of peaceful tourism, but it's important to recognize tourism as a tool of facilitate mechanism for economic development. In the developing countries it's the source of revenue, at the same time, must be mentioned that tourism is more rapidly promoted, than other field of economic. Such kind of per capita income is one of the preventive factors, which promotes civil conflict escalation, so low income causes high inequality and disturbance in the society. Therefore, we can say that tourism is one of the best leverage to prevent this and with its concept of development can be used as a peaceful instrument to prevent such kind of threats.

Scientists agree on the fact that tourism can regulate relations between citizens and different states with different governments within the frame of intercultural dialogue. In any case, tourism development is the best mechanism to regulate relationship at the international level.

Evaluate in this regard, the aim of the peaceful tourism may be activities beyond borders. It will be the significant example of the global partnership.

3. Perspectives of tourism development in Georgia

The development of Georgian tourism begins in the 19th-20th centuries. But it takes a broader look from the second half of the 20th century. Georgia has a great potential of tourism. In this regard, the country is perceived as the new and it's double interesting for travellers and tourists. The most important is the fact that archaeological excavations held near Tbilisi, particularly in Dmanisi in 1999, the fragment of the ancient human skeleton of the Palaeolithic Age was discovered, which dates back one million and seven hundred thousand. This discovery confirms that Georgia is the country of the first European.

It's important to mention, that Georgia is one of the unique touristic country in the world. In the Georgian tourism strategy 2025 there is reflected the challenges of tourism development and opportunities. Here is highlighted the following main perspectives:

- Georgian rich and unique culture (music, dance, art, history, religion, the multiple of the international and national cultural heritage monuments, from which three is among the list of UNESCO world heritage and two in the list of intangible cultural heritage).
- The tradition and history of wine –making - status of “the motherland of wine”.
- 87 protected territories, 11 national parks among them which is 8,62% of the whole area of the country. This gives possibility to develop kind of tourism such as the world wide eco, skiing, cycle, mountainous, adventure, sanitation and other kinds
- Good climate conditions
- Attracted business and investment environment
- Friendly attitude of Georgians and hospitality

What should country achieve by 2025, the vision is following: in 2025, Georgia will be famous as one of the advanced country with high standard of tourism, distinctive with its cultural and natural heritage, world-wide service and old tradition of hospitality. In the “Tourism Strategy of Georgia 2025” one of the main part is engagement of indigenous population, tourism as a model of public activity development. For the development of tourism and popularization of cultural heritage security of country is very important.

4. Monuments of cultural heritage

There are 878 world - wide monuments in the list of UNESCO world cultural heritage monuments and 0,34% are monuments of Georgia among them. In the National policy of cultural heritage of Georgia, which was elaborated in 2014, is told that cultural heritage is the values that connects us to the past, gives sustainable basis for present and tracks the road to the future.

Along with multiplicity there are constant relationships between ethnical groups with cultural treasure and own traditions on the Georgian ground which dates centuries.

In the 20th century, concept of cultural heritage gained wide meaning, consisted of everything what may be reflect humanity's, societies', country's development. The main character of it today is not only aesthetic, but also authenticity and the main criterion is protectionism of its authenticity. On the other hand, it means sincere relation with value which doesn't need prettify due to its authenticity of beauty. Protection of this is the inevitable condition for the development of cultural heritage (national policy of cultural heritage of Georgia 2014).

It's important to take active steps to protect tangible and intangible cultural heritage of Georgia according to the UNESCO Huge convention (1954) and for effective operation of its second report (1999).

Georgia couldn't look after unique monuments of Georgian cultural heritage on the occupied territories of Georgia due to existed situation. Therefore, historic, artistic and cultural values, artistichistorical spiritual buildings, mediaeval assemblies, rare patterns of wall painting, monuments, 4 museum exponents and etc. are in damage (experts of Georgian branch mark). This was confirmed by the report of Russia national committee of ICOM 2011 (October 31-November 5). We must mention, that in this regard, situation isn't changed. Georgian part couldn't look after and protect monuments of the own cultural heritage.

Within the frame of international negotiations the engagement of international organizations working on the issues deal with cultural heritage in the occupied territories (Abkhazia and Tskinali) are active for years. Monuments existed on these territories are not only properties of Georgia but also they are properties of the world as well, because of their meaning for the relations of peoples form the different cultures, which at the same time promotes union of planet for peace.

5. Conclusion

The philosophy of the Romualdo Del Bianco Foundation tells, that monuments of cultural heritage give opportunities for people's meeting, travelling, relaxation, spent holidays and understand each other's character, readiness for generate listening culture, for observation and analysis. Exactly in this moment, so called “educated society”, indigenous inhabitants, travellers, local administration, educational institutions, association of cultural organizations, which must implement above mentioned and this will facilitate peaceful co-existence, intercultural dialogue for confidence-building and reconciliation.

According to the abovementioned, important issues in the process of implementation are political decisions, readiness of politicians and states, joint effort, because heritage, consciences of thesis “what units and what separates us from each other”, promote peace processes in the Earth.

Cultural diversity, alive cultural space is the beneficial ground where emerges bold, innovative modern art, architecture or the street art. This is the ground, which creates unlimited arena for art, inspiration and high creative criteria, refines taste, develops view, and thus it's directly connected to the freedom of creativity. In spite of invisibility cultural heritage connection with other fields of culture is deep and original, this connection generate the greatest charge, which demands to be used due to not to exist heritage without culture of society (strategy 2014).

Acknowledgement

The action plan 2016-2020 of Georgia aims to deepen dialogue among cultures and promotes joint projects at the institutional, organizational and individual level. Memorandums signed between Romualdo del Bianco foundation and institutions from Georgia and activities carried out by them may be guessed as the significant examples of collaboration that facilitates country to use cultural tourism, cultural heritage as an instrument for confidence building and reconciliation and lead intercultural dialogue.

References

Dialogues on the culture and development after 2015. UNESCO, UNDP, UNFPA, 2015

Freedom, rapid development, welfare. Governmental program 2016-2020(Georgia)

Tourism strategy of Georgia 2025

Georgian manuscripts. Manuscript center of Georgia, 2014

<https://www.beyondintractability.org/>

<http://culturepolicy.gov.ge/getfile/cea058f4-efd0-4c81-841d-9e499deb5ed7/.aspx>

<http://dlnm.info/ge/>

<https://en.unesco.org/themes/culture-sustainable-development>

http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CLT/pdf/0-UNGA_Resolution_A_RES_69_230_EN.pdf

http://www.mlit.go.jp/kankocho/naratourismstatisticsweek/statistical/pdf/2009_The_Impact.pdf

<http://www.nationalgeographic.ge/wm.php?page=magazine2&fotocat=553&id=619>

<https://www.numbeo.com/>

<http://premiumi.ge/>

<https://sites.google.com/a/iliauni.edu.ge/>

<http://www.ttimes.ge/>

MUSEUMS – A CULTURAL HERITAGE FOR THE FUTURE OF URBAN ENVIRONMENT

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Abstract

Important tourist attractions and landmarks in a number of cities are museums. Several modifications and extensions of historic museum buildings have been implemented in Riga, the capital city of Latvia. From 2008 to 2011, a building of the Riga Stock Exchange (1852–1855) was restored. In 2013, the European Museum Forum has included the Riga Stock Exchange in the list of newly opened most successful European museums.

The building of the Latvian National Museum of Art (1903–1905) building was renovated and extended from 2012 to 2015. Underground extension contains auxiliary rooms and a spacious exposition hall. The Museum of Decorative Arts and Design located in a medieval building was restored and adapted for the needs of the museum from 1981 to 1988. A small, but one of the most visited museums in Latvia is the Riga Art Nouveau Center, which was opened in 2009. It is located in a remarkable Art Nouveau building.

Keywords: City, Heritage, Architecture of museums

1. Museums as a part of cultural landscape

Important tourist attractions in any place are museums. Most of existing museums of all kinds are installed in buildings that have once been designed and constructed for other functional purposes. Over time, they inevitably need transformations or extensions to meet contemporary needs of museum technology. Alterations of these buildings have often improved not only their functional but also aesthetic quality. The well-known transformation of the Louvre in Paris (1989, architect I. M. Pei; Figure 1) is remarkably distinctive in the environment, however, it fits in the historic building, which is the monument of the highest standard. A number of visitors of the Louvre in the 21st century has doubled, and the museum now is the most visited in the world. Extensions of the National Gallery of Art in Washington, DC (the “East Building”, 1978) and German Historical Museum in Berlin (1995–2003) are also among I. M. Pei’s famous museum buildings. A number of extravagant extensions of different museums worldwide are executed to the designs by Daniel Libeskind. The Extension to the Denver Art Museum in Colorado, USA (2006), stands out among them.

One of the biggest museums’ buildings in Asia is the National Gallery Singapore (Figure 2). It is created by re-building and connecting into one complex the former Supreme Court building and the Town Hall (2008–2015, Studio Milou Architecture), and has become an active place of public venues and a very popular sightseeing



Figure 1 - Paris. Pyramids of the Louvre. 1989. I. M. Pei



Figure 2 - Singapore. The National Gallery. 2008–2015. Studio Milou Architecture

Transformation of historic buildings for new museums is permanently going on. Renowned examples are the Musée d’Orsay in Paris (1981–1986) housed in the former railway station Gare d’Orsay (1898–1900), the Tate Modern in London (1995–2000, Jacques Herzog and Pierre de Meuron) housed in the former Bankside Power Station (1947 and 1963), and the Hermitage Amsterdam (2009, Hans van Heeswijk).

Construction of special museum buildings on a wider scale began only at the end of the 19th century. They have become landmarks in the cityscape of many of the world’s capital cities. The earliest samples – National Gallery (1832–1838, William Wilkins) and The British Museum (1827–1851, Robert Smirke) in London – were followed by the cluster of museums on the *Museuminsel* in Berlin (1830–1930), *Kunsthistorisches Museum* and *Naturhistorisches Museum* in Vienna (1871–1891, Gottfried Semper and Karl von Hasenauer), The Metropolitan Museum of Art in New York, NY (1874, Richard Morris Hunt, and 1910th, McKim, Mead & White), The National Museum in Prague (1885–1891, Josef Schulz), The Nordic Museum in Stockholm (1888–1907,

Isak Gustaf Clason), The Museum of Applied Arts in Budapest (1893–1896, Ödön Lechner), The Pushkin State Museum of Fine Arts in Moscow (1912, Robert Klein) etc.

In the late 20th century and in the 21st century, a number of museums that became world-wide known sightseeing are constructed throughout the whole World. These buildings usually stand out because of unique architecture and innovative technological solutions. Icons of contemporary architecture in this respect are Guggenheim Museum Bilbao (1991–1997, Frank Gehry), Zentrum Paul Klee in Bern (2000–2005, Renzo Piano), Museums in Saadiyat Cultural District in Abu Dhabi including both recently opened Louvre Abu Dhabi (2008–2017, Jean Nouvel) and still not constructed Maritime Museum (Tadao Ando), and Guggenheim Abu Dhabi (Frank Gehry), cluster of museums along the National Mall in Washington, DC, The Louis Vuitton Foundation Museum in Paris (2006–2014, Frank Gehry), The *Musée des Confluences* in Lyon (2001–2014, Coop Himmelb(l)au), etc. This list can also be accompanied by the Kiasma Contemporary Art Museum in Helsinki (1992 – 1998, Steven Holl) and the Kumu Art Museum in Tallinn (1994 – 2006, Pekka Juhani Vapaavuori). Museums are a kind of creative laboratories, and they often attract attention of art historians and architectural theoreticians, regularly publishing voluminous books on museum architecture.

2. Museums in Latvia

Latvia has deep traditions of museum culture, although there are only few museums located in the buildings constructed specially for this purpose. Museum of the History of Riga and Navigation (*Rīgas vēstures un kuģniecības muzejs*) housed in the Riga Dom Cathedral ensemble is originated in 1773 and can be found in the list of the oldest museums in Europe.

The list of museums of Latvia contains 196 titles, covering wide range of typology. Local history and commemorative museums installed in valuable historic buildings prevail. The Bauska Castle Museum, Cēsis History and Art Museum, Jaunpils Museum and Museum of Ventspils are located in restored or partly reconstructed medieval order's castles. The Turaida Museum Reserve covers an area of 42 hectares with 39 historic buildings and structures including medieval bishop's castle.

The Rundāle Palace Museum located in the southern part of the country is probably the most famous tourist attraction in Latvia. The building constructed as a palace of the Duke of Courland-Semigallia (1736–1740, Francesco Bartolomeo Rastrelli) named sometimes the Latvian Versailles is an outstanding monument of Baroque. The Museum was founded in 1972, and restoration of the palace was completed in 2016.

Riga, the capital city of Latvia contains at least four buildings constructed specially for museums – the contemporary buildings of the Latvian National Museum of Art (1903–1905), the Latvian War Museum (1937–1939, architect Artūrs Galindoms) with the medieval fortification tower incorporated in it, the **Museum of the Occupation of Latvia** (1969–1970), and Riga Motor Museum (1985–1988, architects Viktors Valgums and Andris Briedis). Several modifications and extensions of historic museum buildings have been executed recently.

3. The Art Museum Riga Bourse

The Riga Stock Exchange building (1852–1855, architect Harald Julius Bosse) is located in the very centre of medieval Old Riga. It is shaped as a Venetian Renaissance palace, symbolising wealth and richness (Figure 3). In autumn 1979, shortly after the completion of comprehensive restoration works, the sumptuous decorations of the second floor's premises were completely destroyed by fire. For a long period the building was partially abandoned. In 2008–2011, it was reconstructed, restored and fitted for new function – the Art Museum Riga Bourse. The inner courtyard was covered with glass roof, creating a comfortable recreation area (Figure 4), but all the historic premises were restored and adapted for the needs of the newly created art museum (Figure 5). The museum's funds and expositions consist of the most outstanding works of art previously stored in other museums. The building immediately after opening became one of the most popular sightseeing in Riga.

In 2013, the European Museum Forum has included the Riga Stock Exchange in the newly opened most successful European museums and awarded it with the Special Commendation. Award was based on the opinion that it is „one of the most impressive renovated national buildings transformed for a museum purpose. The museum has succeeded in creating an astonishing atmosphere for the public by opening a building to the public that was previously only for the financial elite.” The jewel of architecture in Riga's historical centre sparkles at a new level of brilliance.



Figure 3 - Rīga. The Riga Stock Exchange Building. 1852–1855. H. J. Bosse

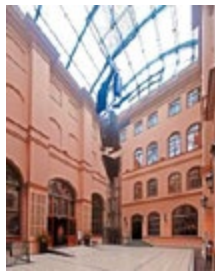


Figure 4 - Rīga. Art Museum Riga Bourse. The courtyard



Figure 5 - Rīga. Art Museum Riga Bourse. Exhibition hall on the 1st floor

4. The Latvian National Museum of Art

The building of the Latvian National Museum of Art (1903–1905, architect Ludwig Wilhelm Neumann) is located in the central part of the boulevard district of Riga and was the very first building in Latvia constructed as a museum, then the Riga City Museum of Fine Arts. This building is a majestic example of the Neo-Baroque trend, one of the last Eclectic style monuments in Riga’s early 20th century architecture (Figure 6). A group of symbolic sculptures by renowned sculptor August Volz sits in the tympanum of the soft lined pediment surmounting the impressive four-column Ionic portico. Painters Vilhelms Purvītis and Paul Gerhard von Rosen painted lunette murals in the grand central staircase (Figure 7). Several details of the finish of the entrance hall – the stained glass, railings, etc. – are shaped in Art Nouveau forms. Latvian painting, an important collection of the works of Baltic Germans and the biggest collection of Russian painting in the Baltic States are exhibited in the museum. Two sculptural reliefs on the walls of the staircase are dedicated to W. Neumann and V. Purvītis, both of whom were long-time former directors of the museum.

The building was not repaired for more than 100 years. The building was renovated and extended from 2012 to 2015 to the design of the Architecture Office “Processoffice” (Lithuania), which gained the highest recognition in the international project competition. New underground premises containing necessary auxiliary rooms (Figure 8) and a spacious exposition hall, as well as museum’s repository located behind transparent walls (Figure 9) are placed under the adjoining park. New exhibition rooms are arranged into the attic floor (Figure 10). Observation terraces are arranged on the roof. The building has completely preserved its historical shape, but useful space has doubled.



Figure 6 - Rīga. The Latvian National Museum of Art. 1903–1905. W. Neumann



Figure 7 - Rīga. The Latvian National Museum of Art. Central staircase



Figure 8 - Rīga. The Latvian National Museum of Art. Plan of the extension. 2012



Figure 9 - Rīga. The Latvian National Museum of Art. Repository



Figure 10 - Rīga. The Latvian National Museum of Art. Attic floor exhibition hall

5. The Museum of Decorative Arts and Design

One of the branches of the National Museum of Art is the Museum of Decorative Arts and Design (Figure 11). It is located in a medieval building erected as a church (St George’s Church) in 1225, incorporating the Sword Brothers order’s palace chapel

and dining room (refectory) for the order's brothers. After the Reformation, since 1554 it was used as a maintenance building. In the 17th century, it was converted into a multi-storey warehouse by building in several wooden floor slabs. During the Soviet occupation the building fell into decay, nevertheless it was restored from 1981 to 1988 and adapted for the needs of the museum. During the course of the restoration the Romanesque window openings were uncovered in the street façade as well as interior space through the full height of the building's altar apse. The major part of the 17th century floor slabs was preserved. Due to this principle, it is possible to perceive the spatial structure of the building simultaneously both as a church and a warehouse (Figure 12).

The ground floor of the museum is one of the most impressive exhibition halls in Riga. Permanent exhibition is displayed in upper floors.



Figure 11 - Rīga. The Museum of Decorative Arts and Design. 1225–1987.



Figure 12 - Rīga. The Museum of Decorative Arts and Design. Interior

6. The Riga Art Nouveau Museum

A small, but one of the most visited museums in Latvia is the Riga Art Nouveau Centre, which was opened in 2009. The museum after intensive restoration was installed in the former apartment of prominent Latvian architect Konstantīns Pēkšēns at Alberta iela 12 (Figure 13). The building, which belonged to the architect, was built to his project in 1903 and is located in a significant cluster of Art Nouveau buildings in the historical centre of Riga. Art Nouveau furniture, various household objects and applied art works have been exhibited in the museum, giving an idea of the urban dwelling culture in the beginning of the 20th century (Figure 14).

In 2016, an extension of the museum followed. A basement was arranged under the building and auxiliary rooms necessary for the museum – an auditorium, a museum shop and a cafe, as well as interactive digital exhibition spaces (Figure 15) – were installed in it.



Figure 13 - Rīga. The Art Nouveau Museum building at Alberta iela 12. 1903.



Figure 15 - interactive exposition in the Riga Art Nouveau Museum



Figure 14 - Maid's room in the Riga Art Nouveau Museum

The building has an impressive winding staircase (Figure 16) leading up to another museum – Janis Rozentāls and Rūdolfs Blaumanis Museum. Janis Rozentāls (1866–1916) was one of the most renowned Latvian painters. He lived in the upper floor apartment of the house from 1904 until 1915. His workshop was built in the attic just above the apartment. Famous Latvian writer Rūdolfs Blaumanis (1863–1908) was J. Rozentāls' friend and periodically lived in the apartment as a lodger from 1906 until 1908. Commemorative museum there was opened in 1973. Now, visitors of the Museum “can view the Art Nouveau period apartment interior and Janis Rozentāls' creative work in the environment in which the artist worked and where many important Latvians working in the field of culture came to visit at the beginning of the 20th century.”



Figure 16 - Rīga. Staircase at Alberta iela 12. 1903.



7. The Museum of the Occupation of Latvia

Wide public response has gained activities concerning the building of the Museum of the Occupation of Latvia located in the very heart of medieval Old Rīga, next to the later reconstructed Town Hall and the Black Head's House. Both were destroyed during World War II. Designed to commemorate the Latvian Red Riflemen, the museum building (1969–1970, architects Dzintars Driba and Gunars Lūsis-Grīnbergs) and sculptural monument in front of it (sculptor Valdis Albergs) were intended to form an ensemble. Its authors for its architecture received the State Award of the USSR in 1972. After 1990, the museum was converted into the Museum of the Occupation of Latvia. The building is clad with geometrically shaped copper plates, initially presuming that they will retain red tone. Nevertheless, they turned black. The social and historical importance of the ensemble's present-day function is strengthened by the fact that it previously served not only for ideological propaganda of the historical mission of the Latvian riflemen but also of the Soviet power which occupied Latvia three times during 20th century.

An extension of the Museum is planned since 2001. The museum building meanwhile has become one of the symbols of the post-war Modern Movement architecture, but remarkable transformation of it was proposed by the Latvian-American architect Gunārs Birkerts (Figure 18). After several years of public debate, a solution has been reached that should preserve the cultural values of the modern time and transfer them to future generations (Figure 19).

Museums are depositories of cultural property and important mechanism for maintaining the public memory, but museum buildings are significant connective tissues of urban fabric.



Figure 18 - Rīga. Project of the extension of the Museum of the Occupation of Latvia. 2001. Gunnar Birkerts



Figure 19 - Rīga. Modified proposal for the extension of the Museum of the Occupation of Latvia. 2016

References

¹ Widrich, M. (2016). The Naked Museum: Art, Urbanism, and Global Positioning in Singapore, in "Art Journal", 2016, No. 75:2, p. 46–65.

² Naredi-Rainer, P. (2004). *Museum Buildings : A Design Manual*. Basel: Birkhäuser, 2004. 248 p., Alexander, E. P., Alexander, M. (2008). *Museums in Motion: An Introduction to the History and Functions of Museums*. Lanham, New York, Toronto, Plymouth, UK: Alta Mira Press, 2008, 354 p.; *Museums* (Xiaolu Li, ed, 2011). Hong Kong: Design Media Publishing, 2011, 288 p., etc.

³ The world's oldest museums [online]. Museums.eu [cited 18.02.2018.]. <https://museums.eu/highlight/details/105317/the-worlds-oldest-museums>

^{IV} EMYA 2013 Awards and EMF Annual Assembly : Press Release 18 May 2013 [online]. European Museum Forum [cited 18.02.2018.]. <http://www.europeanmuseumforum.info/component/content/article/3-emya-award/76-emya-2013-awards-and-emf-annual-assembly.html>

^V Janis Rozentāls and Rūdolfs Blaumanis Museum [online]. Memoriālo Muzeju apvienība [cited 19.02.2018.]. <http://memorialiemuzeji.lv/en/museums/janis-rozentalis-and-rudolfs-blaumanis-museum/>

CULTURAL TOURISM POLICIES AND DEVELOPMENT TRENDS IN CHINA

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Abstract

The cultural tourism industry has become a new economic growth point for China. Relevant policies have been formulating since 2009 as a strategy to ease China's financial market turmoil caused by global financial crisis in 2008. Under the guidance of cultural tourism policy, tourism entered a new stage of development and the relationship between culture and tourism have become closer. Through analysis of China's cultural tourism policies from 2009 to 2017, this paper summarizes the characteristics and main development trends of cultural tourism policies. With the development of cultural tourism, consumers' demands for experience and cultural creativity increased. Nowadays, China's cultural tourism industry is mainly driven by creativity and technology, not only relied on cultural heritage resources.

Keywords: Cultural tourism, Policies in China, Cultural heritage

1. Introduction

As a new consumption style, cultural tourism is attracting increasing attention from all over the world. In 1978, China's tourism industry started to sprout with the advent of Deng Xiaoping's "open door" policies. In response to the global financial crisis of 2008, the Chinese government proposed to promote the integrated development of culture and tourism industry to ease China's financial market turmoil, to expand the China's consumer market and to drive the development of cultural tourism industry. Under the guidance of China's cultural tourism policies, cultural tourism industry gradually took on the favorable developing situation and become major growth industry for local economy over the past decade. At the same time, the development of cultural tourism industry also promoted the preservation and inheritance of historical and cultural resources, such as cultural sites, cultural relics and historic sites, intangible cultural heritage, ancient architectures, folk art, historical cities and towns.

Through the analysis of China's cultural tourism policies from 2009 to 2017, three characteristics are summarized, that is combining culture industry and tourism industry to expand cultural consumption market, emphasizing culture connotation and local characteristics in cultural tourism, and promoting the preservation and inheritance of intangible cultural heritage in the development of cultural tourism. Meanwhile, two main development trends are outlined, that is creating a boutique tourism brand with Chinese characteristics, and developing cultural tourism complex combining cultural tourism with design service and cultural creativity.

2. The Background and causes of Cultural Tourism Policy in China

Just like early Europe, there were also three typical types of tourism in early China: national diplomacy, business travel and religious travel. For example, in the 2nd century BC, Chinese diplomat Zhang Qian explored Central Asia along the Silk Road (Figure1), a route which played a key role in promoting commercial trades and cultural exchanges between the Eastern and the Western. However, as a series of upheavals wracked China, its the tourism industry in china declined throughout the twentieth century until the late twentieth century.

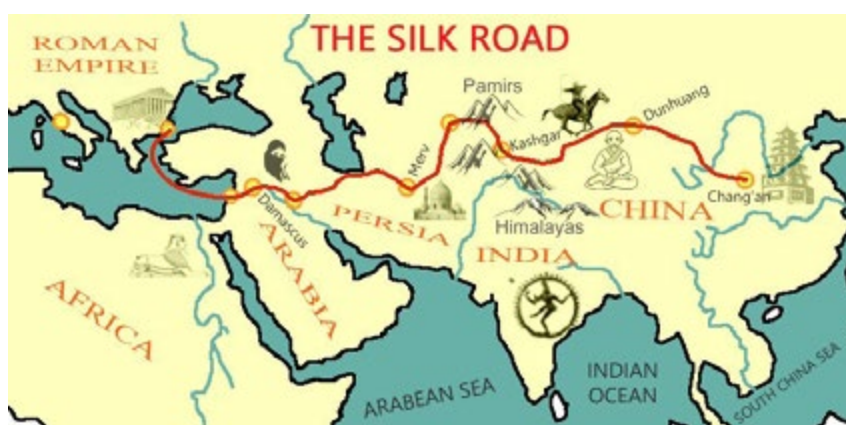


Figure 1 – the Silk Road

Since the adoption of “open door” policies in 1978, Chinese economy has been largely promoted, as well as the development of tourism industry. During that period, China’s tourism industry was mainly aimed at inbound tourism and foreign exchange earnings. The development stage of Chinese tourism policy is from 1990 to 2002, when social economy had rapidly developed and people’s standards of living had significantly raised. Consequently, the domestic demand for tourism has been on the rise in China. Under the influence of the global financial crisis in 2008, Chinese economy was hit fairly hard by the ensuing global recession, especially caused by the impact of declining global demand. In order to stabilize the fluctuations in the domestic financial market, to expand domestic demand and to adjust industrial structure, China started to focus on the development of tourism industry. Wen Jiabao, Premier of the People’s Republic of China, proposed that tourism industry has both economic and social functions, which can not only achieve lower resource consumption, but also bring more employment opportunities and better returns. Therefore, the first policy on cultural tourism, *Guiding Opinions on Promoting the Combination between Culture and Tourism*, was promulgated by the Ministry of Culture and China National Tourism Administration in August 2009.

There are two main reasons for the promulgation of cultural tourism policy. The first one is that financial crisis may bring opportunities for a country to rejuvenate its cultural industry according to historical experience. For example, the Great Depression lasted from 1929 to 1933 promoted the prosperity of American culture, and the Asian Financial Crisis in 1997, became the drive force in the rise of Japanese and Korean cultural industry. China also want to seize this opportunity to develop its cultural industry and to promote the prosperity of its national culture. Another reason is that tourism experience improvement and cultural connotation interpretation have become a higher level of demand in tourism development. Therefore, Chinese policies combined cultural industry and tourism industry to enhance the cultural connotation and attraction of scenic spots.

3. The Characteristics of Cultural Tourism Policy in China

In 2010, the Ministry of Culture and the National Tourism Administration announced that theme year for Chinese cultural tourism will be launched every four years, Chinese International Cultural Tourism Week will be organized every two years, and *The List of Important Cultural Tourism Projects* will be released periodically as well. With the continuous integration of culture and tourism, as well as its positive effects on the growth of national economy, the policies on cultural tourism increased accordingly. The concept of cultural tourism and its corresponding institutional arrangements have gradually appeared in all kinds of government documents.

According to the Chinese cultural tourism policy from 2007 to 2017, three characteristics are summarized below:

3.1. Aiming to expand cultural consumption market, cultural tourism policies promoted the combination between culture industry and tourism industry.

The aim to expand cultural consumption was emphasized in both *Plan for Cultural Industry Revitalization* promulgated by the State Council in September 2009 and *Plan for Cultural Reform and Development in the 12th Five-year Plan* promulgated by the General Office of the CPC Central Committee and the General Office of the State Council in February 2012. As a solution, promoting cultural consumption through tourism industry was proposed in *Decision on Several Important Issues concerning Deepening the Reform of the Cultural System and Promoting the Great Development and Prosperity of Socialist Culture*, promulgated by the CPC Central Committee in October 2011. Subsequently, more detailed plans were put forwarded. For example, implementing Rural Tourism Promotion Plan to boost tourism consumption was introduced in *Some Opinions on Further Promoting Tourism Investment and Consumption* promulgated by State Council in August 2015. Therefore, economic growth is the main objective of the development of cultural tourism policy in China.

3.2. Cultural tourism policy emphasized the culture connotation in tourism and promote cultural tourism projects with local characteristics.

Culture connotation can reflect the quality, spirit and humanistic value of tourism projects, and also serves as the foundation in enhancing the attraction, influence and competitiveness of tourism. The policy encouraged different regions in china to boom tourism industry together with their local distinctiveness in culture, and to avoid homogenization and vicious market competition.

In September 2009, the Ministry of Culture promulgated *Guiding Opinions on Speeding up the Development of Cultural Industry*, and proposed that “we should continue to emphasize the brand building of serial activities in cultural tourism, and to support cultural tourism projects with local and ethnic characteristics”. “To enrich the cultural connotation of tourism and to launch cultural tourism products with local and ethnic characteristic, such as performing arts and festivals.” was also put forward in *Opinions on Speeding up the Development of Tourism Industry* issued by State Council in December. In August 2015, The State Council promulgated *Some Opinions on Further Promoting Tourism Investment and Consumption*, and emphasized “organizing festivals with local characteristics”.

In November 2011, the National Tourism Administration promulgated *Guiding Opinions on Further Accelerating the Development of Tourism and Promoting the Great Development and Prosperity of Socialist Culture*, and emphasized that “we should continue to encourage the creativity and local cultural characteristics in the production of handicrafts and souvenirs, and to continuously enrich the tourism product system with Chinese characteristics.” In April 2017, the Ministry of Culture promulgated *Plan for the Development of Cultural Industries during the 13th Five-Year Plan*, pointing out that it is necessary to develop boutique tourism performing arts and tourism products with regional characteristics and national customs.

3.3. The cultural tourism policies promoted the combination between the preservation and inheritance of intangible and tourism, in order to lead and normalize the development of famous historic cities and towns.

China is abundant in historical and intangible cultural heritage, which could be fragile if exposed to chaotic tourism market. Through the normalized and innovative tourism market, intangible cultural heritage will be more acceptable for travelers in the form of traditional music, dance, drama, folk art, acrobatics and other entertainment, and can be effectively inherited and developed in the process.



Figure 2 –The musical dance performance “Impression Liu Sanjie”

For example, the musical dance performance “Impression- Liu Sanjie” (Figure 2), curated by the famous Chinese director Zhang Yimou, is a famous performance brand in Chinese cultural industries. The whole performance takes place in one of the largest real landscape theater in the world, where the real beautiful landscapes in Guilin, Guangxi Province are stages, blue sky, clouds, mountains and rivers are props. And modern technology of sound, light and electric are used in folk tales narration and performances to intuitively demonstrate folk customs, rituals, festivals and traditional handicrafts to tourists.

Therefore, promoting the combination between tourism and intangible cultural heritage preservation and inheritance was emphasized in both *Decision on Several Important Issues concerning Deepening the Reform of the Cultural System and Promoting the Great Development and Prosperity of Socialist Culture* promulgated by the CPC Central Committee in October 2012 and *Plan for Cultural Reform and Development in the 12th Five-year Plan* promulgated by the General Office of the CPC Central Committee and the General Office of the State Council in February 2012. In November 2011, the National Tourism Administration stipulated to launch a series of travel boutique related to intangible cultural heritage preservation and inheritance, and to lead and normalize the development of famous historic cities and towns in *Guiding Opinions on Further Accelerating the Development of Tourism and Promoting the Great Development and Prosperity of Socialist Culture*. In February 2012, the Ministry of Culture promulgated *Plan for Doubling the Cultural Industry during the 12th Five-Year plan*, and emphasized the innovative utilization of cultural resources like historical and cultural cities, cultural relics, intangible cultural heritage in handicrafts and performing arts.

4. The development trends of cultural tourism policy in China

It is essential that cultural tourism policies are timely and forward-looking on the whole, and can apply to the status quo. Consistent with the development trend of cultural tourism, the development trends of cultural tourism policies are summarized as follows:

4.1. China will strive to build high-quality boutique tourism zones and travel brands with Chinese national and regional characteristics.



Figure 3 – Cultural tourism boutique zone: The Dai ethnic minorities park

In China, there are many ethnic minorities rich in regional culture. At present, China has built some cultural tourism boutique zone featured with minority culture. For example, The Dai ethnic minorities park in Yunnan Province (Figure 3) consists of five best-preserved original natural ecological village, and comprehensively reflects the history, culture, religion, sports, architecture, customs, clothing, food, production and living of the Dai nationality.

In April 2017, the Ministry of Culture promulgated *Plan for the Development of Cultural Industries during the 13th Five-Year Plan*, and mentioned that “By 2020, China will cultivate 5-10 distinctive cultural tourism functional zones with outstanding brand effect. And the government will support the construction of a number of leisure tourism districts, small towns and cities, tourism resorts that reflect cultural connotation and historic, geographical and ethnic characteristics.”

4.2. China has established cultural tourism complex as the direction of tourism development, and aim to accelerate the integration of cultural tourism, design services and cultural innovation.

Cultural tourism complex can not only increase the attractiveness of each single scenic spot, but also boost the development of peripheral service facilities. In March 2014, the State Council promulgated *Implementing Opinions under the Several Opinions of the State Council in Promoting the Collaborative Development of the Cultural and Creative Industries, Design and Related Industries*, which placed an emphasis on speeding up the development of smart tourism and promoting the integrated innovation between tourism and Internet industry. In August 2014, *Some Opinions on Promoting the Reform and Development of Tourism* promulgated by State Council encouraged the innovation in cultural tourism product design. In April 2017, the Ministry of Culture promulgated *Cultural Industry Development Plan during the Thirteenth Five Year Plan*, which proposed to enhance the quality of design services and the development of cultural tourism products, to promote innovation in tourism such as participatory and experiential tourism, and to support the development of cultural tourism complexes that integrated cultural creativity, leisure tourism, health maintenance.



Figure 4 –Fujian Bamin Cultural Tourism Complex project

For example, Fujian Bamin Culture Tourism Complex (Figure 4) which is currently on construction was elected to the *National Excellent Tourism Project List 2017* by National Tourism Administration. With a total investment of RMB 8.5 billion and an area of 74 hectares, this project is mainly composed of cultural tourism streets, squares, temples, hotels, ancient dwellings, theater, theme parks, traditional gardens and sculptures.

5. Conclusion

The main contents of cultural tourism policies from 2009 to 2017 can be briefly summarized that to improve the attractiveness and economic benefits of the original scenic spot through traditional and creative cultural projects, to enhance the cultural connotation of all the elements in the existing or proposed tourism scenic spots, and to increase cultural products and services that utilized cultural resources. In recent years, cultural creativity was specially emphasized in cultural tourism policies. Just like the development trend of international tourism, Chinese tourism is also shifting from cultural tourism to creative tourism. Accordingly, emphasizing the integration of culture and tourism industry, as the focus of cultural tourism policies, will be gradually transformed into the promotion of participatory and experiential cultural tourism complex, under the integrated development of cultural creativity, design, intangible cultural heritage, innovation on internet industry and tourism resources. The policies also aimed to gradually establish a high-quality tourism zone and travel brands with Chinese national and regional characteristics.

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References

- Sofield, & Li. (1998). Tourism development and cultural policies in China. *Annals of Tourism Research*, 25(2), 362–392.
- Xie Zhengfa(谢正发). (2007). (改革开放以来中国文化旅游产业政策演变及启示)Evolution of China 's Cultural Tourism Industry Policy since the Reform and Opening up and Its Enlightenment.(中国集体经济)China's collective economy, (26), 85–86.
- Bi Xulong(毕绪龙). (2013). (文化旅游发展政策及其趋势)Cultural Tourism Development Policies and Trends. 河南教育学院学报(哲学社会科学版)Journal of Henan Institute of Education (Philosophy and Social Science), (05), 19–23.
- Zhou Lin (周琳) . (2014). (中国旅游业的制度创新研究) Institutional Innovation of China 's Tourism Industry. Jilin University (吉林大学). (2005).
- Qi Shuyu(祁述裕). (2008). (中国文化产业发展战略研究)Research on the Development Strategy of Chinese Culture Industry. Beijing: (社会科学文献出版社)Social Sciences Literature Publishing House.
- Xu Jufeng(徐菊凤).(2005). (旅游文化与文化旅游：理论与实践的若干问题)Tourism Culture and Cultural Tourism: Some Problems in Theory and Practice. (旅游学刊)Journal of Tourism, (4)
- Su, Bramwell, & Whalley. (2018). Cultural political economy and urban heritage tourism. *Annals of Tourism Research*, 68, 30–40.
- Huibin, X., Marzuki, A., & Razak, A. (2013). Conceptualizing a sustainable development model for cultural heritage tourism in Asia. *Theoretical and Empirical Researches in Urban Management*, 8(1), 51–66.
- Mckercher, Ho, & Du Cros. (2005). Relationship between tourism and cultural heritage management: Evidence from Hong Kong. *Tourism Management*, 26(4), 539–548.
- Anna, M.R. (2010). Il turismo culturale nuovi orientamenti di sviluppo economico–sociale, *Proceedings of the International Conference of the Ministero Per Ibeni E Attivita Culturali (18–21 February Milan, Italy)*, 2010, pp. 11–12.
- Richards, G. (2011). Tourism development trajectories: From culture to creativity?. *Tourism & Management Studies*, 6, 9–15.
- Richards, G. (Ed.). (1996). *Cultural tourism in Europe*. Cab International.
- Olsen, D. H. (2010). *Cultural heritage and tourism in the developing world: A regional perspective*.
- Yan, H., & Bramwell, B. (2008). Cultural tourism, ceremony and the state in China. *Annals of Tourism Research*, 35(4), 969–989.
- Morelli, P. (Ed.). (2003). *Beni culturali e turismo nelle città d'arte italiane (Vol. 12)*. FrancoAngeli.
- Martelloni, R. (2007). *Nuovi territori. Riflessioni e azioni per lo sviluppo e la comunicazione del turismo culturale (Vol. 7)*. FrancoAngeli.

ZAKOPANE, POLAND: THE IMPACT OF MASS TOURISM ON NEW BUILDING DEVELOPMENT IN HERITAGE TOWNS

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Abstract

Zakopane is located in the foothills of the Tatra mountains. It is a renowned tourist destination attracting over 3 million visitors a year. Famous not only for nature, landscapes, tourism and winter sports, it is also known as a cultural centre for painting, music, and the iconic wooden architecture. The phenomenon of “Zakopane Style”¹ goes back to the 19th c. when a group of Polish prominent art historians and architects, fascinated by traditional residential architecture, decided to transform vernacular building patterns into development of different use. At that time residential buildings were designed much bigger comparing to original ones, extended to accommodate additional rooms and a staircase. Architectural details, ornamentation and materials were meticulously copied to conform with the local style. Attempts to imitate traditional forms and elements appeared also in public buildings.

Today we can observe a similar process to produce a new vernacular architecture for Zakopane in a similar way to the process that took place over hundred years ago. The rapid development of the city and the popularity of its endemic style among tourists brought with it the necessity to adapt the local vernacular architecture patterns, forms and elements into new residential and commercial style. These efforts are undertaken to satisfy visitors and maintain sense of place of city’s heritage districts. But in contrast to the 19th Century’s movement to protect the local vernacular architecture, the mass production of a new regional style today has mostly resulted in bad quality architecture. The regional forms, motifs and materials in newly established buildings, through fragmentary citations, imitations and re-interpretations of original forms of local architecture, have led to low quality, unaesthetic architecture that detracts from the beauty of the original heritage style. This process can be observed in both small and large-scale buildings.

The aim of this paper is to identify and classify forms of vernacular inspirations in the contemporary architecture of Zakopane. It will also investigate and characterise the typological elements used to achieve a new vernacular style for Zakopane. The paper will present good and bad examples of buildings (or their fragments) representing a “New Zakopane Style”. On this basis discussion with investors and architects can be entered to formulate and prepare guidelines for the preservation of regional heritage architecture of great value and improve the quality of new buildings and objects.

Keywords: heritage protection, vernacular architecture, mass tourism

1. Introduction

The folk culture of Zakopane and its vernacular architecture has played an important part in the heritage of the city. As with many settlements “The material culture of any other human group, or any region, or substantial geographical entity to the large degree depends on the natural environment” (Kantor 1991). The development of Zakopane is strongly connected with the hard weather conditions of the Podhale region with its alpine climate, long-lasting winters, and the high altitude. Following the fight to regain Polish independence and attempts to formulate a national style in the mid-XIX century, Zakopane’s vernacular architecture became an inspiration for what was later known as the “Zakopane Style”.

Today tourism in the city and region has brought with it a highly modified Zakopane style adapted to suit large-scale buildings such as hotels and pensions often leading to a loss the original appeal and style. This paper will analyse this modified, contemporary architectural style of the region defined as the New Zakopane style. To date, guidelines have not been developed to preserve the original vernacular architecture and Zakopane style allowing them to mutate into unacceptable forms.

2. The history of Zakopane

Zakopane is well known nationally and internationally as one of the most popular touristic destinations in Poland. With various touristic attractions such as mountain hiking, winter sports and a rich regional culture, the city was visited by the 3,5 million tourists in 2016 city, ranking it second after Krakow.

Situated in close proximity to the Tatras, in the Carpathian Mountain range, Zakopane has an altitude of 730-1000 meters above the sea level, an area of 8486 hectares and a population of approximately 27000 inhabitants [1]. It was settled relatively

¹ “Zakopane style” or “Witkiewicz style” was an art style inspired by a local, vernacular architecture, with the use of local materials, forms and also building techniques. The style created during partition of Poland was to inspire patriotism and focus on polish culture.

late (2nd half XIVth c.) because of its isolation, long winters, dense woodlands and lack of high-yielding soils. It was first recorded in 1624 as Nowa Osada or New Settlement (Momot, 2003) and was mainly used during summers by shepherds and later on as a base for discovery and exploration of minerals such as silver, gold and iron in the Tatra Mountains.

The era of Romanticism made mountain landscapes appealing to the wider public making the Tatra popular for tourism alongside steel an important industry for the development of Zakopane.

The formation of the Towarzystwo Tatrzańskie (Tatra Society) promoted a tourist movement, organized many mountain walking routes and hostels and built the Dworzec Tatrzański (a concert and theatre hall), donated money for the Szkoła Snycerska (the Woodcarving School) and actively promoted Zakopane by publishing pamphlets, posters and other advertising materials. A medical doctor, Tytus Chałubiński (Długołęcka and Pinkwart 1989), strongly promoted the benefits of the mountain climate in treating pneumological diseases, mainly tuberculosis. This led to Zakopane's official recognition as a health resort in 1885.

At the beginning of the twentieth century, Poland was partitioned among three foreign powers: Habsburg Austria, the Kingdom of Prussia, and the Russian Empire. Zakopane then became the spiritual capital of Poland with many scientists, artists, painters, composers, writers and politicians visiting the village. This created an intellectual milieu, which led to the development of a national revival concept. (Mantyka 2008)

Zakopane received a city charter on the 18th of October 1933. This achievement stimulated tourism and development resulting in the construction of a Gubałówka Funicular - a ski jump and cable car at the top of Kasprowy Wierch.

World War II saw Zakopane occupied by German invaders and who turned the city into a recreation centre with a large hospital for soldiers. Parallel with the occupation was the establishment of the Polish Underground Resistance Movement who used the city as a key location for illegal routes between Romania and Poland. After the war, Zakopane resumed its role as a health resort, although its importance was diminished. The main source of income for many inhabitants was tourism with investment in hotels and accommodation facilities.

3. The development of vernacular architecture

The first settlement of the Podhale region began in the XII c. It was the Vlachs shepherds in the XIV c., however, who, together with the local inhabitants, created a new culture known today as the highlander lifestyle. Sheep grazing in the Tatras in the XVI c. created new settlements and traditions as well as a vernacular building style, which evolved from the simple constructions for summer use only. The buildings were temporary, usually constructed quickly and without a precision carpentry. They first appeared as stone shelters with wooden roofs and later rafter shelters based on interlocking log cabin walls.

The XVII c. to the middle of XVIII c. brought the construction of all year farmstead buildings with more precision carpentry using spruce and fir woods to cover the roofs (Fig. 1a). Not surprisingly, climate played a very important role in the form of traditional buildings as reflected in the shape and size of doors, windows, floor plans, roof angles and overhangs. Hence buildings were designed to withstand the long winters and strong local winds as described by Tłoczek as follows: "... the most important rule of the architecture was to adapt to the organization of the work and the harsh climate" (Tłoczek 1985). Sheds were placed on the west side of the main building to protect it from the prevailing southwest winds. Houses were mainly built on a rectangular plan layout. The longer elevation had the door and windows placed in the "11 o'clock" position requiring the houses to face south. Underground stone foundations supported the corners. The house design could be described as a well-planned enclosure where the black chamber (this was a room with an open fire without a chimney) was closest to the sheds for the convenience of tending animals.

Unlike the flat roof buildings in the Alps, the Podhale region is characterized by tilted roofs (angles of 48-53 degrees), which were designed not only to withstand the wind but also to remove snow. The proportions of the shingled gable roofs in relation to the visible parts of the floor are 1:1. Floor plans show how the temperature was controlled with the two main rooms connected by a hall. The hall was located in the middle separating the black chamber (Fig.1b) and white chamber (this room was for sleeping only).

The black chamber is where family life took place. It served as both a kitchen and bedroom and was heated with a wood-burning stove. During the winter the whole family and even some small animals lived there.

The main purpose of the white chamber and living room was representational. These rooms were beautifully decorated with the living room used to entertain notable guests, as well as to keep the most expensive and precious possessions.



Figure 1a - Tea, the oldest highlander house in Zakopane, build 1879.b.The black chamber, from the exposition of Muzeum Tatrzańskie Main Building Source: Authors' archive.

It is important to mention that the early highlander house typically had no decorations. People from the Podhale region, although for the most part poor, were very talented in the decorative arts even for the smallest of everyday objects. This same talent eventually found its way into the vernacular architecture. The most important element of the decorative motifs was the *sosręb* (crossbeam) running from the east to the west wall. It was a central part of the black and white chambers and had both structural and ornamental purposes. The beam was sculptured and recorded the year the building was erected, the name of the owner and elements such as the rosette – which depicted the symbol of life, a star and religious quotes together with floral and geometrical motifs. In the upper part of *sosręb*, there was usually a small hiding place to keep the most valuable possessions like golden and silver coins and jewelry made out of corral.

Development of the highlander house was also influenced by the Swiss style. This saw the inclusion of a canopy supported by two pillars added to the floor plan to make a porch, which sometimes ran along the entire walls of the house. Also “additional rooms were added, the hallway reduced, the space above the rooms adapted, stairs leading to the upper floor added. This modification created the two-bay house. Its shape is an extension of the traditional layout of the cottage, adapted to new needs”. (Skowrońska, 2014).

4. The origin of Zakopane style. Main principles and examples

As indicated above, tourist numbers in Zakopane continued to grow as a result of the newly opened rail connection between Krakow and Chabowka, the promotion of the health values of the village and the activity of the Tatra Society (Towarzystwo Tatrzańskie). This growth required further development of the village where the traditional houses of Highlanders from one- line only became two- line. But this wasn't enough to accommodate higher visitor numbers.

First introduced by Germans in 1830, the Swiss style became popular in Zakopane by the end of XIX c. Characterized by a use of asymmetrical porches, bay windows, verandas and balconies, it included decorative wooden panels with various motifs of foreign folk cultures and historical citations.

This Swiss style was used in the public buildings, an example being the current School of Woodcarving, circa 1883 designed by Antoni Luszczkiewicz. Villas in this style first appeared on Krupowki and Kościuszki Streets, Kuźnice Road and Zamoyskiego Street. The Swiss style compared with the vernacular architecture seemed out of place making the village appear similar to other summer resorts in the Tatras such as Smokovec in Slovakia, Krynica and Szczawnica in Poland.

At the end of the XIX c. Władysław Matlakowski observed the original style of Podhale Highlanders and began recording the materials for his book. And in 1886 Stanisław Witkiewicz, who was well-known painter and art critique, came to Zakopane for the very first time on the invitation of Maria and Bronisław Dembowski, This marked the beginning of the fight for the “Zakopane style.

Witkiewicz described the Swiss style as ‘like a rubbish heap, brought by a gust of wind from the outside world’.

Described by Teresa Jabłońska, Witkiewicz's view was that the huts were not just ‘a raw material anymore, but were [now] presented in quite a refined style, from which a new and independent architecture could develop’. (Jabłońska, 2008) This change embellished an already existing traditional and simple wooden alpine architecture. In fact, Witkiewicz wanted to develop this idea into a different but significant national style because he believed it would be strikingly appropriate for Zakopane especially because Poland was under partition at this time. Witkiewicz made the following observation: “Today, more than ever, the issue is to bring out and develop all the possible, intrinsically positive features of Poland's peoples. For this, we have to turn to the region's folk cultures, which have preserved traces of distinctive and special forms of beauty”.

Therefore for Poles to preserve the identity of Poland, its culture and roots were the most important things to conserve and enhance. Local folk art was considered the appropriate tool for this to occur.

The first building designed by Witkiewicz in Zakopane Style was Villa Koliba (Completed in 1892; owner Zygmunt Gnatowski)

on Kościeliska Street (Fig 2a and 2b). While it used traditional materials and the forms of construction and ornamentation of the Highlander house, the scale of the building was much larger, being similar to a typical two-storey Swiss style villa, with many eclectic citations. Later Witkiewicz carefully chose the ornaments for the villas making them less experimental, more mature and defined. He also used the proportions of the traditional highlander farmstead and added different elements to the form of the building, namely: a high stone wall base, multiple breaks in the facades, decorative balconies, terraces, verandas, porches, large decorative chimneys, multiple roof ridge decorative pins (pazdury) and various shaped windows. The *sosręb* or crossbeam was changed from a construction component to a fully ornamental feature. And furnishings were harmonized with the villa architecture where “every detail [was] covered with highlander ornament or highlander shape” to fill the interiors while also creating designs “that had never been seen in [the] highlander huts.” (Witkiewicz, 1904). The Zakopane style was well received and soon more projects of Witkiewicz’s were constructed such as the Villas Pepita (1893), Staszczkówka (1894), Oksza (1895), Zofiówka (1895) among others. The most recognizable representations of the styles were arguably the Willa pod Jedłami (The House under the Firms- Fig.2c) erected in 1897 and the Chapel of the Sacred Heart in Jaszczurówka (1904-1907) (Fig. 2d). As Witkiewicz himself wrote: “Pod Jedłami is the best developed, the richest in its form and its function” in terms of achieving the Zakopane style. Stonewall underpinning reached to 4 meters in height and added a monumental quality. This same element was added to the Jaszczurówka chapel, although the building itself was lighter thanks to the delicate wooden arches of the porch surrounding the front façade. The Zakopane style did not spread throughout Poland. Nevertheless, it is highly regarded for helping to preserve, popularize and modernize the Podhale vernacular architecture.



Figure 2 - Iconic Zakopane style examples: Works of Stanisław Witkiewicz a. Willa Koliba, 1882, b. The interiors of Willa Koliba, 1882, c. Willa pod Jedłami 1887, d. The Chapel of the Sacred Heart in Jaszczurówka 1904-1907. Source: Authors' archive.

5. The contemporary Zakopane architecture

Another criticism is the over development of the city and surrounding region of Podhale. The local Masterplan of 1994 expired in 2003 and was replaced with a new governmental bill in the same year. This left Zakopane without an overall city plan. Where building permits for around 10 years have been based on a case by case scenario, which has led to architectural chaos in the form of high-density and often inappropriate development, the disappearance of the green spaces, the oversizing of buildings and the lack of proper, regional policy objectives.

The regional economy is now dominated by tourism. It is now the main source of income for locals who have “rooms for rent” in private, residential buildings. The ever increasing influx of visitors to Zakopane has led to a point where private room rental cannot meet demand. Single-family houses have become larger to meet this demand with a concomitant loss in the integrity of the original vernacular design concept (Fig.3b). Some houses have reached 3 to 4 floors with garish purple or pink paints to attract the attention of potential clients. The 1:1 proportion of the roof and visible part of the house is now lost. Roofs are now often distorted into exaggerated forms and covered by sheet metal. Walls made of brick and the availability cheap materials have almost completely eliminated wood. The only original material in use is the stone wall base of the buildings.

Further, because the cost of buying land in the Podhale region is very high, this has resulted in floor plans modifications to attract higher economic returns. The original plans in the Zakopane style were elongated and rectangular, but since the 1980's many houses are now based on a square plan to maximize the building footprint in relation to the lot size.

Witkiewicz had a rare opportunity to pick the land for his designs. He wanted to find a connection between the building and its natural surroundings. Willa pod Jedlami is an example of this connection where being on a hill enabled the design of a high wall underpinning. And even though unorthodox for contemporary architects, this design emphasizes the importance of the relationship between the building and nature. The problem is further compounded by client demands for biggest buildings with visitor parking space. What often occurs is that many buildings have virtually no green space, not to mention a lack of trees.

In many respects, Zakopane has always been looking for its original style. As well as traditional architecture there were many inspirations around. The highly popular Swiss style is one such inspiration that drew from various citations as did the Zakopane style is mainly based on regional architecture, with elements of Art Nouveau. The same balancing act between Podhale's vernacular architecture and foreign styles can be seen in Zakopane today (Fig 3c).

Indeed the most popular hybrid style uses endemic elements in the form of the classical nobility manor house. (See the works of Stanisław Topór) Recently there has been a growth in buildings with elements inspired by Gaudi (Fig.3d) (See the works of Sebastain Pitoń and Adam Bukowski Tyrąta), which has turned into a heated discussion between supporters and detractors.

Interestingly decorative elements that have been sparsely used by the locals in the past, are now in vogue where the current style leans more towards Witkiewicz with designs that employ rich motifs used purely for decoration without the previous functional component. Also, other patterns that are used are often foreign, cartoonish and extensive (Fig.3f).

Since 2006 work had begun on the development of a Masterplan for Zakopane. There has also been some progress in unifying the architecture of the city.

Regulations are now in place to try and resolve some of the above issues. Buildings must now include following:

- Be made with the use of regional materials (wood, shingles, stone and imitations)
- A ban on siding made of artificial materials and pastel coloured elevations
- Roof colour must be dark red, dark brown, graphite, matt black including materials imitating wooden shingles
- Gable roofs must have a pitch angle of 45 to 54 degrees
- Eave must have a maximal height of 5 meters

The Masterplan also regulates the number of floors, the maximal height of the buildings and the percentage of the green space of the lot.

Regional architecture is vital to the continuance of the vernacular architecture, as well as the Witkiewicz style. In addition, it is imperative to rediscover and revitalize aspects of tradition particularly explicit characteristics of style and even more importantly, the hidden dimensions of culture. (Pallasmaa, 2008) Other factors that should be considered are:

- Keeping the original proportions of wooden logs to avoid a change in the scale
- The use of elongated, rectangular plans (Fig. 3a)
- The use of original highlander decorative motifs (Fig.3e)
- The use of geometric forms for the floor plans present both in vernacular and "Zakopane style"
- The enhancement of the natural environment seeing architecture as a secondary element
- Maintaining the pragmatism of the architectural form.



Figure 3 - Examples of successful Zakopane style inspirations a. Private House, Droga na Bystre street, architect unknown, c. Pension Fóluszowy Potok, Zamoyskiego street, architect unknown, e. commercial building, Krupowki street, architect: T. Trojan-Korn, P. Szlachetowski, S. Szatko (2009-2010); Examples of improper use of regional architecture: b. Private House Bogdańskiego street, architect unknown, d. Willa Kominiarski Wierch, Kościeliska street, architect: S. Pitoń, f. commercial building, Krupowki street, 2014-2016, architects: A. i R. Rafacz. Source: Authors'archive.

Conclusions

The growth of popularity of Zakopane as a touristic destination helped the city to develop, yet as in other top touristic destinations around the world, today it may cause irreversible changes. The overgrowth of urban development, change of the city scale and growing number of tourists threaten local culture and surrounding nature. The ongoing process of city transition may provoke the loss of authenticity of Zakopane heritage architecture.

Urgent actions must be taken to stop and prevent negative factors and phenomena.

The Master Plan is highly needed for Zakopane, and the new document, unlike the current one, must be developed and revised by the same team of urban designers in order to keep unified points. Also, as in the past, the works of social initiatives (e.g. Towarzystwo `Opieki nad Zabytkami) is highly needed in order to educate and protect the heritage of the place. Other form of highly effective locals engagement are social consults, where residents can voice their opinion and ideas to the local government.

Changes in tourism are required as well. Education could increase the knowledge about the region in order to prevent degradation of local culture. The initiatives like creation of the Culture Park in Zakopane should also help in shaping the better image of the city, which would overall shift the target group of the visitors. The activities offered in the city should include the wider variety of cultural experiences.

References

- Mieczysław Mantyka (2008) *"Zanim powstało miasto"* Zakopane 75 lat Praw Miejskich, Urząd Miasta Zakopane, 2008 Zakopane
 Walery Eljasz (1870) *Ilustrowany przewodnik do Tatr, Pienin i Szczawnic*. J.K. Żupański, 1970, Poznań

- Zbigniew Moździerz, Marcin Roman (2016) *Rys Historyczny Rozwoju Przestrzennego i Architektonicznego*, Zakopane - Kraków 2016
- Zbigniew Moździerz (1998) *Początki architektury sakralnej w Zakopanem in 150 lat organizacji parafialnej w Zakopanem (1847–1997)*. Kraków Materiały z Sympozjum. Zakopane, 24–25 października 1997. Towarzystwo Muzeum Tatrzańskiego w Zakopanem. Wydawnictwo Św. Stanisława, 1998, Kraków
- Zbigniew Moździerz (2003) "Geneza i rozwój stylu zakopiańskiego.", Wydawnictwo Tatrzańskie, 2003, Zakopane
- Zbigniew Moździerz (2003) "Dom pod Jedłami Pawlikowskich", Wydawnictwa Muzeum Tatrzańskiego im. Dra Tytusa Chałubińskiego w Zakopanem nr. 24, 2003, Zakopane
- Stanisław Momot (2003) "Zakopane i Tatry" Wydawnictwo Krokus, 2003, Zakopane
- Zofia i Witold H. Paryscy (1995) "Wielka Encyklopedia Tatrzańska", Wydawnictwo Górskie, 1995 Poronin
- Lidia Długołęcka, Maciej Pinkwart (1989) "Zakopane Przewodnik historyczny", Wydawnictwo PPTK Kraj, 1989, Warszawa
- Jan Gw. Pawlikowski (1931) "O "Styl Zakopiński" w Budownictwie Zakopanego i Podhala" Polskie Towarzystwo Tatrzańskie, 1931, Kraków
- Stefania Krzysztofiak Kozakowska (1999) "Sztuka Młodej Polski", Ryszard Kluszczyński Wydawnictwo, 1999, Kraków
- Stanisław Witkiewicz, (1911) "Styl Zakopiański, Zeszyt II - Ciesielstwo" Wydawnictwo H. Altenberga 1911, Lwów
- S. Witkiewicz, (1904) "Styl zakopiański. Zeszyt I: Pokój jadalny," Wydawnictwo H. Altenberga 1904, Lwów
- Wiesław Biały (1991) "Budarka", in *Zakopane czterysta lat dziejów*, Tom I, KAW, 1991 Kraków
- Teresa Jabłońska, 2008, *Styl Zakopiański Stanisława Witkiewicza*, Olszanica BOSZ
- Jan Majda, 1979 "Styl Zakopiański", PAN, Nauka dla Wszystkich nr 303, 1979, Kraków
- Barbara Tondos (2009), "Styl Zakopiński i Zakopinaszczyzna", Zakład Narodowy im. Ossolińskich 2009, Wrocław
- Stanisław Eljasz Radzikowski (1901) "Styl Zakopiański" Krakow, Towarzystwo Wydawnicze, 1901, Lwów
- Jan Władysław Rączka (2001) *Walka o Polski Styl Narodowy w Architekturze*, Politechnika Krakowska, 2001, Krakow
- Maciej Pinkwart <http://www.pinkwart.pl/Zakopane/zakopane-historia.htm> 02.02.2018 17:28
- Stanisław Żychoń (1991) *Rozwój Przestrzenny i Budownictwo*, in *Zakopane czterysta lat dziejów*, Tom I, KAW 1991, Kraków
- Józef Tarnowski (2012) *Styl alpejski w Środkowej Europie i polska kontrakcja wobec niego - styl zakopiański*. Estetyka i Krytyka nr 2 (25), Wydawnictwo Uniwersytetu Jagiellońskiego, 2012, Kraków
- Ryszard Kantor (1991) *Gdzie chleb się kończy, a niebo zaczyna*. Kultura ludowa Zakopanego i okolic in "Zakopane czterysta lat dziejów", Tom I, KAW, 1991, Kraków,
- Tłoczek Ignacy (1985) *Dom mieszkalny na polskiej wsi*, PWN, 1985, Warszawa
- Małgorzata Skowrońska (2014) *Architektura drewniana Gminy Czarny Dunajec* Wydawnictwo Artcards Czarny Dunajec | Chochołów, 2014
- Władysław Matlakowski (1987) *Budownictwo ludowe na Podhalu 1892*, Kraków Akademii Umiejętności
- Józef Durden (1987) *Zdobnictwo budownictwa drewnianego w Zakopanem*, in "Podtarze", Zeszyt 3-4, Drukarnia Narodowa, 1987, Zakopane
- Juhani Pallasmaa (1988) *Tradition and Modernity: The Feasibility of Regional Architecture in Post-Modern Society* in "The Architectural Review", May 1988, London
- Joanna M. Sosnowka (2007) "Wystawa Paryska 1925", Materiały z sesji naukowej Instytutu Sztuki PAN, Warszawa, 16-17 listopada 2005 roku, Instytut Sztuki Polskiej Akademii Nauk, 2007, Warszawa

CULTURAL HERITAGE VS. CULTURAL TOURISM – THE ROLE OF MANAGEMENT

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Abstract

An essential part of urban development and planning is conservation of infrastructure heritage. Thus, the architect is a person who understands and knows how to make heritage architecture suitable for modern realities. However, architecture should be also a way to attract people and interact with them, directly and indirectly. Tourists already discovered the pleasure to find heritage places and understand local culture or the identity of the place. Nowadays tourism is becoming much more cultural and growing number of people desires to know better other cultures. More and more cities started to improve old heritage places to gain attraction of tourists. For some people this could be a great opportunity to make business and win money. For others, it is perceived like an invasion of people from other places in their territory, and because of that some of them are moving out, deciding to live out of the heritage areas. Therefore, cultural tourism is perceived nowadays as a controversial aspect of public policy. Nevertheless, the growing number of urban centers decide to invest in that concept and attire attention of potential visitors. In the article, we discuss how cultural tourism is developing, what impact it has on the local infrastructure and how it can influence the wreathless of regional cultural communities.

Keywords: Heritage, Tourism, Architecture, Public Management

1. Introduction

With the rapid development of globalization and the systematic growth of tourism, cultural institutions are beginning to see new opportunities for their activities. One of them is so-called “cultural tourism”. This phenomenon is characterized in the literature as “the movement of people to cultural attractions located outside their place of residence in order to gain new information and experience and meet their cultural needs” (Richard & Munsters 2010) . At present, cultural tourism shapes 40% of all tourist traffic in the world, and its popularity is growing every year. More and more cultural institutions strive to develop strategies that would encourage tourists to visit their institutions. On the one hand, it can contribute to popularize their educational mission. On the other, it means more financial inflows and investments.

As indicated by some of the cultural institutions involved in the development of cultural tourism strategies, attracting the attention of tourists to a given institution requires the development of a number of solutions that were previously not practiced in this type of entities. Significant barriers can be noticed especially in large metropolises (such as in Paris), where the interest of tourists with limited visiting time is already attracted by popular cultural institutions of global recognizability (Louvre, Museum d'Orsay, Center George Pompidou). Smaller institutions must therefore look for such strategies and solutions that would induce tourists to give up part of the main program for their offer. In this area, one can observe attempts to make individual contracts with tourist offices, city or region authorities as well as shaping niche interests and addressing unique cultural offers to them. Significant problems in the field of cultural tourism also appear in the case of smaller towns that are away from the main tourist routes or have only one (important from the point of view of the tourist's cognitive value) cultural institution.

An important barrier to cultural institutions is not only the problem of little time that a given tourist can spend in a specific place, but also the fact that this type of visitor attaches greater importance to entertainment during free time than the average guest. Effective encouragement of travel agencies and tourist groups to visit a given institution would force some of them to modify their current offer towards a greater combination of entertainment and education. Such solutions are still opposed by many managers of cultural institutions, claiming that this would violate the mission of their organization.

2. Challenges of Cultural Tourism

Cultural institutions that strive to increase the number of tourists' visits indicate the need to increase expenditure on promotion of cultural offer, information about the location of the institution, creating a friendly atmosphere and more permanent offers (so that the tourist can visit his friends after returning home) (Colb 2013). The motivation of tourists to take up activities in the field of cultural tourism is diverse and it depends mainly on individual experiences, values and attitudes. The literature notes that the main motivation of tourists include: relaxation, the need for stimulation (rest and escape from the environment, seeking an adventure), establishing and developing relationships with others (spending time with family and friends), developing knowledge and increasing the level of self-esteem (need increase knowledge about a given place and share it with the environment) and a sense of fulfillment (willingness to feel part of a given place) (Duhme 2012).

The vast majority of tourists' offers is placing particular emphasis on the first three of abovementioned motivations. However, in the case of cultural tourism such elements as developing knowledge, increasing self-esteem and feeling of fulfillment of the tourist are becoming particularly important. Unfortunately, it is still observed that cultural institutions forget about the need to provide tourists with entertainment and the opportunity to develop relationships. This can be the main reason why many institutions still fail to present coherent and attractive offer which would delight the demands of cultural tourism.

The analysis of case studies in the field of cultural tourism allows to notice that cultural institutions are building their strategies in this area of cooperation with the city or region in which they operate. Modern research indicates that this type of cooperation has a positive impact not only on the institution itself and the promotion of its cultural mission but also on the development of the city's region. It is noted that the development of cultural tourism has an impact on economic growth in a region, number of new jobs and economic development (Colb 2013). Cooperation of cultural institutions with cities / regions can build a sense of the authenticity of the place, satisfaction with staying in the particular area and attachment to the place by creating its expressive identity, arousing positive emotions, encouraging return (Ramkisoorn 2015). From the point of view of the development of relationships within the urban center, it is noted that opening up to cultural tourism can have a positive effect on the creation of a more integrated community (Mgonja et al 2015). This type of cooperation is widespread in Europe and America. Similar trends in this area are noticed even in African countries where cultural tourism is considered a significant stimuli of the economic development.

3. New Trends and Constraints of Cultural Tourism

In modern literature, it is noted that the development of research on cultural tourism has become an important area of interest of the public sector where studies on the impact of this phenomenon on the economic growth of a given region started to be more and more visible. However, relatively less space is currently devoted to strategies that could be used by cultural institutions to increase the effectiveness of their activities in this area. Current trends indicate that cultural tourism will continue to be an important phenomenon both in the social and economic perspective. For this reason, it should be perceived as a clear opportunity for cultural institutions and analyzed as a potential direction of development in the future.

Table 1 - Pros and cons of cultural tourism



The opponents of cultural tourism used to claim that its development can have mainly negative effects on the functionality of local communities. First, the growing number of people visiting the city is contributing to the faster destroying of infrastructure (both modern and heritage). That problem is more and more visible in main European cultural centers – Venice, Paris, Barcelona. It is observed the rising polarization between tourists and locals who started to establish their organizations and make protest to force local authorities to limit the number of tourists visiting the city. The protesters used to claim that city centers started to be more congested and polluted. Second, the cultural tourism is changing the cultural heritage of the place. The growing number of tourists impede the habits and traditions of locals who started to move out of the city centers. The direct consequence of that phenomenon is that the cities are changing into scansions, losing their identity and unique cultural shape. The tourists are losing the opportunity to see real people in their natural environment. The opponents of cultural tourism claim that their cities are changing into zoological garden where tourists observe them as animals. The locals who change their place of residence start to be replaced by actors and their homes become artificial places (restaurants, clubs) which have nothing to do with real cultural heritage. Thirdly, the cultural tourism is leading to the growth of prices. The opponents of that phenomenon prove that business is raising the prices of apartments and basic products to earn more money on tourists who are prone to pay more during their holidays.

4. The Future of Cultural Tourism

The future shape of cultural tourism is mainly unknown as far as the attitudes of local authorities, global organization and locals perceive it in a different way. As it was mentioned before, in European wealthy metropolities it is perceived negatively by locals who strive to limit its scope. They started to form not only local organization but local parties which are getting more and more voices in elections (for example: Spanish Podemos). Their success can lead to the limitation of tourists visits what they want to achieve by costly fees to enter their cities. The proponents of cultural tourism is mainly local and international business which see in that phenomenon a chance for making money by selling cheap Chinese souvenirs or opening plenty of 'local' restaurants and hotels,

The cultural tourism is differently perceived by smaller, less wealthy cities in regions. Since robotics era is more and more developing and factories used to be closed, more people suffer from unemployment and poverty. The unqualified workers see an attractive chance for their survive as far as cultural identity is very often the only resource they can propose to the outside world. Unfortunately, the cultural tourists seem to be still more attracted by most recognizable metropolities than the local communities. To gain their attention demand more reasonable and coherent strategy as well as more media attention and internet buzz.

The phenomenon of cultural tourism is constantly developing. More and more strategies and affected by multisensory experience, 3D technology, virtual and augmented reality as well as gamification. To entertain the tourists becomes the main objective of the companies who organize the trips. However, new technologies and innovative strategies lead to the dynamic changes in such offers. In consequence, to prepare attractive and up-to-date strategy demands more money and experts. For this reason only the most wealthy urban centers are able to keep up with the Joneses.

The other form of cultural tourism started to develop in the paradigm of "sustainability" what is mainly supported by locals and international organization. Its proponents urge to perceive cultural tourism as multidimensional and coherent process which demand reasonable management strategy. Thus, the urban centers and cultural organization should pay attention not only to the financial effects of such form of tourism but also to planning, organizing and controlling. According to sustainable cultural tourism the tourism traffic should be limited if it has negative consequences for community. On the other hand, the urban centers should develop strategies which would encourage both tourists and organizers to respect local traditions and heritage.

Table 2 - New solutions in cultural tourism offers.



Conclusion

In summary, cultural tourism is intrinsically connected to the development globalization. It is perceived as a chance for development as well as a danger for cultural identity. More and more cultural institutions try to find strategies which will encourage tourists to visit them and improve their financial position. Similar economic perspective is cultivated by business. The opponents of that phenomenon are mainly locals who observe the growing prices, deterioration of local infrastructure, pollution and little respect for their culture. It seems that to balance the effects of cultural tourism the contribution of global organization will be necessary. Only the international, cross-cultural groups seem to be adequate to work out the system that would meet demand of tourists and protect local heritage.

As the vast majority of social phenomenon connected to globalization also cultural tourism is raising both ethical and strategic doubts. On one hand, it promotes local tradition and heritage, shows people new perspective and build intercultural tolerance. On the other hand, the massive tourism waves are constantly destroying local infrastructure, violate its unique identity and influence the social structure of the place. Undoubtedly, the cultural tourism demands strategic thinking and management which can improve both the impression of the visitors and, simultaneously, protect the local heritage of the community.

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References

- Greg Richards, Wil Munsters (2010) *Cultural Tourism Research Methods* – 2nd edition, CAB International, Oxfordshire, p. 15.
- Bonita. M. Kolb (2013) *Marketing for Cultural Organization New strategies for attracting audiences to classical music , dance, museums, theatre and opera* (2nd Edition), Cengage Learning EMEA, Cork, p. 131-132.
- Laura Duhme (2012) *Cultural Tourism: Case Study Portugal*, Diplomica® Verlag, Hamburg, p. 22.
- Haywantee Ramkissoon (2015) *Authenticity, satisfaction, and place attachment: A conceptual framework for cultural tourism in African island economies*, *Development Southern Africa*, 2015 Vol. 32, No. 3,p. 298.
- John T Mgonja, Agnes Sirima, Kenneth F. Backman & Sheila J Backman (2015) *Cultural community-based tourism in Tanzania: Lessons learned and way forward*, *Development Southern Africa*, Vol. 32, No. 3, s. 387-388.

POTENTIALS OF THE BELGRADE INDUSTRIAL HERITAGE IN THE CONTEXT OF TOURISM DEVELOPMENT

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Abstract

The Belgrade Waterfront area along the Sava and the Danube rivers has a large number of abandoned industrial buildings that have significant values that need to be preserved and revitalized. Some steps in this direction have already been made and some industrial buildings represent significant premises in the tourist offer of the city. In the last decades, some development projects have had a negative effect with regard to the industrial heritage of Belgrade and the historical cityscape, with its characteristic morphology and typology, is gradually fading away. In order to stop this tendency and demonstrate a will to achieve further sustainable development, it is necessary to redefine the approach to the protection of industrial zones, creating a new one for urban and spatial planning, taking into account all the values, tradition, authenticity and identity. The focus of analysis will be on the contemporary proposals for reactivation of Belgrade Waterfronts and its implementation. The question is: How the tourism market trends affect the cultural heritage protection policy and whether processes of industrial heritage reuse should be spontaneous or imposed?

Keywords: Belgrade waterfront, Industrial Heritage, Rehabilitation, Tourist Potential

1. Introduction

Preservation of industrial architecture in Serbia is often compromised by a lack of appreciation of their values. Because most of this buildings and sites date from the 18th to the 20th century, sometimes, they are not regarded as sufficiently old to focus the attention of either conservation experts or citizens and users. They don't understand that the buildings which represent their everyday environment actually possess the values and characteristics of monuments. For that reason they are exposed to degradation processes, the areas and buildings are neglected and left to decay. Even though same efforts are taken in Serbia to find a more adequate conservationist approach, to modernise the legal and administrative systems, to integrate conservation into the planning process, and to achieve greater co-operation between the protection service and urban planning, it is becoming more and more difficult to protect the endangered urban heritage, while the preservation of its authenticity and integrity is becoming a prime professional task. Although the conservation of cultural heritage has been integrated into the laws, planning process and master plans, such in Belgrade, aiming to involve a large number of stakeholders and citizens, in the practice we can see many problems and inconsistencies in implementation those goals.

2. Urban Development And The Industrial Heritage Of The Sava And Danube Riverfront Area

The close relationship between the two rivers, the Sava and Danube, and the city is one of the main elements of Belgrade's specific historical and cultural identity, authentic urban morphology and special cityscape characteristics (Roter Blagojević 2015). The modern urban development of Belgrade in the early 19th century, after the establishment of The Serbian Principality and its partial political autonomy within the Ottoman Empire, is connected with the rapid development of trade and river traffic and the establishment of the first manufacturing workshops. The economic centre of the city was in the area of the Sava Port, as the main connection of Belgrade and Serbia with the Austrian Monarchy and Europe. There, developed a new trade and transit district and trading houses, hotels and warehouses were built. It displayed the new European spirit, liberation and modernisation and many foreign travellers left testimonials that area was very colourful and vivid. After the proclamation of the Kingdom of Serbia in 1882, stronger ties with Europe were established, especially with the Austro-Hungarian Monarchy. Foreign capital arrived in Serbia, the first industrial factories were built and the state experienced constant economic growth. This was especially supported by the construction of the railway (1881-84) and the first railway bridge over the Sava River. The railway was to have a crucial impact on Serbia's future development and Belgrade became a link between Europe and Sofia and Istanbul. The greatest changes were made around the Sava River's right bank, where the Railway Station was built in 1884 which today stands as proof of the technical and architectural development of Serbia (Kulenović 2010). On the Danube River bank area (near Pančevo Bridge) the First Industrial Slaughterhouse was built in 1895 and has recently been in the process of valuation as a cultural property with preventive protection (Kulenović 2010). The railway, parallel to the river bank was built in 1898-99, and linked the new industrial area on the Danube with the Railway Bridge on the Sava, cutting the connection time between the town and the rivers. The expansion of the city toward the river bank was planned, with a new structure with square blocks covering the area between the railway station and the river bank, as recorded on the *Bešlić plan from 1898* (Roter Blagojević 2015). However, this has not been realized and today this area is a part of the new Belgrade Waterfront project. New industrial complexes were built on the south-west entrance to the city, at *Mostar*, near the Sava River and the railway bridge, and on *Palilula*, near the Danube

River. The attractiveness of the Danube area was as a result of the railway connection, the easy supply of water and wastewater discharge, and the vacant, undeveloped land (Mihajlov 2011).

After WWI, Belgrade was the capital city of the new Kingdom of Serbs, Croats and Slovenes (later the Kingdom of Yugoslavia) and rapidly grew. City lost its centuries-long border position and the large-scale reconstruction was planned. One of the basic goals of the city authorities was a modern city community infrastructure. The first Master Plan was completed in 1923 and one of the main highlighted problems was that of traffic, especially river and railway traffic, with the consideration that such traffic was of vital importance to the city's successful future planning, growth and development. In order to connect Belgrade with the Pannonia Plain, new bridges over the Sava and Danube were planned (Vukotić Lazar and Roter Blagojević 2017).

During the 1920s and 1930s, the 29 industrial facilities from beginning of the 20th century very quickly increased so that in 1941 Belgrade had 206 registered industrial facilities (Petrović 2006). The majority were located along the banks of the Sava and the Danube, at *Čukarica*, *Mostar*, *Savamala*, *Dorćol*, *Palilula* and *Karaburma* (Kulenović 2010). We can say that this industrial heritage represents a part of the European heritage and memory, since a great number of the industrial buildings were built by architects from Central European countries (Hungary, Austria, Bohemia, Germany and France) and the typology of the buildings are similar to European ones, although specific local elements can be noticed. One of the major facilities was the new Municipal Power Station *Snaga i svetlost*, erected in 1932 (Mihajlov 2011).

Many buildings along the river banks were severely damaged during WWII by the German bombardment in 1941, as well as by allied forces in 1944. Consequently, the period immediately after the war was characterised by the loss of one half of the industrial facilities, bringing their total registered number in 1950 to 90. The establishment of a new political framework and socialist state brought significant change to the industrial sector. In addition to the processes of a planned economy, the industrial sector was also shaped by the process of homogenisation of individual locations and manufacturing facilities. The spatial distribution of the manufacturing facilities themselves remained unchanged, with a higher proportion of facilities on the waterfront (along the Danube). The period of the 1960s was characterised by the constant annual growth of industrial production with an attempt to relocate manufacturing to suburban areas, within the framework of the new homogenisation processes for industrial facilities. The period of the 1970s and 1980s was characterised by a process of relocation of industry from central city areas, but also by the opening of new facilities on the waterfront. In this period, the economic sector lost touch with innovation and the processes of modernisation of the industrial facilities (Petrović 2006).

A period of disintegration in the 1990s considerably increased the negative trend in the industrial sector and accelerated the processes of degradation and the closing of numerous industrial complexes. This process, as well as a poor strategy for industrial production, additionally increased the market fragmentation. Industrial production dropped by 20%, and the negative trend that started in the 1980s reached its culmination. In the urban development plans the river bank area was never considered as an integral part of the city fabric and a major part of the old industrial zone is nowadays devastated and neglected (Djukić et al. 2014).

3. The renewal of industrial heritage on the Sava and Danube rivers banks and the creation of a new city image

Regardless of the state and neglect, the specific historical and urban identity and use of the Sava Port area is preserved until today. The area is the basic element of historical cityscape of Belgrade and the Sava River waterfront and in the focus of interests of planners and investors. The most important area on the confluence are the *Belgrade fortress*, listed cultural monument of outstanding value and the *Kosančićev venac*, cultural-historical unit of great value.



Figure 1 – a) View of Beton Hall; b) Restaurant “Comunale”; c) Restaurant “Sofa” (<https://www.betonhala.rs/>)

At the river bank, the important old infrastructural building is *The Concrete Hall*, the railway tunnel with a row of white warehouse blocks in the front, facing the river (Kulenović 2010). In the end of 20th century the Concrete Hall became abandoned and ruined, but in last decade the excellent position on the river bank and view on the confluence affected the old warehouses to get a new use as recreation and tourist area. The new river bank waterside promenade is formed. The *Concrete Hall* now is occupied by exclusive contemporary restaurants and cafes and this area lives a dynamic nightlife. But the problem with late 19th-century

railway which connected industrial facilities at the Sava and Danube river bank still exists. It has a great impact on the possibilities of urban renewal and development of the Sava port area and safe movement of pedestrians.

The importance of Sava Port area for preservation of historical cityscape and future touristic development of the city is evident. For this area in 2011 carried out international competition for a project which would create a new access point from the Sava river bank to the historic core on the hill. The project of *Beton Hala Waterfront Center* by Sou Fujimoto Architects - 'floating cloud' - won the competition. It was one of the recent attempts to create the competitive identity of the town and to brand the city through the famous architect's projects (Vaništa-Lazarević 2015).

The one of a specific and internationally well-known area, which today is a kind of independent artistic quarter, is ambience under the Sava Bridge, today is known as *The Savamala creative district* (Vaništa-Lazarević 2015). The main bank street, Karadorđeva St, is even today one of the main traffic city arteries for transport, noisy and polluted. Today most of the old residential buildings and warehouses from late 19th and early 20th century are abandoned, ruined and in very bad condition. Young creative people occupy streets and some old buildings and today *Savamala* is converted in the heart of Belgrade's new wave of cultural activity and alternative culture, where they work together to redefine the wider image of the city. The informal cultural events happen spontaneously encouraging various alternative approaches of young artists. Many hostels occupy houses and flats in *Savamala* and in *Karadorđeva St.* near bus and railway station. A poor area has become an extremely attractive tourist spot.

The Cultural Center Town (KC Grad) is one of the epicentres of creative industries - hosting exhibitions and creating a platform for alternative activities in the city - simultaneously drawing attention to the surrounding riverside neighbourhood, still in very bad condition. Also nearby is open a comedy club, as well as many music clubs, taverns and restaurants, and creative places as a contribution for the rebirth of the whole neighbourhood (Vaništa-Lazarević 2015). One of *Savamala's* most prominent venues - the cult place - was *The Mixer House*, a design center and performance space occupying a vast old warehouse. Unfortunately, today *The Mikser House* is closed and there is an exclusive restaurant, cultural artistic contents are no longer in the focus of the new owners.



Figure 2 – a) View of Savamala; b) “Mikser” House before; c) “Mikser” House today – restaurant Remix

The Savamala district shows that civil society, independent creative people, and entrepreneurs, with joint actions and small investments, can initiate the development of old ruined areas of historical cities (Vaništa-Lazarević 2015). Problem is that that independent cultural activities hasn't official support. Today the most important government and city project are *The Belgrade Waterfront*, lanced in collaboration with an investment fund from Dubai and construction firm *Eagle Hills*. The old industrial and traffic area along the right Sava riverbank include business offices, vast shopping malls, luxury hotels and apartments. And, in style so typical for Middle Eastern cities its centerpiece will be a 200-meter glass tower. The project is the result of City authorities and Government wish to brand the Serbian capital and to undertake the development of the city and country. The design totally reverses the historical development and identity of the old riverside industrial and traffic area. The new high buildings will block the view from the river to the old town. The continuity of cityscape, from Belgrade fortress and Sava port area to the *Mostar* area, will be cut off and disturbed by new high buildings. The old city dominant buildings with their domes, like Church St Sava on the *Vračar* hill, will be blocked (Roter Blagojević and Nikolić 2017).

The area of *Railway Station* is the part of the project. According to the plan, only the old station building will be preserved on the green round square and transformed into a museum. The *Mostar* area is part of that project too. The old railway facilities - like railway locomotive depot and water tower - which are under preventive protection as technical heritage - will be preserved, but without its historical ambience and surrounded by new high buildings.

The entire old *Mostar industrial area* is awaiting transformation and renewal. Today the old industrial buildings are abandoned and ruined. They are privatized and new owners have not financial power for renewal and adaptation. They are rented as free space where young creative people gather and work together (artists, designers, and musicians) or as offices, stores, and warehouses. Especially, *The Printing Shop* is in ruined condition. Only *The Old Mill* is revitalized as a modern hotel, *The Radisson Blue* (by Soravia Group), designed by Biro GRAFT, Berlin, in 2013-2014, with modern facilities, but with inadequate new additions - the high two towers behind and one in front of the old building. The process of reconstruction of the old building was inadequate too. The old building was destroyed and entirely reconstructed with new modern reinforced concrete construction. Only the old bricks were recycled as material and used for the façade walls. A very valuable old cast iron construction with pillars and beams

were removed, and the old machinery and all equipment too. On the site is evident a disparity between old and new structures, mostly due to the fact that space is overbuilt and the new buildings are too high. The additions are dominant, blocked the old protected buildings, Old Mill and Printing Shop, and are not harmonizing with the surroundings. The old pillars are at present outside, as decoration of *piazzetta* in front of the building. Inside is modern interior design with façade walls of old bricks. Only that is preserved from the authentic building. This project showed that investors and designers did not respect cultural and technical values of the historical industrial site (Roter Blagojević and Nikolić 2017).



Figure 3 – a), b) The Old Mill – before and now is The Radisson Blue Hotel (<https://www.radissonblu.com/en/hotel-belgrade>)

For the industrial zone along the Danube River, we can see two new development projects - *Marina Dorćol* and *Port of Belgrade*, which have a tendency to remove industrial facilities and introduce residential and commercial properties. In order to modernize and create new parts of the city, great names from the world of architecture have attracted, such as Daniel Libeskind and Zaha Hadid, to form a new look of Belgrade with their projects. However, these modern visions to some extent devastate the historical identity of the city.



Figure 4 – a) The Port of Belgrade today; b) The project for Port of Belgrade, D. Libeskind (<http://www.lukabeograd.com/en/city-on-water/master-plan.html>)

The main goal of the project for renewal of the old Cargo Port of Belgrade (*Luka Beograd*), done by Daniel Libeskind, was to activate the great potential of the coast and to build a modern center as an integral part of the city that will improve the river area and future image of the city of Belgrade (Djukić et al. 2017). The location of the Cargo Port of Belgrade was divided into residential areas connected with green areas. The industrial facilities of significant historical, architectural and technical value were proposed to be restored and revitalized for the center of contemporary art and creative industries. The *Marina Dorćol* is another project planned for the construction of the new city center with commercial, residential and sports facilities, etc. The old crane of old Thermal power station “*Power and Light*”, a significant example of modern industrial architecture is preserved as sign of the past (Djukić et al. 2017).



Figure 5 – a) Area of Marina Dorćol and Industrial Heritage “*Power and Light*” with old crane; b, c) Project of Marina Dorćol with old crane (<http://www.stmgconsultancy.com/project/project-engel-marina-dorcol-belgrade-serbia/>)

Near to the *Belgrade Fortress*, on the Dorćol area, is located the former *Textile Factory “Beko”*. The location is about 500 m away from the city center. The factory’s location was sold to the Greek company Lamda Development and the development project was done by Zaha Hadid Architects in 2007 - 2012. Through 94,000m² various residential and commercial facilities are envisaged, such as exclusive residential areas, business premises with offices, five-star hotel, congress center, shops, etc. (Vukmirović 2015). The project was criticized by professionals who are engaged in the protection of cultural heritage because it violated the historic silhouette of the Belgrade Fortress and the surrounding protected area.



Figure 6 – a) The Belgrade Fortress and textile factory “Beko”; b, c) Beko Masterplan by Zaha Hadid Architects (<http://www.zaha-hadid.com/masterplans/beko-masterplan/>)

4. Strategies for management of historical ambients related with cultural tourism development

Due to the recognition of tourism as a generator of economic development, there often comes to commercialization and exaggerated interventions on cultural heritage, for the sake of providing comfort and variety of tourist offer. Historical units on representative locations within the city core are particularly exposed to economic and political influences that are often contrary to conservation practices. Conservation is also largely dependent on funding from funds - in Serbia, mainly from the state budget or foreign funds, which gives special weight to the conservation and politics of relations, i.e. to confront the interests of the state, city or local self-government.

In contemporary circumstances, the focus in preserving cultural heritage rests on self-sustainability and integrative approach, and cultural tourism is recognized as a driving force and a fundamental factor in self-financing of heritage, combining economic gain and fulfilment of the basic goal of protection, spreading knowledge about culture and the history of one place. Often, the economic gain from cultural tourism is oversimplified in relation to reality and often happens that it dictates conservation. Focusing exclusively on cultural tourism and adaptation of heritage, primarily to the needs of tourists, in addition to often unjustified interventions, the issues for which urban history of the city and its heritage are related are being ignored, because in order to meet the needs of tourists, it tends to the general values of comfort, which leads to globalization and loss the original ambience and the spirit of the city. Also, both restored and revitalized areas become inaccessible to the local population, due to the high cost of living and the excessive number of tourists (Pavlović, 2017).

Similar problems and difficulties common in the rehabilitation of historical urban structures require outlining active methods which will, through integrated management process, enable their new role associated with social, urban and conservatory issues. The focus should be directed to: the preservation of social links which hold the community together; preservation or revival of residential function; preservation of economic, social and cultural functions in a certain balance; help to improve environmental conditions; restoration of as many buildings as possible in a sustainable manner and protection of human ambience in the world dominated by global networks which are diminishing contact between people and fostering alienation. Some industrial buildings on the Sava river can be successfully revitalized with appropriate tourist and cultural facilities (hotels, museum and gallery spaces, etc.), which would lead to significant tourist offerings of this part of the city. *The Vapa Paper Factory*, *the Sugar Factory* on Čukarica, near to Ada Ciganlija recreate area, or the old *Printing Shop*, listed cultural monuments, can be successfully revitalized and obtained new facilities due to the degree of preservation its authentic architecture.

Voluntary and long-term actions have to be based on the preservation of recognizable urban values, establishment of political commitment and development of a suitable management framework. Urban values are: *identity* – recognition of morphology and typology, the significance of rehabilitation of public areas, and the change of architecture perception – residents should identify themselves with the surrounding buildings; and *complexity* - diversity in social and functional sense, ensuring that different social groups and features can exist together and that they can change. (Pickard & de Thyse, 2001)

Political commitment on the national and local level is necessary for the success of rehabilitation of historical urban centers by means of financial help and legal regulations. Local authorities should be linked to the social and private sector. Rehabilitation should be a part of official policy, so that rehabilitation of old buildings is ensured, help to low-income residents provided and gentrification, the creation of exclusive urban neighbourhoods. Active democratic participation of the wider community is required (local residents and interested investors), their organic interconnection in the process of making decision on changes; creation of decentralised and interdisciplinary teams which design plans and interventions; in order that the process of planning

should be flexible and changeable depending on the wishes of the local residents, entrepreneurs and investors; rehabilitation should be based on sustainability and preservation of optimal environmental state of vicinity; traditional construction materials and techniques should be maintained when renovating or constructing new buildings, removal of heavy traffic and pollution, restriction of motor traffic and similar; provide coordinated, controlled and sustainable tourism management in order to generate income through the work of the local community but without large pressure of new tourist functions which could damage the state of protected historical environments. The ultimate goal is to connect the past with the present and the future needs of the community (Pickard & de Thyse, 2001).

5. Conclusions

Through the transition of the society, socio-economic relations and competencies are also changing. Different actors and interest groups are involved, and funding gets different scope and pace. Laws and regulations in the field of cultural heritage in Serbia did not follow these changes with other laws, which make cultural monuments, and the protection services, into an unhealthy situation. Common for all transition countries is that urban development is taking place at a much faster pace than in the West, urban resources are limited; there is a desire to modernize and speed up the process of urbanization. All this contributes to the proposals and ideas about various, sometimes overly and unsuitable content in historical areas, primarily under the justification of the development of cultural tourism and economy. In this sense, it is necessary to prevent the negative aspects of tourism development, such as: a) inadequate consideration of potential conflicts between tourism development projects and heritage protection, which most often leads to the development of bad plans and adverse impacts on natural and cultural heritage, as well as in the way the lives of local communities; b) conservation, interpretation and tourism development programs based on inadequate understanding of complex and most often conflicting important characteristics of the area can lead to the loss of its authenticity and recognition; c) the lack of an adequate and appropriate presentation of the importance of heritage, both to visitors and local communities, can lead to misunderstanding and a poor relationship to culture and the heritage of the area in the wider sense; in this way, it is possible to prevent or significantly reduce public and political support, as well as the available financial resources for the protection and promotion of heritage (Pavlović, 2017).

Based on the above, it can be concluded that these problems are in accordance with the views of the contemporary methodology of protection, and that the laws and strategies that define the field of tourism offer a framework for an integrative and self-sustainable approach to the protection of cultural heritage, which is also sought in the contemporary approach to protection, revitalization, and presentations of historical spaces. It is necessary to devise long-term plans for Belgrade Waterfront which will increasingly involve various official and civil initiatives, make the area attractive for investment but with the preservation of cultural character and old construction fund. During the future planning and designing, radical changes such as demolition of old buildings with environmental character, construction of new buildings of dominant heights should not be permitted but real and coordinated changes which will take into account the past should be created in order to create diverse environments which will represent harmonized blend of the old and new in accordance with the modern needs. By establishing monitoring, a consistent plan for the protection and revitalization of the Sava and Danube coastal areas will be implemented consistently. Monitoring should consist of two segments: one is monitoring the state of the whole, and the other is monitoring the implementation of the plan.

References

- Aleksandra Djukić, Eva Vaništa Lazarević and Milena Vukmirović (2014) *Planning framework, projects, urban competitions and visions for development of Sava Amphitheatre*, in *Izgradnja* 3-4, pp. 103-121.
- Aleksandra Djukić, Ana Špirić and Tijana Vujičić (2017) *Urban Design Competition and Megaprojects in a Context of Identity of Cultural Heritage: Case Study Belgrade's Riverfronts*, in e-Monographic Publication of ICOMOS Slovenia: Protection and Reuse of Industrial Heritage: Dilemmas, Problems, Examples, ed. by Sonja Ičko and Marko Stokin, Ljubljana: ICOMOS Slovenia, pp. 59-71, <http://icomos.si/files/2015/06/monographic-publication-2.pdf>, 14.02.2018.
- Dragan Petrović (2006) *Istorija industrije Beograda. Razvoj i razmestaj industrije Beograda u XIX i XX veku*, Beograd: Srpsko geografsko društvo.
- Eva Vaništa Lazarević (2015) *Urban regeneration tools (city branding) in Belgrade after the democratic change in 2000 – social frame*, in *Planning Capital Cities: Belgrade, Bucharest, Sofia*, ed. by Grigor Doytchinov, Aleksandra Đukić and Catalina Ionita, Graz: Verlag der Technischen Universität Graz, pp. 174-187.
- Marta Vukotić-Lazar and Mirjana Roter Blagojević (2017) *The 1923 Belgrade Master Plan – historic town modernization*, in *Planning Perspectives*, pp. 1-18 (<https://doi.org/10.1080/02665433.2017.1408485>).
- Marta Vukotić-Lazar and Marija Lalošević (2010) *Beograd u mapama i planovima od XVIII do XXI veka*, Beograd: Urbanistički zavod Beograda.

Marina Pavlović (2017) *Kulturni turizam – izazovi za kulturno nasleđe*, in *Moderna konzervacija* 5, pp. 97-107.

Milena Vukmirović (2014) *Belgrade: The quest for the desired city image*, in *Planning Capital Cities: Belgrade, Bucharest, Sofia*, ed. by Grigor Doytchinov, Aleksandra Đukić and Catalina Ionita, Graz: Verlag der Technischen Universität Graz, pp. 188-211.

Mirjana Roter Blagojević (2015) *The modernization and urban transformation of Belgrade in the 19th and early 20th century*, in *Planning Capital Cities: Belgrade, Bucharest, Sofia*, ed. by Grigor Doytchinov, Aleksandra Đukić and Catalina Ionita, Graz: Verlag der Technischen Universität Graz, pp. 20-42.

Mirjana Roter Blagojević and Marko Nikolić (2017) *Dilemmas and Problems in Active Reuse of Belgrade Industrial Architecture – The Case Study of the Sava River Area*, in e-Monographic Publication of ICOMOS Slovenia: Protection and Reuse of Industrial Heritage: Dilemmas, Problems, Examples, ed. by Sonja Ifko and Marko Stokin, Ljubljana: ICOMOS Slovenia, pp. 25-35, <http://icomos.si/files/2015/06/monographic-publication-2.pdf>, 14.02.2018.

Rifat Kulenović (2010) *Industrijsko nasleđe Beograda*, Beograd: Muzej nauke i tehnike.

Rob Pickard and Mikhäel de Thyse (2001) *Management of Historic Centres: towards a common goal*, in *Management of Historic Centres*, Volume 2 of Conservation of the European Built Heritage Series, ed. By Rob Pickard, Taylor & Francis, pp. 274-290.

Saša Mihajlov (2011) *Nastanak i razvoj industrijske zone na desnoj obali Dunava u Beogradu od kraja 19. do sredine 20. veka*, in *Nasleđe XII*, pp. 91-116.

ARCHITECTURE HERITAGE MOOD

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Abstract

Conservation of built heritage is an essential part of urban development and planning. The built heritage adds variety to the urban environment, stimulating visual interest and excitement to the environment. Restoring and conserving historical buildings also adds to the distinctive identity and character of the environment and more importantly give the sense of memory and history even as people move to the future (Probst, 2013). The complexity and the culture of a community or a city are recalled through heritage buildings. Through historical buildings-whether they are related to something recognizable dramatic or famous, longtime residents and tourists can see the cultural and aesthetic history of a place. A city needs heritage buildings to maintain the sense of heritage and permanence. The spirit of the place is connected with the memory of the place, and our intention is to spread this concept as a main startup for a new cultural and architectonic touristic place.

Keywords: city, architecture, heritage, mood

1. Architecture heritage

The term mood is determined as a mild feeling state that can be defined as either pleasant or unpleasant and which has a broad influence on perceptions, motivation, and behavior. The historical environment and the heritage buildings is a shared resource and it is not an individual resource. Heritage buildings and the environments are shared resources, and everybody in the community is expected to be responsible for the conservation of the resource.

We will attempt to answer the question about how Urban Health Vs Urban Communication, improve the architecture heritage mood.

We could say that Moods are like feelings but less emotional. The term mood can be defined as the moment to moment emotional tone that a person experiences (Manjunatha, Khess, & Ram, 2009).

This article will examine both the practical and cultural values of heritage buildings and look at some of the reasons that make their preservation of the buildings are beneficial to both the culture of a community and the local economy.

Buildings of a particular era have intrinsic value. Structures of a given age tend to be built using high-quality materials such as rare hardwoods that were only in the period and no longer exist. The standards in the buildings were also different. The principles that were used in the heritage buildings might be better as compared to the brand-new counterparts. The other reasons that make heritage buildings are that when they are destroyed, one could not know the value of what is damaged. A developer may purchase a building with the aim of bringing it down and putting a new structure in place. The eyesores that these buildings have can be relevant to the heritage of a community (Probst, 2013). When they are destroyed, a heritage of a city may be damaged.

The heritage of a community may be linked to some business that may describe the culture. Currently, some new companies prefer heritage buildings. There are some economic advantages that some enterprises achieve when they are located in heritage buildings. The heritage buildings have been determined to make sense for business, and several have thrived well in the heritage buildings when compared to those in new constructions. Heritage buildings are centers of attraction. Through the visits, the heritage of a community lives on. Those who love heritage buildings think the buildings are more interesting than the new ones. The different levels, the awkward corners, the vestiges of other uses and the mixture of style make people have something to talk about all the time they see the buildings. Heritage is preserved through the discussions on the structures and their importance in the era they were built. Whether the feeling is homey, patriotic, reassuring or warm, old architecture tends to fit the bill. No matter the type or standard of lives that the Americans live, they prefer to picture themselves living in the heritage buildings.

There must be a relation between the subject and the object so that the aesthetic experience comes to life, led by time and sense. As originally posited by Umberto Eco, there must be a dialog between the subject and the object (Eco 1989). Improving an emotive experience in the street, after our research, means that our mood and feelings, could be better or worse because of the shape, color volume, and texture of one building of the street, or from all street. Those buildings are the meaning of the message and will help to translate the idea, about the recognition of the place.

A city needs heritage buildings to maintain the sense of heritage and permanence. In preserving heritage buildings to preserve the culture of a community, it is essential to consider that regret only goes one way. The preservation of the heritage buildings is just one way such that there is no chance that the buildings will be renovated to save the historical aspect once it is gone. When the heritage buildings are restored, their value decreases. Once a piece of history is lost in the buildings, it is lost forever.

2. Principles of conservation of heritage

In the previous chapter, the importance of preserving heritage buildings to protect the memory of a place was discussed. In this chapter, the principles of conservation of heritage buildings will be addressed. The policies outline some of the practices to ensure the heritage buildings are conserved.

The first principle is on the consideration that the conservation of the heritage buildings is based on respecting all the heritage values of the building and the place without unwarranted emphasis on any of the aspects at the expenses of the others. Through this principle, the conservation of heritage buildings is viewed as a protection of values of the premises without emphasizing of only one of the aspects over the other (Umeda, 2012). The cost of the building should be seen as equal. Another principle is that the conservation of the buildings should include maintenance of the buildings, provision of security and providing for its future. According to the principle, the heritage of the buildings is maintained when the community provides protection avoid damage to the aspects that make it a heritage and not an ordinary building considering its importance in the future. In protecting the buildings, everyone is expected to participate

According to Willson & McIntosh, (2007), conservation of heritage buildings should involve the least physical interference. The necessary should be done to the buildings with little interference with the natural make of the building. Through physical intervention, the heritage of the buildings may be lost. In the conservation of heritage building, all experiences, knowledge that can contribute to safeguarding and the study of the place should be applied (Forde, 2007). According to the principle, the information about these heritage buildings that could effectively help in conserving the buildings should be applied. On another principle, the conservation of heritage buildings requires recording accurate decisions and changes that are made to the buildings and the reasons behind the decisions or changes (Willson & McIntosh, 2007). There are situations that changes to the heritage buildings cannot be avoided, clear records of the decisions and the changes made are however important in ensuring the heritage is not lost. The changes that are made to these heritage buildings should be consistent, transparent and reasonable. The other principle is the consideration that the historical environment and the heritage buildings should be undertand like a shared resource and not like an individual resource.

Everybody in the community is expected to be responsible for the conservation of the resource.

3. Reasons for preserving the memory of the place

Mood also affects consumer behavior. Research has found that people are likely to buy more goods and services when they are in a good mood than when they are in a bad one (Desmet, 2015). It thus important for architects to consider factors that put people in a good mood when designing consumer spaces such as shopping malls, shops, and supermarkets. Mood also influences consumer behavior in relation to their interaction with the goods and services that they purchase. For instance, a person is more likely to explore a mobile phone they have just purchased if they are in a good mood and are less likely to experience buyer's remorse thereafter (Desmet, 2015). It is, therefore, of utmost importance that architectural design takes into consideration the possible effect it may have on peoples' mood, seeing that it has such power on creating positive and negative mood, and this has an adverse effect on peoples' behavior and general wellbeing.

The ultimate importance of preserving the memory of a place is its role in promoting people's psychological and social comfort. A tangible presence of the heritage in our societies contributes to our connection sense with both present and the past as it serves as the anchor to place and an assurance that we belong to something which is valuable (Ozorhon, 2016). For instance, we value the places which were created by our precedence and we, therefore, have the responsibilities of protecting them for those who will come after us. When our symbolic place which reflects our cultural and natural heritage is interfered with, we instinctively explore methods of protecting and reclaiming them from the hazard (Murakami & Al-Shwani, 2011). Similarly, when we face dangers in our lives, we then have to visit our cultural and natural heritage symbols for consolation. Heritage promotes psychological well being, sustainable growth, and social cohesion. Preserving our places helps the affected people to recover from the problems which could affect us psychologically.

People create an emotional ecosystem which is mainly established near social interactions. The first creation is influenced by the physical manifestation and culture. Admittedly, our traditions and physical presence which are connected to our close places are integral to the viable emotional ecosystem (Murakami & Al-Shwani, 2011). When individuals are displaced and uprooted, they lose their components of familiarity and the neighborhood connections which aid to anchor them to a venue and then subject their ecosystem to suffering. The ability to reconnect to the original physical manifestation is significant in helping people to stabilize and reduce trauma which caused by the stress.

4. 3 Examples of streets in Europe

Almost all cities in the European region have the true luxurious designated areas where people go to shop. The towns are filled with the streets which are cobbled with magnets for the customers who are searching for the quality and or very best products of their life. Magstraede Street, Copenhagen City has champs Elyees and the lined tree in the arrondissement while Goldenes

Quartier Street, Vienna is bustling and discreet with the exclusive street in the village-like corner of the Mayfair. The Golden Quarter Street is the heart of the Vienna town and is listed in the UNESCO Global Heritage website.

Magstraede Street, Copenhagen City:

Majority of the cities in the European nations, especially Denmark and Sweden have a long history of painting their houses with bright colors. As one moves down the street in these countries, the buildings keep on changing in terms of appearance from one to another. Although the behavior is common in the entire city, there are many prime streets which are located at the far end of the town. The known street in Copenhagen city is Magstraede:

Magstraede is a nice historic street located in an off-canal that surrounds the Christiansburg castle. Stretching from Radhusstraede to Knabrostraede, it is rumored that it is among the first street to establish in Copenhagen. The street is characterized by the shorter lane, beautiful buildings, and old paving stones which symbolize the ancient charm. The lane is wide enough to allow wagons to bounce over the stones when moving towards the docks. Many of these places attract both locals and tourists who tour to this place to see the cozy nonprofit Café Retro.

Goldenes Quartier Street, Vienna City:

Vienna city is renowned for having the high quality of life for its residents. The town has many streets which are characterized by several commercial activities which are under the oversight of the Planning department headed by Thomas Madreiter. The streets of the town are co-developed by the public-private entity which is responsible for formulating frameworks and solutions.

The Goldenes Quartier provides an optimum guide to the competitive shops in Vienna. The street is elegance, architecture, and sophistication with the charming location to explore the retail therapy, art, and culture. Descriptively, the street has large shopping centers which attract the attention of the visitors and locals passing through the road. Thus, Goldenes Quartier beautiful outlook is because of the architectural works.

Goldenes Quartier Street is established between the Seitzergasse, Tuchlauben, and Bognergasse towns. Currently, the area is the best destination of the collection of the premium luxurious products in Vienna City. Moreover, it provides wealth for global designs and the home for the glamorous flagship warehouses. The latter includes British brands such as Alexander McQueen, Vivienne Westwood, and Jimmy Choo.

How Architecture Improves the Mood of People in Magstraede and Goldenes Quartier Streets

Architects intuit places in such a way that it influences our behaviors, thought, and feelings as well as the moods. Admittedly, the behavioral researchers give their hunches an empirical idea. The scientist is unearthing the tantalized clues on how to come up with modern designs that encourage creativity, keep learners attentive and promotes social intimacy and relaxation. These effects inform the designers that their efforts are cutting-edge projects such as residence for diplomats in which the building is part of the enjoyment. Additionally, the architecture affects the people's productivity in office by improving the quality of air and reduces the injury hazards (Hyogo Prefecture Board of Education Disaster, 2011). Thus, ventilation, lighting, and building materials influence the well-being and mood of the house occupants.

Architecture design buildings which instill the sense of control over the personal space to the occupants as well as improving their health. Additionally, the shared residences minimize stress and enhance the productivity of the workers in homes and offices respectively. Naturally, well-ventilated air reduces the sick building syndrome and ductwork regularly removes the in-house pollutants. Moreover, the innovative designs with windows and doors facilitate cross ventilation. Ventilation is significant for risk mitigation of radon posting before setting it on. Ultimately, there is no location which is fully guaranteed of the safety.

5. Ways in which architecture interact with the past and future

The shapes of buildings that people get into as well as those that they may pass by in the street often elicit different emotions. A Street bears the ability to evoke moods of joy or discomfort depending on the shapes of the buildings that align it. History plays an important role in our daily way of life. Basically, we learn a lot by analyzing the past (Asfour, 2016). For example, the architectural values and inspirations are the basis upon which the modern buildings are being raised. Considerably, there are contemporary ways of pursuing the social space. A remarkable past that still influences the ideas of the architectures is the Damien ski installation in the public space. Apparently, there are several ideologies and concepts which are valuable.

Ultimately, architecture acquires a modern technique which values the past as the reference of the overlooked and yet significant illustrations which are available for disposal in the development approaches of the design (Mahgoub, 2015). With the facilities entering in the urban activism, the architectures are introducing new designs which are different from the traditional plans by evaluating their approach which is shaped under the prevailing political circumstances the past and future as well as the community expectations.

Another way architecture interacts with past and future is by creating dialogues and social places in the sections such as social, private, and public avenues. They provide a platform for negotiating between the public space and social life by considering the designs which diminishes significantly in the areas we visit frequently. There is believed to be a direct correlation between the space created by architectural design and an individual's mental perception of being and significance (Parsaee, Parva, & Karimi, 2017).

6. Conclusion

In summary, the architecture is the bottom line of the heritage mood. Buildings designs influence our way of life. The designers develop projects which have long lasting life because they are significant in advancing one's social and psychological comfort. The remarkable presence of the projects in our community connects our present with the past. In my opinion, the designers should explore the modern architectural plans when creating the facility since they are essential in the people psychological arrangement.

The first chapter identifies six factors that make the conservation of heritage important. Some of the elements include the intrinsic value in the heritage buildings, lack of knowledge of what might be being destroyed when the heritage buildings are destroyed and the economic importance of the buildings. The attraction of the heritage building, reminders of the complexity and culture of a city or environment and regrets being one way such that when the buildings are destroyed, and the history is destroyed are also considered (Forde, 2007). These cannot be reversed.

The second chapter identifies six conservation principles in the management of heritage buildings. Among the principles is respect to the heritage value of the buildings, provision of maintenance and security to the buildings, involving the least possible physical intervention, accurate recording of changes and the decisions made on the heritage buildings and user experiences and all disciplines that to safeguard the heritage buildings.

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References

- Asfour, O. S. (2016). Bridging the Gap between the Past and the Present: a Reconsideration of Mosque Architectural Elements. *Journal of Islamic Architecture*, 4(2), 77-85.
- Forde, H. (2007). *Preserving archives*. London: Facet.
- Hyogo Prefecture Board of Education Disaster. (2011). 'Risk Management of Cultural Heritage Based on the Experience of the Great Hanshin Earthquake'.
- Huang, S. (2009). Cultural heritage management in China: preserving the cities of the Pearl River Delta. *Journal Of Heritage Tourism*, 4(2), 173-174. <http://dx.doi.org/10.1080/17438730802327526>
- Lucchi, E. (2017). Review of preventive conservation in museum buildings. *Journal Of Cultural Heritage*. <http://dx.doi.org/10.1016/j.culher.2017.09.003>
- Murakami, Y., Director of Cultural Assets Office, Al-Shwani, S. Y. B. (2011). *Influence of Modernity versus Continuity of Architectural Identity on House Façade in Erbil City, Iraq* (Doctoral dissertation, Thesis. University Saints Malaysia. Penang).
- Navrud, S., & Ready, R. (2002). *Valuing cultural heritage*. Cheltenham, U.K.: Edward Elgar.
- Mahgoub, Y. (2015). Kuwait: learning from a globalized city. *The evolving Arab city: Tradition, modernity and urban development*, 152-83.
- Ozorhon, İ. F. (2016). The expression of identity: Country pavilions for expo in architectural design studio. *A|Z ITU Journal of the Faculty of Architecture*, 13(3), 43-52.
- Parsaee, M., Parva, M., & Karimi, B. (2017). Space and place concepts analysis based on semiology approach in residential architecture. *HBRC Journal*. Retrieved 22 January 2017, from <http://www.sciencedirect.com/science/article/pii/S1687404814000571>
- Probst, P. (2013). Preserving Heritage and the Values of Exchange: Lessons from Nigeria. *History Compass*, 11(12), 1035-1046. <http://dx.doi.org/10.1111/hic3.12102>
- Umeda, Y. (2012). *Design for innovative value towards a sustainable society*. Dordrecht: Springer.
- Willson, G., & McIntosh, A. (2007). Heritage Buildings and Tourism: An Experiential View. *Journal Of Heritage Tourism*, 2(2), 75-93. <http://dx.doi.org/10.2167/jht024.0.0.2307/1572847>

WEAVING CRAFT IN 19TH CENTURY POLAND AS A CONTRIBUTION TO DIALOGUE AMONG CULTURES AND THE SUBJECT MATTER FOR CURRENT TOURISM TRENDS

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Abstract

We often forget about the values that the meeting of different cultures brings to creating common cultural heritage. One of the examples of this possibilities can be development of the 19th century weaving craft in a small towns located in the heart of Poland. Turek town owes its present shape and character to economic immigrants who arrived from Saxony, Austria, Czech Republic and Hungary. This activity resulted in building regulation and creation of the new craft districts. The urban area of the districts has been preserved until today and now constitutes a historical testimony of preindustrial period in Greater Poland. Nowadays, the weaving craft has become one of the most important city's visiting card. The objective of the paper is to present the proper use of this 19th century heritage to create and manage current tourism market trends and to increase the tourist attractiveness of the whole region.

Keywords: weaving craft, evangelicals, heritage, tourism market

Introduction

There were cases when economic immigrants initiated a certain development and established the direction of change in local community. Is it possible to use them in today's tourism market to create its trends? I would like to present two examples of how the heritage of evangelical immigrants is used to certain trends and ensure proper protection of preserved monuments at the same time.

Turek and Władysławów (situated 10 kilometers from each other), located in the Turek County, Wielkopolska Province, are the example of towns that have unique remains of craftsmanship and Evangelical culture functioning next to the local Roman Catholic culture. The crucial influence on the development and significance of these two towns were craftsmen from the west who settled, assimilate and decide about the further shape of towns and the way of life in the whole region at the end of the 18th and the beginning of the 19th century. Weavers' houses, along with the Evangelical Churches and Cemeteries erected by settlers, still constitute the most important monuments of the local heritage and shape the main tourist trend for the region.

2. Craft settlements at Władysławów and Turek

2.1. Craftsmen at Władysławów

Władysławów as a town was located in 1727 near the Russocice village by the Chełmno voivode, Władysław Jan Kretkowski.¹ In 1728 Władysławów together with Russocice and nearby Wyszyna village passed into the possession of Poznań Castellan, Melchior Hieronim Gurowski. At that time, craftsmen, mainly connected with weaving craft started to settle in the area. Their guilds received privileges from the Gniezno Castellan already in 1739. Most of them were evangelical refugees from Silesia, where religious persecution took place at that time. Several settlement waves from Silesia resulted in creation of the Evangelical school in 1740, and then the establishment of the Evangelical commune in 1776.² In the 1920s and 1930s, there was a rapid growth of the weaving industry. This is the period of another wave of immigration weavers from Silesia and western Wielkopolska, this time on a strictly economic basis, related to the economic policy of the Prussian kingdom. At that time, at Władysławów, a number of houses of the same architectural type were erected. They were located on characteristic elongated parcels with ditches of water at their back used by them to bleach fabrics. These areas were transferred free of charge to the weavers who settled in the town.³

2.2. Immigration of weavers to Turek in the 19th century

Although Turek is a town with a tradition dating back to the Middle Ages, in fact, its proper economic and urban development began since 1826 on the basis of the weaving industry.⁴ At that time, weavers from Saxony, the western part of Wielkopolska, the Czech Republic, Austria and Hungary began to settle at Turek.⁵ Urban planning began and it prepared the town for the reception of newly arrived settlers.⁶ Two new craft districts were distinguished along the outgoing roads – Pólko (now called

1 Ruszczyńska and Sławska (eds) 1959: 24.

2 Łuczak 2014b.

3 Łuczak 2014b.

4 Ruszczyńska and Sławska (eds) 1959: 18.

5 Markiewicz and Czekala (eds) 2015: 14.

6 Szczepański and Grzelka 2002: 90.

Żeromskiego Street), and Nowy Świat (now called Kaliska Street). They were built up with the characteristic weavers' houses preserved to this day.⁷

1822 was the year when the Evangelical cemetery was established at Turek. In 1827 a branch of the nearby Władysławów parish formed there, which after ten years was transformed into Turek Evangelical parish. In the years 1849-1857 the Evangelical commune built its own church.⁸ After 1945, unlike in many other towns in Wielkopolska, the Protestant inhabitants of German origin stayed at Turek, and their descendants still live there assimilated with the Roman Catholic population.

3. Cultural heritage of evangelical settlers

3.1. Craft buildings

3.1.1. Weavers' houses at Turek

In 1820s two-family single-story buildings with the dimensions of 15 x 8 m were erected on the construction parcels at Nowy Świat and Pólko districts. The layout of chambers in each of the houses was very similar, based on the same project. The houses consisted of two front and two rear chambers, separated in the middle by a corridor leading from the front to the yard.⁹ At the back of the house was a garden and a courtyard with outbuildings, where later small weaving manufactures were opened. All buildings were situated in front of a wide street. Most had a delicate late-classical wall decoration, cornices, windows of the same size and gabled, half hipped roofs with wood shingle or roofing paper.

Today, weavers' houses remained as 43 buildings, situated at two main streets of the town – Kaliska Street (Fig. 1) and Żeromskiego Street. This is a unique example of well-preserved infrastructure of weaving districts from the first quarter of the 19th century in eastern Wielkopolska. In 1970 and 1974, they were entered in the register of monuments and have been under the care of the Provincial Office of Monument Preservation. Unfortunately, the owners often carry out improper repairs and conversions, which change the original form of the buildings and completely disturb their proper character. However, despite the reconstructions carried out through the next decades, the urban space of the weaving districts remained the same even to this day.¹⁰ Weaving craft lost its significance for the town's economy, however, the preserved heritage of the urban layout at Turek and Władysławów, is a historical testimony of the pre-industrial period in Wielkopolska.¹¹

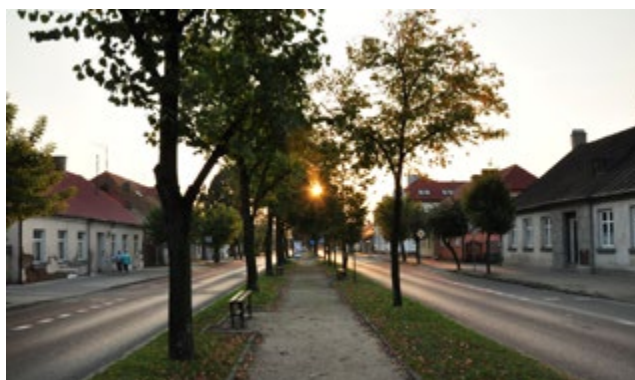


Figure 1 – Weavers' houses at Nowy Świat street (today Kaliska street), Turek, 2017 (photo by K. Rabiega).

3.1.2. Urban layout at Władysławów

At the turn of the 18th and 19th centuries, the proper spatial arrangement of Władysławów was formed. It consists of single-story buildings erected along the market square on a narrow rectangular plan. The market was the compositional center of the town. A network of narrow and long parcels was established as a part of the urban layout, practically unchanged to modern times. The weavers' houses, covered with the half hipped roof, were raised front-gabled to the market square. They were one-story buildings, made of brick, with a unified architectural type and through-going entrances.¹² After some time, side-gabled houses were also built. Often, it was the result of joining old narrow parcels or delimiting the new ones with a larger width.¹³

7 Górzyński 2009: 223-273.

8 Łuczak 2014a; Łuczak 2015a, Łuczak 2015b.

9 Ruszczyńska and Sławska (eds) 1959: 19; Szczepański and Grzelka 2002: 90-91.

10 Łuczak 2015a.

11 Łuczak 2015a.

12 Ruszczyńska and Sławska (eds) 1959: 25.

13 Łuczak 2014b.

Despite the fact that the entire spatial layout of the market is under protection of the Province Monument Conservator unfortunately most of the weavers' houses were destroyed, and those which miraculously survived are mostly rebuilt to such extent that their historical form is not legible anymore.

3.2. Evangelical churches

3.2.1 *Evangelical church at Turek*

The Evangelical-Augsburg Church dedicated to God's Grace (Fig. 2) had been erected in the years 1849-1857, about 25 years after arrival of the first immigrants to Turek. A small temple was built on a Greek cross plan, in the late classicist style, according to the design of architect Henryk Marconi.¹⁴



Figure 2 – Evangelical church, Turek, 2017 (photo by K. Rabięga).

3.2.2. *Evangelical church at Władysławów*

The original Evangelical Church at Władysławów was established in 1776.¹⁵ In 1872, a neoclassical-style brick church¹⁶ was erected there (Fig. 3). The building has the form of a single-nave body with an independent higher curtain of the facade. A turret on a square plan rises above the tri-pit roof.

After 1945 the church was abandoned and for many years there was a warehouse with grain and building materials there. That was until 1978, when the local government purchased the property in order to adapt it to new functions. This event saved the monument and ensured its conservation with all external elements preserved. Since 1986, the building is the residence of the Commune Culture Center.¹⁷



Figure 3 – Evangelical church and the craftsman house, Władysławów, 1930s (after: Kossmann 1967).

14 Ruszczyńska and Sławska (eds) 1959: 19.

15 Górzyński 2014: 314.

16 Górzyński 2014: 311-333.

17 Górzyński 2014: 331.

3.3. Evangelical cemeteries

3.3.1. Evangelical cemetery at Turek

The Evangelical Cemetery at Turek was established in 1822. It was located next to the newly marked Catholic necropolis. To the Evangelical necropolis led a monumental gate with battlements and a cross (the gate unfortunately has not survived till modern days).¹⁸ There are a lot of historical tombstones and monuments in the cemetery. Ornamental decaying wrought fences are also admirable (Fig. 4).

3.3.2. Evangelical Cemetery at Felicjanów

The Cemetery of the Evangelical parish at Władysławów commune is located at the Felicjanów village, on a high hill today called „German Hill” today (Fig. 5). The cemetery, in the form of a regular rectangle, was founded around 1750, under the privileges received by the German-speaking residents of Władysławów from the Gurowscy family. The burial ground was active until 1945. Unfortunately it was devastated and plundered after the Second World War. The entrance gate, still preserved in the form of a ruin in the 1970s, was finally pulled down.¹⁹

At the end of the 1990s, the cemetery was partially restored on the initiative of Bruno Kneifel, a descendant of the local family. In 2000, due to Kneifel and Henryk Trocha, a plaque commemorating the Poles of German descent who had been tragically killed in 1939 there was unveiled. Then, the exhumation of the corpses of German soldiers, shot at the hill in 1945 by Red Army soldiers, were carried out.²⁰



Figure 4 – Evangelical cemetery, Turek, 2018 (photo by K. Rabięga).



Figure 5 – Evangelical cemetery, Felicjanów near Władysławów, 2018 (photo by K. Rabięga).

18 Górzyński 2009: 353.

19 Górzyński 2014: 440.

20 Górzyński 2014: 440.

4. Regional tourism based on the weaving craft heritage

To honor the settlers for their contribution to the town's development, in 1978 the Weaving Craft Museum in Turek was established (since 2012 called Town of Turek Museum named after Józef Mehoffer). To preserve the traditions of the region for as long as possible, the Museum presents the weaving heritage with particular care. That is where the heritage is the subject of a permanent exhibition entitled „Traditional weaving craft and textile industry at Turek and the surrounding area”.²¹ The basis of the museum collections are exhibits related to weaving traditions. The honorable place in the exhibition is occupied by the oldest preserved crafting documents at Turek – privilege for the Guild of Shoemakers at Turek issued on July 23, 1539 by the Archbishop of Gniezno, Jan Latański. The exhibition is complemented by original old machines and weaving tools. Visitors can also see the weaving house's furnishing with a division into a white chamber – a representative room and a black chamber – a kitchen (Fig. 6).

In 2015, the Museum implemented a project of the ethnographic exhibition modernization, „from the program of the National Institute of Museology and Collection Protection „Cultural Heritage, Priority: Supporting museum activities”. This allowed for the adaptation of media for blind, visually impaired and deaf people²². The educational activity of the museum is addressed to a wide range of visitors – from kindergarteners to adults of all ages. In the weaving workshop, various thematic meetings, as well as museum lessons and artistic-educational activities for children and youth have been conducted. Thinking about tourists and schools, the museum has developed a local tourist trail „Weavers, what's left of them – Evangelicals at Turek”.²³

What is more, the Turek Town Museum is the organizer of the „National Competition of Non-Professional Textile Work”. The competition was launched in 1980 and takes place every three years. It is addressed to children, teenagers and adults, both individuals and club members.



Figure 6 – Part of the ethnographic exhibition in the Town of Turek Museum (photo by K. Rabiega).

5. Conclusions

Turek and Władysławów are towns, which have a unique tourist potential due to the rich tradition of the weaving craft. Multiculturalism and multi-denominational society in the 19th century resulted in the emergence of a unique character of the city. The various groups living together brought elements of their culture to the life of the whole community²⁴ and it is worth using the potential for building the local brand and creating an increase in tourist attractiveness. We can notice the relationship between cultural heritage, which has the influence on tourist trends, and museum-conservation activity, which supports the tourism, draws profits from it and at the same time protects the heritage and allows to manage it properly.

Turek, as the main town of the county, has a museum unit due to which the cultural heritage of evangelical weavers is known today, and its remains are protected. Activity of the Town of Turek Museum and Evangelical community ensures the preservations of the weavers' houses and sacral monuments in relatively good condition. Appropriate museum policy and management of tourism market trends result in proper treatment of the preserved cultural heritage.

The example of the Władysławów town illustrates how the remains of the heritage of weaving craftsmen are destroyed, due to the lack of proper policy of managing this heritage. The urban layout of the town, is not sufficiently protected, which results in destruction of exceptional buildings. Among the weavers' heritage at Władysławów, the Evangelical Church survived in the best condition, saved from falling into ruin by adaptation to the Communal Culture Center. Only due to the individual inhabitants initiative, the cemetery at Felicjanów was partially organized, and the process of its devastation was stopped. Today it is considered as one of the most beautiful and charming places in the entire cultural landscape of the area.

21 Markiewicz and Czekala (eds) 2015.

22 Markiewicz and Czekala (eds) 2015: 14-15; Stachowiak 2015: 18.

23 Stachowiak 2015: 21-22.

24 Derucki 2012: 33.

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References

- Derucki, Marcin (2012) "Wyciskamy" z Turku atrakcje, in „Włóczypióro” 29, 2012, pp. 30-33;
- Górzyński, Makary (2009) *Zabytki miasta Turku i powiatu tureckiego, tom pierwszy: Miasto Turek*, Turek: Miejska i Powiatowa Biblioteka Publiczna im. Włodzimierza Pietrzaka w Turku;
- Górzyński, Makary (2014) *Zabytki miasta Turku i powiatu tureckiego, tom drugi, część druga: Architektura i sztuka sakralna*, Turek: Miejska i Powiatowa Biblioteka Publiczna im. Włodzimierza Pietrzaka w Turku;
- Kossmann, Eugen Oskar (1967) *Ein Lodzer Heimatbuch. Geschichte und Geschichten aus Stadt und Land*. Hannover: Hilfskomitee d. Ev.-Luth. Deutschen aus Polen;
- Łuczak, Tomasz (2014a) *Turek: Kościół ewangelicki*, in ZABYTEK.PL website, www.zabytek.pl (accessed 20.02.2018);
- Łuczak, Tomasz (2014b) *Władysławów. Układ urbanistyczny*, in ZABYTEK.PL website, www.zabytek.pl (accessed 20.02.2018);
- Łuczak, Tomasz (2015a) *Turek: Zespół domów tkaczy*, in ZABYTEK.PL website, www.zabytek.pl (accessed 20.02.2018);
- Łuczak, Tomasz (2015b) *Turek: Cmentarz ewangelicko-augsburski*, in ZABYTEK.PL website, www.zabytek.pl (accessed 20.02.2018);
- Markiewicz, Joanna and Aleksandra Czekąła (eds) (2015) *Ekspozycja etnograficzna*, booklet, Turek: Muzeum Miasta Turku im. Józefa Mehoffera;
- Ruszczyńska, Terasa and Aniela Sławska (eds) (1959) *Katalog zabytków sztuki w Polsce. Tom V. Województwo poznańskie. Zeszyt 26. Powiat turecki*, Warszawa: Państwowy Instytut Sztuki;
- Stachowiak, Bartosz (2015) *Turek – miasto, historia, muzeum. „Konserwacja kolekcji turkowskiego misterium Józefa Mehoffera – etap I”*, booklet, Turek: Muzeum Miasta Turku im. Józefa Mehoffera;
- Szczepański, Bolesław and Beata Grzelka (2002) *W okresie zaborów i walk o niepodległość (1793-1918)*, in „Dzieje Turku”, eds by Edmund Makowski and Czesława Łuczak, Poznań: WBP, 2002, pp. 77-169.

REHABILITATION OF LUZIAMAR TOURIST COMPLEX: STRUCTURE AND COMPOSITION AS A WAY TO PRESERVE ARCHITECTURE HERITAGE

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Abstract

LUZIAMAR tourist complex opened in 1974, and for many years was a reference space in the north and neighboring Galicia, marking various generations between the seventies, and nineties. This space closed to the public in the nineties and it is until today abandoned.

The subject “rehabilitation” is a topic that is increasingly discussed and present in Architecture, not only for sustainability issues, but also for the ability to revitalize areas where they are inserted and for the ability to return life to spaces that remain forgotten. Thinking architecture having as focus shape and structure is the main goal of this rehabilitation proposed and expansion of the LUZIAMAR. This is a proposal for the rehabilitation an old tourist complex, on Viana do Castelo, in which it is intended to recover the tourism program of the complex, adding also a residential sector, taking existing architectural language and combining it with a current expression.

Keywords: tourist complex, rehabilitation, heritage, conservation

1. Introduction

The choice of the subject “Rehabilitation” is due to the fact that this is increasingly a subject discussed and pertinent in Architecture, as a way to rebuild, renovate and revitalize buildings and spaces.

To think the rehabilitation of this tourist equipment arose from the importance that it has for the local population, being this a space associated to a golden age in the end of the “Estado Novo” (in English “New state” name given to the dictatorial period in Portugal). This equipment has become so important for the population of the city that there has always been talk about the possibility of its rehabilitation and, recently, with urban rehabilitation in the area where it is inserted, even the Town Hall reeferes this subject as being an added value to the construction of new hotel units.

About LUZIAMAR hears the most varied stories from the nights at the disco, the weddings, at summer camps and other events held there. The way this space is remembered reveals the importance of the same to the population, and can be affirmed as a milestone in their memories. In the nineties the disco closed, and since then all the equipment has been abandoned, ending up being the target of vandalism.

It is with the intention of giving life to what once was important for a population, that the idea of the theme for this article arises. Consequently, this is a proposal for the rehabilitation of an old tourist complex, near the coast of Viana do Castelo - Cabedelo, in which it is intended to recover the tourism component (programmatic) proper of the complex, adding also a residential slope, taking existing architectural language and combining it with a current expression.

The volumetric complexity of LUZIAMAR, the necessity to understand its space, and how it can be coherently rehabilitated and expanded, has led to the need to understand volume by volume and its connections. Shape (composition and geometry) and structure then appear as protagonists of a basic concept for the analysis and development of this project and that will support the solution for its rehabilitation / expansion.

1.1- Methodology and Objectives

The methodology applied in the development of the article / project is based on the following phases:

Information gathering in loco, allows the permanent and direct relation through visits to the location to collect available material on the subject to be developed; contact with entities possessing relevant information (town hall, parish council, etc.) and Identification of the existing spaces, through trips to the place and the analysis of technical drawings and photographs.

Theoretical part allows to study the building and the existing program, as well as the proposed one and its relation with the contextualization’s carried out throughout the article and to deepen the rehabilitation tools necessary to clarify and to understand the concept of rehabilitation and the care to have when designing a proposal. This phase corresponds to the elaboration of the article composed by introductory phase that contains summary, introduction, methodology and objectives, Historical and geographical contextualization, as well as a second part that approaches the architectural proposal as a way of preserving the architectural heritage.

Elaboration of the architectural proposal involves the elaboration of a program that creates a compromise between the already

existing structure (to be rehabilitated) and the new one that is proposed, evaluation and characterization of the intervention area, analysis and identification of building pathologies in study, elaboration of diagrams and diagrams, together with the descriptive memory and justification of the proposal; detailed design of the necessary parts and design of real / virtual models indispensable to the best understanding of the proposal.

In view of the above, the methodology applied in the development of the article has the objective of understanding and analyzing the relationship between the existing spaces of the building and the spaces to be proposed, based on the relation of the existing form and structure, the analysis and identification of the anomalies building and identify the changes that have taken place in the tourist complex throughout its existence, both in terms of architecture and the experience of space itself, in order to improve the spatial quality of the building from the existing programmatic content, establishing new relationships among the various volumes.

2. Tourism and Rehabilitation

"Tourism today is made of experiences, contacts with reality. A tourist who lives pleasantly the places that he visits has a tendency to return to carry out more and more experiences, becoming an ambassador abroad to spread his good experiences". (2016)

The XXI century continues to be marked by three big subjects, Tourism and Rehabilitation and sustainability. The tourism sector has been developing since the second half of the XX century, and in the XXI century gained the status of the world's largest economic activity (Abranja, et al., 2009), becoming for many countries a strong economic sector of their development.

The subject Rehabilitation has been discussed since the second half of the century. XX, and nowadays it reaches a greater relevance, not only as a means of preserving the heritage, but also as a form of sustainable development. Faced with a panorama of abandonment, which is seen in several areas of the country, the growth of the Tourism sector has promoted the revitalization of urban spaces, making the "old cities" attractive space for investment and promoting sustainability and urban rehabilitation (A.D., 2017).

"The rehabilitation and renovation of cities and towns is an indispensable action for the success of the affirmation of Portugal as a sustainable tourist destination" (Worx Real Estate Consultants)

It is factual that tourism and rehabilitation go hand in hand and with them the sustainability factor. Rehabilitation emerges not only as a means of preserving the heritage, but also as a way of creating infrastructures to support tourism. In rehabilitation, whether in urban or rural environments, advantages of sustainability and economy are associated.

Being Portugal, a country with strong cultural roots, history preservation and tradition, tourism and rehabilitation has intensified these values. With these it is attended, still to the emotional side of the local populations, who see reborn buildings and spaces that were empty. It is the revival of what once longed for the city, creating new lives and new memories (A.D., 2017)

3. Geographic Context



Figure 1 - aerial photo of Darque village

"Cabedelo is called to the said moorage of vessels and ships, already near the mouth of the bar whereby only small ships enter the account of the bar is very airy, although some high-speed ships entered through the bar.

The best wind to enter by it is the south and by the other part where they call doors can also enter with wind of oest-northwest" (Costa, 1758)

LUZIAMAR was built in the place of Cabedelo, next to the access to the beach that gives its name, Luzia Mar beach. This place belongs to the village / parish of Darque, this parish, which belongs to the municipality of Viana do Castelo.

Darque, is situated as it can be seen in Fig. 1, on the south margin of the Rio Lima, on the opposite margin of the city of Viana do Castelo. Throughout time, its location has allowed a strong relationship between the river and the sea with the locality.

Before 1940, this place belonging to the locality of Darque, was an uninhabited place, the only references to dwellings in the area were “the rough houses of the fishermen by the old pier, and with a restaurant / casino called “gaivota “ (in English seagull). (Gonçalves, 2013)

Between the 1930s and the 70s, the Cabedelo place was the target of an urbanistic revolution. The first urban plans in Viana do Castelo appear in the 40’s of the 20th century. Between 1934 and 1941, at the same time as the city was built the neighborhood of the garden and the neighborhood of the workers of the railroads, conceived according to the ideologies of the New State, also appeared the first partial plans of the concrete residential areas. (Gonçalves, 2013)

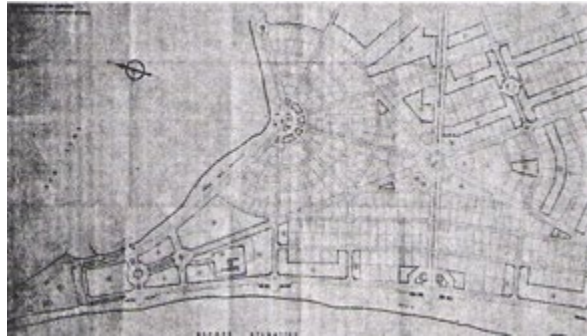


Figure 2 - Master Plan for the Urbanization of Praia do Cabedelo (Lobo, 1995)

“(...) dois pontos focais, um central, atravessando pelo eixo viário principal, perpendicular à costa atlântica, e outro, junto ao rio, donde divergem sete arruamentos radiais.”

“(...) two focal points, one central, crossing the main road axis, perpendicular to the Atlantic coast, and another, by the river, from which there are seven radial streets.” (Lobo, 1995)

The urbanization plan for cabedelo beach, is based on a contest launched in 1933, in which architects Jorge Segurado and António Varela won the contest. This first plan contemplated an extensive area of pinewood and two areas of beach, one facing the sea and the other of fluvial character, facing the river. In this proposal the green corridors and the pedestrian routes were also highlighted. The blocks arose from the linear road structure, traced, and the parcels would be separated by vegetation. (Reis, 2008)

In 1960, in continuity with the old plan, a plan of urbanization for the pinewood of the Cabedelo, made by the architect Carvalho Dias, is realized, in which a residential area of low density made up of houses. This new foreground then served as a basis for the interventions that were going on in the next two decades.

“Estes bairros introduzem um novo conceito de cidade – bairro residencial periférico constituído por moradias construídas sobre uma malha reticulada e apoiada em vias existentes.”

“These neighborhoods introduce a new concept of a city - peripheral residential neighborhood made up of houses built on a reticulated grid and supported on existing roads.” (C.M.Viana do Castelo, 1999)

The place of Cabedelo is the place that directly confronts the historical center of the city of Viana do Castelo. Its location, which has sea and river confrontations, gives this place an extraordinary environment on the coast, and ends up being a complementary space of the city of Viana do Castelo, and as such plays within the scope of the Strategic Plan of Polis Coastal North a structuring role in the urban and environmental system of the region (A.D., 2016). Its housing component, to this day, remains in general the image of the plan realized in the 1960s. However, the excellent conditions that the beach of Cabedelo provides, for the practice of nautical sports such as wind-surfing and Kit- surfing, makes

this area receive thousands of tourists, national and international and with this leads to the development of infrastructure in support of nautical activities and tourism.

4. “For the Homeland, Morals and Good Customs” – LUZIAMAR

“For the Homeland, Morals and Good Customs” is how in 1969, the architect, Francisco José Gouveia Alves Nogueira finishes the descriptive memory about the first phase of construction of the tourist complex, LUZIAMAR.

The tourist complex, LUZIAMAR, was designed in the year of 1969, and would open to the public in the year of 1974, twelve days

before the “revolution of the carnations”. This, then designed by the ideals and rules of architecture imposed in the *Estado Novo* (name for the dictatorial period in Portugal) and was a reference space in the northern region and in neighboring Galicia (Spain), marking the various generations between the seventies and nineties.

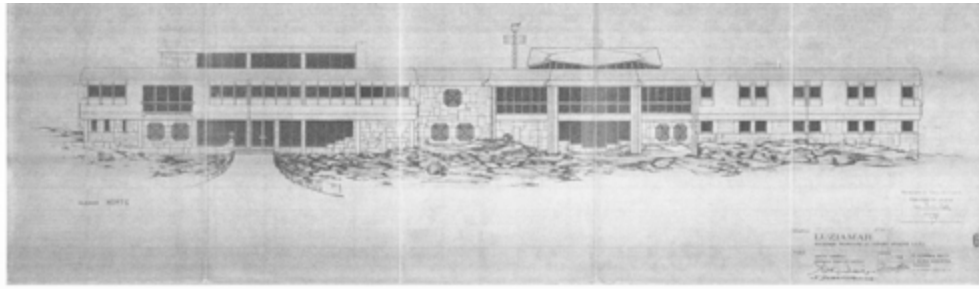


Figure 3 - North Elevation. LUZIAMAR 1969

The proposal for the tourist development LUZIAMAR of the year 1969 corresponds to the first phase of construction of the tourist enterprise. At this stage, according to an existing document from the Viana do Castelo estate registry, it was planned to build a swimming pool, restaurant, ballroom, tennis court and playground. The building is composed of three volumes, two parallelepipeds and a central octagon, which communicate with each other. It has in its constitution two floors, and in the volume the spring is built a 3rd floor, the solarium.

Completed construction of Phase 1 of this project within three years was provided for the construction of phase 2 corresponding to the construction of hotel property, however, this never came to be built.

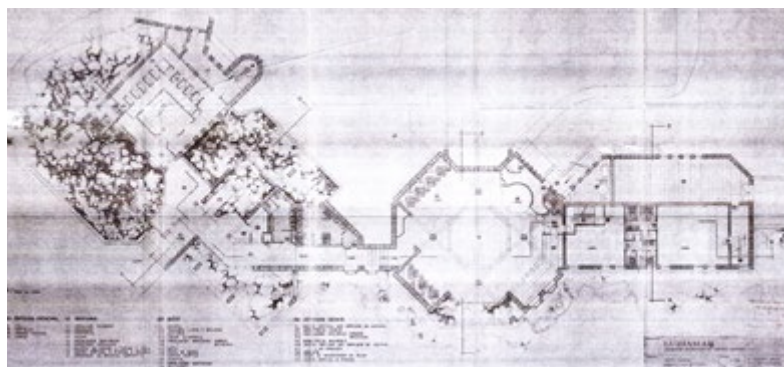


Figure 4 - Plan ground floor - LUZIAMAR 1969

In an analysis of its original program, although the main entrance is common to both men and women, the organization of the program is based on the conservative rules imposed by the *Estado Novo*, which provide for the separation of activities and circulation between women and sex male.

The final proposal of the year 1969 does not define LUZIAMAR as being only a nightclub. However, over the years, the disco would become more attractive to the population, ending bathing activities for losing importance and space, passing the nightclub, occupy more areas of the building.

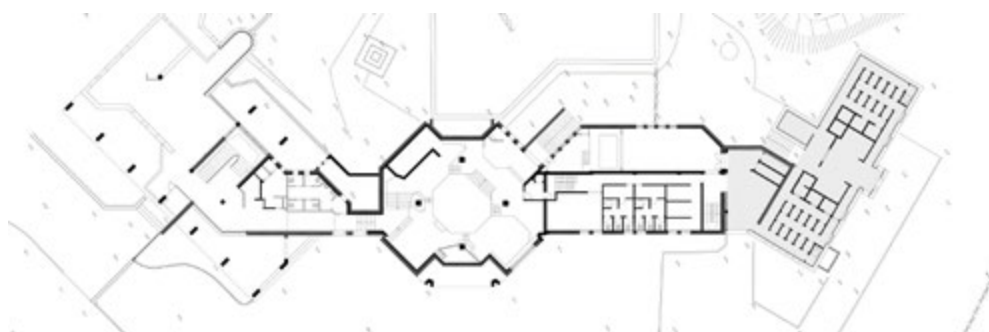


Figure 5 - Ground floor with the present organization of the program

In 1995 this space closes doors to the public. It is not known for sure what led to its closure, but since then it has been abandoned, resulting in vandalism. About LUZIAMAR you can listen to the most varied stories, from nights at the disco, weddings, holiday camps and other events held there. The way this space is remembered reveals the importance of the same to the population, and can be affirmed as a landmark in their memories.



Figure 6 - photos of the current state of LUZIAMAR

5 - The structure behind the shape - Proposal for rehabilitation and expansion of the tourist complex LUZIAMAR

Three geometric shapes, three volumes and two structural meshes make up a building. The apparent simplicity of volumetry does not coincide with the complexity of its intersections, requiring careful and accurate volume-to-volume analysis to understand it. After this analysis came two key words

- shape and structure - which are the two essential elements in the composition of the building and that originate the concept for the LUZIAMAR rehabilitation and expansion proposal.

5.1 - Shape and Structure as protagonists – CONCEPT

In the analysis of the existing building these two elements coexist among themselves and are the elements that mark the orientation and volumetry of space. The original building is composed of two parallelepipeds intersecting a central octagon. The most nascent volume and the octagon have in common the same structural mesh. However the geometric shapes are different. The volume at the west is a smaller parallelepiped and has a structural mesh different from the other two.

For the amplification of LUZIAMAR the understanding of the importance of the existing structural mesh in conjunction with the geometry of the volumes was fundamental to understand how a new volume could be integrated in the original complex. The implantation of this new volume arises based on the alignments of the main structural mesh (nascent and octagonal volume). The structure of the western volume is also important in this restructuring, because it functions as a break element and its orientation will be present in elements such as courses and exterior arrangements.



Figure 7 - Structural net structure.

Figure 8 - site plan without Scale

Octagon - unlike the original building, the specificity of the geometry of the central volume gives it a greater prominence, becoming, therefore, the central and entry element of LUZIAMAR's rehabilitation proposal.

The access is made by the ground floor where previously was the disco, which is now the entrance of the hotel, marked by the great central staircase. The 1st floor, besides being the main space that precedes the area of the rooms, also works as a hotel lobby, since at this level it is possible to have a direct access to the pool and restaurant rooms. Although it is not exactly another

floor, the existing dome has a strong impact on the volumetric composition of the octagon and therefore, in this rehabilitation proposal, will be maintained.

East parallelepiped - In the original design it was from this volume that one had access to the interior of the LUZIAMAR building. In the new proposal, the main entrance ceases to exist, being the access to this volume made through the octagon.

On level 0 there is the bar of the hotel winter garden and sanitary facilities to support this area of restoration. On the 1st floor is for the hotel restaurant where there is the dining room, kitchen and dining areas. On the 2nd floor is smaller, this is for a “lounge bar” so as to take advantage of the existing perched roof and the view over the sea.

West parallelepiped - This volume was intended for the technical areas of the old complex. On the ground floor was intended for employees’ residences, and on the first floor was the kitchen of the old restaurant. In the rehabilitation proposal, on the ground floor will continue to be a technical zone, and now also administrative. Already on the first floor you will find one of the side of the hotel rooms.

Expansion - As previously mentioned, LUZIAMAR rehabilitation proposal expects the creation of a hotel area that had never been realized. For this it is necessary that there is a new area for the hotel and Spa.

The proposed extension consists of two similar overlapping volumes. The new volume on the ground floor is intended for SPA and technical areas. To this volume a new volume is added to the hotel where the double / twin rooms and suites are located.

Demolitions - As previously mentioned, in the survey carried out, changes were made to the 1969 project, namely an annex to the nascent volume and a fourth volume of which there is no information on when it will have been made. As such it has been assumed that this fourth volume is illegal and then in the rehabilitation proposal this will be demolished, replacing the existing volume of the 1969 project. The smaller annex will also be demolished because it does not fit the proposal.

6. Conclusion

Tourism and rehabilitation are topics that are nowadays side by side. Growing concerns about sustainability factors make these two often take the same path. Portugal is one of the countries that have been increasingly developing a strong tourist development and in turn is investing more and more in rehabilitation, not only as a preservation of the built heritage, but also as an economic and sustainable source that supports the tourism sector.

LUZIAMAR since its construction is thought for this sector, but due to the several adversities is abandoned. Its rehabilitation comes as a solution to preservation as a local memory for the population, who see in it an icon of the city, as well as a new supporting infrastructure, to the city of Viana do Castelo, and especially to the Cabedelo area, for the tourism sector, since the tourism sector has a strong

“Structure behind the Shape” is the proposed concept for the rehabilitation of LUZIAMAR in order to preserve the existing building and based on the structure of this thinking a new volume capable of satisfying the new functional program, for him thought. Finally, the idea of rehabilitation starts not only from the preservation of what exists, but also from the expansion of an element invisible to the eyes, to a new volume that will become the history of the original building.

References

A.D. 2017. *A Reabilitação E o Turismo: Uma União Com o Futuro*. [ed.] Urban Business - Mediação Imobiliária. 12 de 04 de 2017.

—. 2017. *A Reabilitação E o Turismo Uma União com o Futuro*. *Urban Business - Mediação Imobiliária*. [Online] 12 de 04 de 2017. <http://ubmi.pt/conteudo/136244/5>.

—. 2016. *Polis Litoral Norte - Concurso para a elaboração do projecto de Requalificação da Frente Ribeirinha de Viana do Castelo*. Nucleo do Cabedelo, Documentos ARU_ Darque. Viana do Castelo : Departamento de Urbanismo da C.M. Viana do Castelo, 2016. Memoria Descritiva.

Abranja, Nuno e Almeida, Isabel. 2009. Turismo e Sustentabilidade. [Online] 2009. disponível em: [<http://revistas.ulusofona.pt/index.php/jts/article/view/506>]. <http://revistas.ulusofona.pt/index.php/jts/article/view/506>.

C.M.Viana do Castelo. 1999. *Plano de Urbanização da Cidade*. s.l. : C. M. Viana do Castelo, 1999. Costa, José. 1758. Memória Paroquial da Freguesia de Darque de 28 de Maio de 1758. Darque : s.n., 1758.

Gonçalves, Candido. 2013. *Darque o outro lado da Cidade de Viana do Castelo*. Darque : Junta de Freguesia da Vila de Darque, 2013. p. 126.

Lobo, Margarida. 1995. *Planos de Urbanização: A época de Duarte Pacheco*. Porto : Faculdade de Arquitectura da Universidade do Porto, 1995. p. 126.

Portas, Nuno. 2008. Arquitectura para hoje 1964 seguido da evolução da Arquitectura Moderna em Portugal 1973. Lisboa : Livros Horizonte, 2008, p. 35.

Reis, Hugo. 2008. Evolução da Estrutura Urbana de Viana do Castelo, Factores de transformação e elementos de continuidade. Porto : Universidade Fernando Pessoa - Faculdade de Ciências e Tecnologias, 10 de 2008. p. 71.

2016. Sintonia da Reabilitação Urbana com o Turismo. *WORX Real Estate Consultants*. [Online] 2016. <http://www.worx.pt/pt/noticias/geral/sintonia-da-reabilitacao-urbana-com-o-turismo>.

Worx Real Estate Consultants. Sintonia da Reabilitação Urbana com o Turismo. [Online] <http://www.worx.pt/pt/noticias/geral/sintonia-da-reabilitacao-urbana-com-o-turismo>.

ICT TO MANAGE TOURISM IMPACTS IN ISLANDS

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Abstract

New technologies can represent, for some aspects, both a problem and a precious resource. As we concerns, in tourism sector, ICT can help in managing and promoting destinations in a better way than in the past, especially in those cases where problems linked with the management of tourist flows and the need to manage a sustainable development exists.

Monitoring tourism impact at the destination is a fundamental issue in order to respect the right pressure and to avoid negative effects in the destination and with the residents. There are several devices available and useful for different needs, then almost each kind of monitoring and analysis can be supported by the right tools. This knowledge should encourage local responsible to implement regular and meticulous surveys and analysis to manage the impact of tourism pressure and to respect the optimal carrying capacity of the site.

Keywords: destination, tourism impact, development, ICT

1. Introduction

Local development is always more often dependent from tourism sector, especially in fragile contexts such as islands. These territories, in fact, represent a special cluster such as an independent state from the membership countries. Particularly, insular economies are almost totally based on tourism and connected activities. Because of this, they are the best cases to be analyzed in order to highlight positive and negative aspects of economic development based on tourism sector.

Tourism can bring development and growth but also negative effects on the local environment and residents. So, it needs to consider a sustainable development approach based on quantitative and qualitative indicators and a wide awareness about the need to preserve and then valorize local resources. It needs to use new tools in order to reach the optimal development without threatening the sustainability of the destination, containing the negative effects of tourist flows and then the local carrying capacity. In this sense new technologies represent a relevant tool both in the phase of analysis and as a method to reach the goal. New technologies have radically changed the way to share information, to speak, to work, to travel and, in general, to live. They can represent, for some aspects, both a problem and a precious resource. As we concerns, in tourism sector, ICT can help in managing and promoting destinations in a better way than in the past, especially in those cases where problems linked with the management of tourist flows and the need to manage a sustainable development exists.

Monitoring tourism impact at the destination is a fundamental issue in order to respect the right pressure and to avoid negative effects. ICT can be employed, for example, to drive tourists towards alternative paths, promoting other sites, as well as to monitor the number of tourists visiting or walking through a specific site at the destination, reducing for example the lack of data deriving from the administrative nature of traditional surveys.

There are several devices available and useful for different needs, then almost each kind of monitoring and analysis can be supported by the right tools. This knowledge should encourage local responsible to implement regular and meticulous surveys and analysis to manage the impact of tourism pressure and to respect the optimal carrying capacity of the site.

The paper will present the island contexts and their peculiarity in respect of the mainland, as well as some of the existing technologies and methods to monitor and to evaluate the impact of tourism at the destination, showing how ICT tool can support an efficient and effective management. The aim is, indeed, to keep the attention towards the available methods and tools and encourage the use of technologies in promoting the preservation of the site, through the evidences obtained in the existing literature. Particularly, the attention will be on the use of ICT tools in contexts characterized by high levels of tourism pressure and relevant problems in terms of sustainability. The need to reduce the impacts of tourist flows in the destination is linked with the preservation of local heritage, either material and immaterial, and the promotion of a real exchange between residents and tourists, based on a respective approach oriented to the relationality and the valorization of the local identity (Vázquez & Ruggieri, 2011).

2. Literature and background

2.1. Island contexts

Tourism has become essential for local economy, especially in islands, characterized by little other economic activity. The obstacles to economic growth in these contexts can be summarized under four categories (Briguglio, 1995; Hampton & Christensen, 2007; Scheyvens & Momsen, 2008):

- small size;
- insularity/remoteness;
- environmental vulnerability;
- socio-economic factors

Small size often implies limited natural resources, high propensity to import goods and services, limited possibilities for import substitutions and a lot of what is consumed by tourists cannot be produced locally in either sufficient quality nor quantity (Sharpley & Ussi, 2012). Small size also means small market for domestic products and hence dependency on export markets, difficult for domestic industries to take advantage of economies of scale, high transportation costs and high levels of openness to international trade. The barriers to economic growth, especially in the case of small islands developing states (that is, SIDS), include a heavy dependency on foreign aid, cooperation and preferential trade agreements. Tourism development for these contexts is a valid chance for independent economic growth and increasing standards of living, so representing opportunity. It is an opportunity, for example, for the local population, to gain much income and employment or to improve basic infrastructure such as roads, airports and utilities that the local population can use. The impacts, both positive and negative, of tourism on islands can have a more pronounced effect than those ones recorded in the mainland (Croes, 2006 and 2011). The magnitude of the economic benefits will also depend on the degree of good governance in the destination. In this context, the need to pay particular attention to the carrying capacity, the community involvement, the dynamic political environment and the special interest activities emerges (Lim & Cooper, 2009). We consider both the small islands developing states (SIDS) and the small island tourism economies (SITE), that is economies heavily dependent on tourism as measured by indicators such as aggregate tourism spending or average daily tourist density, and exhibit more favorable characteristics on a range of economic, social and demographic indicators. For these ones, this depends on three reasons: the geographic proximity to major global markets; early post-war development of international tourism; a longer and more intense period of colonization that led to the early establishment of basic infrastructure and market institutions (Parry & McElroy, 2009). Particularly in these contexts, tourism and agriculture have had special relationship, with benefits for the local economies (Mitchell & Ashley, 2010; Torres, 2003).

Many small island economies rely heavily on international tourism for their economic growth. Schubert, Brida, and Risso (2011) study the relationship between the tourism demand growth and the economic one. They find that an increase of tourism demand leads to an increase in economic growth, a confirmation of the tourism led growth hypothesis (Durbarray, 2002). Moreover, Seetanah (2011) finds a two way relationship between tourism growth and economic growth. Another peculiarity concerns the focus of islands efforts on sustainable tourism because of their natural environments and lack of built tourism attractions, like theme parks and museums. Also, there is normally a cultural allure to the islands that motivates visitors to choose those destinations. One of the issues associated with natural tourism sites is that tourists expect a more personal experience in a natural setting with minimal development. However, they need to focus their product development efforts in areas that are consistent with their strengths, as well as the economic policies of the government. Additionally, it is important to manage the negative social and environmental impacts of tourism and in this sense there has been a good deal of research in the area of sustainable island development (Craigwell & Maurin, 2007; Griffith, 2002; Chen, 2006; Sharpley, 2003). In fact, the expansion of tourism from a luxury destination to a mass-appeal destination with many companies benefiting, including hotels, taxis and local food producers, if it is not well managed, could lead also to negative effects and impacts on people and environment. All of the same products available to tourists are made available to the locals, resulting in a favorable environment for tourism expansion and a high percentage of repeat visitors. Initially, other countries do not take advantage of the favorable international environment for tourism expansion. Over time, most of the countries improve once they realized the importance of tourism to the economy.

Tourism is often the principal source of employment and foreign exchange earnings for island states, and the dominant economic sector. The economic effects of tourism development can be evaluated in different ways if you don't consider the other dimensions involved, such as the social and environmental ones. According Sharpley (2003), promoting mass tourism has proven to be an effective vehicle of development while promoting sustainable or 'quality' tourism might not be as effective as the mass marketing approach. Kokkranikal et al. (2003) addressed the issue of the added importance of sustainability-oriented tourism development for islands, given the fact that they face geographic, environmental, structural, and political limitations. This approach proved effective in minimizing the negative impacts of tourism. Ghina (2003) explored the status of sustainable development in small island developing states, highlighting that they face challenges such as ecological fragility and economic vulnerability. But according the authors the main challenge was environmental vulnerability – e.g., climate change which will threaten the sustainability of the economy (e.g., tourism). Belle and Bramwell (2005) examined the importance of policies addressing climate change impacts and how policy makers and tourism managers disagreed. Tourism managers didn't view policy interventions as favorable as the government policy makers, even though both felt it was very likely to be damage to the coast and the ecosystems. Moreover, some researchers have proposed new methods for managing island destinations. Sahli and Nowak (2007) proposed a trade theoretic approach for modeling the role of inbound tourism on overall economic development. There are negative economic impacts from tourism, in addition to the well documented negative social and environmental impacts.

2.2. Tourism and technologies

The use of technology in tourism is not new. The tourism industry has been influenced by increased applications, growth and widespread use of ICT and it continues to heavily influence the changes within tourism (Buhalis and Law 2008). The literature concerning the application of ICT to specifically support the management of sustainable tourism is not very rich. Melville (2010), Dao et al. (2011) and Bajracharya et al. (2013) have all commented that a research gap exists which focuses on the role of technology for developing businesses capabilities for sustainability. Watson et al. (2010) further argues that studying on providing a greater understanding of how technology can help to support sustainability concerns to scholars, while Henry (2012) noted that, "it would seem foolhardy not to understand the ICT implications in these regard". Destinations are not only a widely accepted organising unit in tourism and the attracting power for tourists; they are the central point for all the stakeholders in the tourism industry (Ko 2005; Bornhorst et al. 2010).

In the literature, one area that has not been thoroughly investigated is the possibility of using ICT to mitigate the negative impacts of tourism and highlighting its positive consequences. For destinations, it serves as a mechanism for new distribution channels and increases communication and interaction with and between stakeholders (Gratzer et al. 2002; Buhalis and O'Connor, 2006).

Mohammed Shafie et al. (2013) presented a conceptual approach in understanding how ICT can be used in sustainable urban tourism through specific indicators development. Using Åre in Sweden as a case study, Fuchs et al. (2013) presented a knowledge-based destination management information system, which can aid in sustainable destination development. Chiabail et al. (2013) focused on facilitating stakeholder participation for sustainable cultural tourism development through the design of a Website, which used tools such as blogs and forums concentrated on how ICT can be used for sustainable tourism. Ali and Frew (2013) have presented an overview on the field of ICT sustainable tourism by conceptualizing it from a destination, consumer and business perspective and derived a collection of ICT-based tools for sustainable tourism development.

The importance of technology is marked by now, since technology and innovation are considered the main forces for ensuring sustainability (Scheel 2011). Hjalager (2010) reinforced this when she identified ICT as an important catalyst for tourism innovation whilst Racherla, Hu and Huyn (2008) argued that destinations have not embraced the power of ICT to connect with innovation for tourism planning and development. Since this, new roles in Destination Management Organizations (DMO) will be defined. The innovation not only exist in a physical state, but also are habits and customs and provide some type of framework within which people can interact. The tourism system will have to be managed by an institution that is located beyond the scope of individual businesses and organizations, but able to understand local needs and potentialities. The use of ICT for sustainable tourism innovation by fostering better partnerships with stakeholders and engaging in dialogue with the community. ICT can be an innovative and practical approach for destination managers in their efforts to further support sustainable tourism. Then, one of the fundamental issues for Tourism sector development will be adopting a sustainable strategies and policies for the future. To understand the effective direction, the definition of sustainable tourism is needed. The official definition of sustainability as regards tourism sector has been provided by WTO in 2005: "Sustainability principles refer to the environmental, economic and socio-cultural aspects of tourism development and a suitable balance must be established between these three dimensions to guarantee its long-term sustainability". In order to reach this goal, the analysis of the actual scenario at the destination has to be defined through a set of tool to evaluate the impact of tourism. In this sense, over the years, many indexes have been elaborated to evaluate the impact of tourism in a destination, such as carrying capacity, social responsibility and integration between tourists and local people. Particularly, carrying capacity has been considered the most relevant indicator. According the WTO, the carrying capacity of a tourist destination may be defined as "the maximum number of people that may visit a tourist destination at the same time, without causing destruction of the physical, economic and social environment".

Once the starting framework has been pictured, an efficient and effective strategy to contain the negative impact has to be selected and implemented. In both the phases, preliminary analysis and management of the tourist flows, new technologies play a relevant role since their accuracy and widespread over the world.

3. Existing technologies and methods

The available tools to collect data about tourists movements and behavior at the destination are mainly based on GPS, WiFi or video technologies. They consist in counting people at the access points of the destination, such as harbors or airports for insular contexts, as well as at the entrance of specific sites at the destination, such as city centers, archaeological sites, natural or theme parks and so on. The devices could be positioned also in specific sites to evaluate the level of crowd and support decisions. But the available tools and the support they can provide are increasing.

A destination is defined as the physical space/geographical area, which contains tourism products and services to be consumed by the tourists as part of the experience and which is managed by an organization, such as a DMO, that is the organization responsible for the management of tourism at the destination level. To support the destination management, the available ICT Tools for sustainable tourism are:

1. Destination management system
2. Intelligent transport system
3. Environment management information system
4. Location based services
5. Global positioning system
6. Geographical information system

a) Destination Management Systems (DMS) are identified by destination managers within DMO as the most important tool for supporting efforts in sustainable tourism development. It is used for information management, marketing (Horan and Frew 2007), exchange amongst stakeholders, resource management, distribution, tourist education and satisfaction and sustainable consumption.

b) Intelligent Transport System (ITS) is an important ICT tool used for tourist satisfaction by providing real time information and traffic management (Diagle and Zimmerman, 2004), leading to savings in energy, to identify the safest and quickest route, assist in navigation and generally enhance the enjoyment of the destination.

c) Environment Management Information Systems (EMIS) is used for resource and information management (El-Gayar and Fritz, 2006), which could lead to cost savings. Labour cost is reduced since manual processes can be automated through the use of the EMIS. Destination managers are then more aware of the impacts of tourism at the destination and can therefore take the necessary remedial or mitigating action. This information helps to monitor and measure the environmental quality of the destination to identify areas for zoning, for instance, areas of tranquility or areas with people on bikes.

d) Location Based Services (LBS) are very promising for managing sustainable tourism, with a wide variety of uses, including the provision of information to the tourists for visiting geographic locations in real time (Berger et al. 2003; Liburd 2005). It aids in the management of the destination's resources since they can market and inform the tourists about which sites and attractions to visit, educate them on travelling to sensitive areas, how they can maintain the destination's environment and appropriate behaviour at the destination. This information can help tourists make sustainable choices about which products to consume during the stay (Liburd 2005).

e) Global Positioning Systems (GPS) are identified for both tracking and analysis of tourist movements (Shoval and Isaacson 2006) and location identification for tourists. A destination manager can use this information to develop tourism plans for spreading tourists at different sites and attractions at the destination. This ensures that environmental impacts are better managed in a particular area through 'load balancing'.

f) Another ICT-based tool/application was Geographical Information Systems (GIS), used for mapping and profiling tourists at the destination (Lau and McKercher 2007). Using this information, destination managers can monitor the destination and use it to assist with visitor management techniques. A GIS also assists a DMO in transport planning and routes identification (Lew and McKercher 2005). This provides both the tourists and the locals with the safest and quickest routes at the destination. Economic benefits can also be realised from the co-ordination and management of information. GIS can also being used for data integration and mapping so as to provide DMOs with a clearer picture of conditions at the destination for better decision-making.

Further technologies are strongly related with the need to preserve local heritage and resources, such as Community Informatics (CI), used for community engagement, heritage preservation, interpretation and community cohesion (Gretzel et al. 2009), and truly engages with the socio-cultural aspect of sustainable tourism. It can connect the community by allowing them greater involvement in decisions relating to tourism development and planning at the destination. This is important since if the locals feel integrated in the tourism process then they will have greater buy-in (Cole, 2006).

Increasing awareness through CI can support the host community in gaining a better appreciation of their neighbors, their community and their environment. According to Chiabai (2013) encouraging stakeholders participation is a key element in terms of social sustainability. This ICT-tool improves awareness among the host community about sustainability in an online environment. It can also allow the community to play an important role in what messages to communicate to the tourists. Another example is the Carbon Calculators, that is more of an awareness-raising tool, which allows tourists to monitor their CO₂ emissions. It is a marketing and promotion tool for destinations wanting to advertise that they are "green" and environment friendly. A bit different is the Virtual Tourism (VT), which contributes to reducing degradation at sites/attractions by reducing

tourist numbers. Through information distribution tourists can also be educated about the destination. A number of destinations are already using rich media on their websites to seek to reduce the intangibility aspect of the tourism product. Finally, Computer Simulation (CS) is used for predicting trends by simulating scenarios (Lawson 2006) such as climate change and illustrating changes to the environment from tourist usage. This provides the destination manager with realistic images of what proposed tourism developments would look like under varying conditions. This information can be used to make decisions, which have a more favorable long-term impact on the environment and therefore contribute to the destination sustainable development.

4. Conclusions

The sustained tourism growth rate makes it highly attractive as a means of economic development (Mihalic et al. 2012) but like most commercial activities, tourism has produced both beneficial and detrimental environmental and socio-cultural impacts, some of which may be irreversible. Balancing economic growth with protection of the environment is a challenge, which today faces most tourism professionals and the tourism industry is focusing on sustainable tourism development as a mechanism to try to achieve the goals of economic development whilst protecting, preserving and enhancing the environment and the local culture. Destinations are the sites where the tourism impacts occur (Wall and Mathieson 2006) and there has been a general and growing concern on how destinations can develop in a sustainable manner (Dodds 2012). Some examples of these approaches include indicators, monitoring, eco-labelling, codes of conduct and alternative forms of tourism. However, many of these approaches have been documented as having a “lack of quality, technical content, reliability, maturity, equity and effectiveness” (Van Der Duim and Van Marwijk 2006). ICT can help to reach this goal with the different tools available and the high degree of precision in collecting data.

Without any form of control, in case of very popular sites, the risk is to receive so much visitors that they are perceived as invaders rather than guests by the residents. This doesn't help the creation of a good exchange between residents and tourists as well as the valorization of the local culture. In general, the whole local heritage, is threatened by this massive flow. Moreover, also the arising attention towards a more relational tourism and the awareness for the need to protect and valorize local features, should be considered as a stimulus to reach new tools to monitor and manage tourism impacts, as encouraged by this paper. The tools briefly introduced in this paper can help to understand the variety of existing opportunities in order to collect the needed data, to deeply analyse them and to implement the designed solutions.

References

- Ali A, Frew, AJ (2013) Information and communication technologies for sustainable tourism. Routledge, London
- Ali, A., & Frew, A. J. (2014). Technology innovation and applications in sustainable destination development. *Information Technology & Tourism*, 14(4), 265-290.
- Bajracharya B, Cattell D, McPhee D, Too L, Khanjanasthiti I (2013) Sense in the city: Making the Gold Coast an intelligent and sustainable city. http://epublications.bond.edu.au/sustainable_development/205/. Accessed October 5th 2013
- Belle, N. & Bramwell, B. (2005). Climate Change and Small Island Tourism: Policy Maker and Industry Perspectives in Barbados, *Journal of Travel Research*, 44 (1), 32-41.
- Berger S., Lehman H, Lehner F (2003) Location-based services in the tourist industry. *Journal of Information Technology & Tourism* 5: 243-256.
- Bojanic, D. C., Warrick, R., & Musante, M. (2016). An Evaluation of the Relative Importance of Tourism for Islands.
- Bornhorst T, Ritchie JR, Sheehan L (2010) Determinants for DMO & destination success: an empirical examination. *Tourism Management* 31:572-589. doi: 10.1016/j.tourman.2009.06.008
- Briguglio, L. (1995). Small island developing states and their economic vulnerabilities. *World Development*, 23(9), 1615-1632
- Buhalis D, Law, R. (2008) Progress in information technology and tourism management: 20 years on and 10 years after the internet-the state of eTourism research. *Tourism Management* 29: 609-623. doi: 10.1016/j.tourman.2008.01.005
- Buhalis D, O'Connor P (2006) Information communication technology-revolutionizing tourism. In: Buhalis, D, Costa C (eds) *Tourism management dynamics: trends, management, tools*. Elsevier, Oxford, pp. 196-209
- Chen, R. (2006). Islands in Europe: Development of an Island Tourism Multi-Dimensional Model (ITMDM), *Sustainable Development*, 14, 104-114.

- Chiabai A, Paskaleva K, Lombardi P (2013) e-Participation model for sustainable cultural tourism management: a bottom-up approach. *Int. J. Tourism Res.* 15:35–51. doi: 10.1002/jtr.871
- Cole S (2006) Information and empowerment: the keys to achieving sustainable tourism. *Journal of Sustainable Tourism* 14: 629–644. doi: 10.2167/jost607.0
- Craigwell, R. and Maurin, A. (2007). A Sectoral Analysis of Barbados' GDP Business Cycle, *Journal of Eastern Caribbean Studies*, 32 (1), 21-52.
- Croes, R. (2006). A paradigm shift to a new strategy for small island economies: Embracing demand side economics for value enhancement and long term economic stability. *Tourism Management*, 27(3), 453–465.
- Croes, R. (2011). Measuring and explaining competitiveness in the context of small island destinations. *Journal of Travel Research*, 50(4), 431–442.
- Dao V, Langella I, Carbo J (2011) From green to sustainability: information technology and an integrated sustainability framework. *Journal of Strategic Information Systems*, 20:63-79. doi: 10.1016/j.jsis.2011.01.002
- Diagle JJ, Zimmerman AC (2004) The convergence of transportation, information technology and visitor experience at Acadia National Park. *Journal of Travel Research* 43: 151-160. doi: 10.1177/0047287504268239
- Dodds, R. (2012) Sustainable tourism: a hope or a necessity? The case of Tofino, British Columbia, Canada. *Journal of Sustainable Development*, 5:54-64. doi: 10.5539/jsd.v5n5p54
- Durbarry, R. (2002). The economic contribution of tourism in Mauritius. *Annals of Tourism Research*, 29(3), 862–865.
- El-Gayar OF, Fritz DB (2006) Environmental management information systems (EMIS) for sustainable development: a conceptual overview. *Communications of the Association for Information Systems* 17: 756-784.
- Fuchs M, Abadzhev A, Svensson B et al (2013) A knowledge destination framework for tourism sustainability: A business intelligence application from Sweden. *Tourism: An International Interdisciplinary Journal* 61:121-148
- Ghina, F. (2003). Sustainable Development in Small Island Developing States, *Environment, Development and Sustainability*, 5 (1/2), 139-165.
- Gratzer M, Winiwarter W, Werthner H (2002) State of the art in eTourism. 3rd South Eastern European Conference on e-Commerce 2002.
- Gretzel U, Go H, Lee K et al (2009) Role of community informatics in heritage tourism development. In: Höpken W, Gretel U, Law R (eds) *Information and communication technologies in tourism 2009*. Springer, New York, pp. 1-12
- Griffith, Winston (2002). A Tale of Four CARICOM Countries, *Journal of Economic Issues*, 36 (1), 79-106.
- Hampton, M. P., & Christensen, J. (2007). Competing industries in islands: A new tourism approach. *Annals of Tourism Research*, 34(4), 998–1020
- Henry BC (2012). ICT for sustainable development. *Science and Technology* 2:142-145. doi: 10.5923/j.scit.20120205.06
- Hjalager A (2010) A review of innovation research in tourism. *Tourism Management* 31:1-12. doi:10.1016/j.tourman.2009.08.012
- Horan P, Frew, AJ (2007) Destination eMetrics. In: Frew, JA (ed) *Proceedings of the Travel Distribution Summit, Europe Research Conference 2007*. Axon Imprint, London, pp. 25-44.
- Ko TG (2005) Development of a tourism sustainability assessment procedure: a conceptual approach. *Tourism Management* 26: 431-445. doi:10.1016/j.tourman.2003.12.003
- Kokkranikal, J., McLellan, R., & Baum, T. (2003). Island Tourism and Sustainability: A Case Study of the Lakshadweep Islands, *Journal of Sustainable Tourism*, 11 (5), 426–447.
- Lau G, McKercher B (2007) Understanding tourist movement patterns in a destination: A GIS approach. *Tourism and Hospitality Research* 7: 39-49. doi: 10.1057/palgrave.thr.6050027
- Lawson S. (2006) Computer simulation as a tool for planning and management of visitor use in protected natural areas. *Journal of Sustainable Tourism* 14: 600–617. doi: 10.2167/jost625.0
- Lew A, McKercher B (2005) Modeling tourist movements: a local destination analysis. *Annals of Tourism Research* 33: 403–423. doi:10.1016/j.annals.2005.12.002
- Liburd LJ (2005) Sustainable tourism and innovation on mobile tourism services. *Tourism Review International* 9:107-118. doi:10.3727/154427205774791771

- Lim, C. C., & Cooper, C. (2009). Beyond sustainability: Optimising island tourism development. *International Journal of Tourism Research*, 11(1), 89–103.
- Melville, P N (2010) Information systems innovation for environmental sustainability. *MIS Quarterly*, 34: 1-22.
- Mihalic T, Zabkar V, Cvelbar, K L (2012) A hotel sustainability business model: evidence from Slovenia, *Journal of Sustainable Tourism*; 20:701-719. doi: 10.1080/09669582.2011.632092
- Mitchell, J., & Ashley, C. (2010). *Tourism and poverty reduction: Pathways to prosperity*. London: Earthscan.
- Mohammad Shafiee, M., Mohammad Shafiee, M., Shams, H., Yahai, M.R. and Golchin, H. (2013), 'ICT Capacities in Creating Sustainable Urban Tourism and its Effects on Resident Quality of Life', 7th International Conference on e-Commerce in Developing Countries with focus on e-Security.
- Parry, C. E., & McElroy, J. L. (2009). The supply determinants of small island tourism economies. *The ARA (Caribbean) Journal of Tourism Research*, 2(1), 13–22.
- Pratt, S. (2015). The economic impact of tourism in SIDS. *Annals of Tourism Research*, 52, 148-160.
- Racherla P, Hu, C, Hyun YM (2008) Exploring the role of innovative technologies in building knowledgebased destination. *Current Issues in Tourism* 11: 40-427. doi: 10.1080/1368350080231602d
- Sahli, M. & Nowak, J. (2007). Does Inbound Tourism Benefit Developing Countries? A Trade Theoretic, *Journal of Travel Research*, 45 (4), 426-434.
- Scheel C, Vazquez M (2011) The role of innovation and technology in industrial ecology systems 18 for the sustainable development of emerging regions. *Journal of Sustainable Development* 4: 197-210
- Scheyvens, R., & Momsen, J. (2008). Tourism and poverty reduction: Issues for small island states. *Tourism Geographies*, 10(1), 22–41
- Schubert, S. F., Brida, J. G., & Risso, W. A. (2011). The impacts of international tourism demand on economic growth of small economies dependent on tourism. *Tourism Management*, 32(2), 377–385.
- Seetanah, B. (2011). Assessing the dynamic economic impact of tourism for island economies. *Annals of Tourism Research*, 38(1), 291–308
- Sharpley, R. (2003). Tourism, Modernization and Development on the Island of Cyprus: Challenges and Policy Responses, *Journal of Sustainable Tourism*, 11 (2/3), 246-265.
- Shoval N, Isaacson M (2006) Tracking tourist in the digital age. *Annals of Tourism Research* 34: 141-159. doi:10.1016/j.annals.2006.07.007
- Torres, R. (2003). Linkages between tourism and agriculture in Mexico. *Annals of Tourism Research*, 30(3), 546–566.
- Van der Duim R, van Marwijk R (2006) The implementation of an environmental management system for Dutch tour operators: an actor-network perspective. *Journal of Sustainable Tourism* 14: 449-472. doi: 10.2167/jost559.0
- Vázquez, F. J. C., & Ruggieri, G. (2011). Relational tourism: challenges and potentials. *Turismo y Desarrollo: Revista de Investigación en Turismo y Desarrollo Local*, 4(9).
- Wall G, Mathieson A (2006) *Tourism: change, impacts and opportunities*. Pearson Education Limited, Essex
- Watson T R, Boudreau M, Chen J A (2010) Information systems and environmentally sustainable development: energy informatics and new directions for the IS community. *MIS Quarterly* 34:23-38.

CONTEMPORARY MONUMENTS IN POLAND (1945-1989). COMPLEXITY AND CONTRADICTIONS IN PRESERVATION

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Abstract

The article is focused on Polish modern architectural heritage (1945 and 1989) and the problems with its protection. Many iconic structures have already disappeared or lost their beauty, but many have survived and make up cities' tissue, create their identity, and offer tourism potential. However, not protected, they are endangered and on the verge of extinction. In the last two decades, Poland has lost some of the fine examples of socialist, brutalistic, modern constructions. Some of them disappeared during the "modernization" of the country after the collapse of the communist system. The attitude toward socialist monuments and the way they are treated depends on many factors, including location, investor's profile, level of knowledge, local authorities' attitude, and type of the building (office, hotel, transport, industry, culture). We would like to discuss selected problems concerning the protection of modern heritage, as well as present some positive examples of its preservation (Cracovia Hotel).

Keywords: modern heritage, preservation, Polish architecture

1. Introduction

For many years, Polish modern architectural heritage (1945 and 1989) had been ignored, the buildings neglected, emptied, and often hated. Nowadays, they have lost their ideological and programmatic meaning and become architectural objects, sometimes masterpieces, fighting for recognition. Although many iconic structures have already disappeared or lost their beauty, many have survived and make up cities' tissue, create their identity, and offer tourism potential. However, not protected, they are endangered and on the verge of extinction. In the last two decades, Poland has lost some of the fine examples of socialist, brutalistic, modern constructions. Others disappeared during the "modernization" of the country after the collapse of the communist system.

2. The problem with (insufficient) protection

The issue of protecting modernist architecture is a complex, multifaceted problem. This is because the modernist heritage comprises landmarks of different functions, locations, and degree of preservation. A visibly growing interest in Polish post-war architecture, a tendency which has seen an increased number of relevant publications, does not, however, translate into actual conservatorial steps. Modern heritage is a "difficult" one not only in Poland: it can be observed that only 3% of the landmarks included on the UNESCO World Heritage List come from the 20th century. In 2014, Jörg Haspel, president of ICOMOS Germany, emphasized that "in the context of the world heritage, it is important to act in line with outstanding universal values, visual integrity, and historical authenticity" [Haspel 2014:188].

An obstacle to an efficient protection of Polish post-war modernist architecture is e.g. lack of clear statutory provisions and conservatorial guidelines [Lewicki 2014:150]. The reference document concerning the protection of all landmarks, thus including modernist ones, is the act on the protection and care of historical monuments, dated 23 July 2003. Subsequently, additional legislation was passed whose aim was to protect material heritage. For instance, it was stipulated that a selected landmark can be protected under a local spatial development plan. Unfortunately, both these legal solutions, i.e. the act and inclusion in the plan, proved ineffective for a number of reasons. In the first case, the problem is about defining the evaluative criteria, and in the other, it is about lack of spatial development plans for most Polish towns and cities. Then, in 2003, the term of "modern cultural objects" was introduced to apply to the most recent historical monuments. A list of modern cultural objects was compiled, but, sadly, being recorded in this list does not mean any kind of legal protection (sic!). Additionally, the criteria of selecting a building to be potentially classified as a modern cultural object were still vague. The problem was rather quickly identified by professional circles of architects, conservationists, and art historians, all of whom took steps to lay down the criteria for evaluating modernist buildings. It was decided that an object has to meet the following conditions:

- innovative character with respect to architectural, spatial, and technical properties
- context, both at the stage of development and subsequent localization
- local tradition
- symbolic value
- contemporary recognition

- test of time and retention of spatial and esthetic values
- artistic
- uniqueness and completeness.

The ineffectiveness of conservatorial actions with respect to modernist architecture also results from erroneous records in the register of cultural heritage objects as well as procedural errors in the course of administrative proceedings, whereby just a part of an object rather than an object in its entirety is recorded [Lewicki 2014: 155]. A faulty record was filed e.g. in the case of Warsaw's Central Department Store (designed by Zbigniew Ihnatowicz, 1948).

The protection of modernist heritage is also adversely affected by the ill-will of authorities or investors, who ignore the opinions of experts and society. A case in point is the story of the destruction of some of the most important landmarks of post-war modernism, namely the Warsaw "Supersam" (designed by Ewa Krasińska, Maciej Krasiński, Jerzy Hryniewiecki, Wacław Zalewski, 1959-1962), characterized by a unique suspended roof, and the Katowice railway station (designed by Wacław Kłyszewski, Jerzy Mokrzyński, Eugeniusz Wierzbicki, 1964-1972), which was a model example of Polish brutalist architecture. In the case of the "Supersam", Jakub Lewicki underlined that "on his final day in office, the Mazowieckie Province Conservationist refused to recognize the 'Supersam' as a monument, invoking expert evidence. At the same time, the Massachusetts Institute of Technology, one of the world's most renowned institutions connected with architecture, held a huge monographic exhibition of the designs of prof. Wacław Zalewski, one of the building's designers (the brains behind the experimental construction), and the exhibition catalog's cover featured a picture of the "Supersam" [Lewicki 2014: 151]. Due to hostile disposition toward post-war modernism, it was impossible to salvage many other extremely valuable objects, which were either completely destroyed or underwent extensive modifications – despite public protests or inclusion in the list of modern cultural objects. The objects which were legally destroyed in Warsaw included the 10th-Anniversary Stadium (on whose site the National Stadium for the UEFA Euro 2012 was erected), the Chemii pavilion, or the "Wenecja" bar. The list of losses is long.

The biggest problem to date is the obliviousness to the value of the post-war modernism legacy. Ignorance and lack of knowledge, in their turn, contribute to the creation of the new politics of memory, whereby architectural objects are treated instrumentally. This is evidenced e.g. by the recurrent debate on whether to knock down the Palace of Culture and Science. Sadly, this preposterous idea has been supported not only by politicians but also by representatives of the circles of art historians and architects.

Paradoxically, it is the social realism objects that are in the most favorable position. Despite controversy, voices of dissent from some right-wing circles, and heated debates, it is precisely the social realism objects that have been recorded in the register of cultural heritage objects earliest and are the strongest group in said register. This is chiefly because of the most significant time gap: they were built during the first half of the 1950s. The status of a cultural heritage object has been given to the Palace of Culture and Science, Marszałkowska Residential District, the former KC PZPR (Central Committee of the Polish United Workers' Party) headquarters (the so-called House of the Party), or the urban layout of Nowa Huta, a district which can even aspire to be recorded as a UNESCO site. These are just selected examples. It is fascinating to follow the present-day situation of Gdynia Main Railway Station (designed by Wacław Tomaszewski, 1950-1956), with its compelling, masterfully recreated interior decorations (paintings by Janusz Studnicki and the team, after 1956). In 2008, the building was included in the register of cultural heritage objects of Pomorskie province, thus becoming the youngest cultural heritage object in the region. However, the inclusion was surrounded by numerous debates and controversies. Robert Hirsch, Gdynia's Municipal Conservationist, remarked that "after the renovation and conservation works, the station has been given a new look, similar to that from the 1950s. It should be chalked up as a success that once the works were finished and the station was commissioned, voices of criticism could no longer be heard. Today, the new station is in the public eye and is even admired and appreciated" [Hirsch 2014:15]. Unfortunately, a few years later, another unique object, a flagship creation of social realism located in the nearby Gdansk, namely the Leningrad (subsequently Neptun) movie theater, was knocked down, despite protests by society and professionals, including architects and art historians. On the other hand, not much publicity was given to the "modernization works" to valuable post-war objects in Podhale, which were about destroying significant details, replacing the roof shingles with steel roof tiles, or a whole reconstruction. One of the objects to have undergone such a negative modernization was the Tourist's House in Zakopane, a perfect example of post-war regionalism and the building with the largest shingles roof in Europe (designed by Tadeusz Brzoza, Zbigniew Kupiec, 1949-1956). In 2015, it was rebuilt to serve as an expensive hotel. In the process, the materials, details, and interiors were changed, with the object's artistic values destroyed for commercial purposes.

However, degradation, destruction, or total reconstruction much more often affect some outstanding creations of Polish post-war modernism from the thaw period, after 1956. These are being fast replaced – especially in the centers of big cities – with new, but not necessarily better buildings. A symbolic example may be that of the Vitkac department store in Warsaw (designed

by Stefan Kuryłowicz and the team, 2013), which was erected in place of a light, experimental modernist department store, the so-called Chemii Pavilion (designed by Jan Bogusławski, Bohdan Gniiewiewski, 1960-1961). A well-known Polish publicist wrote then that Lord Vader had obscured Luke Skywalker [Springer 2011]. Presently, a decision is to be made concerning a number of modernist objects which require immediate upgrading, adapting to new functions, and adjusting to present-day operational requirements. Discussions are ongoing with regard to one of Poznań's modernist icons, namely the Arena multipurpose indoor arena (designed by Jerzy Turzeniecki, 1974), a venue characterized by a unique construction of reinforced concrete arches inspired by Luigi Nervi's Pallazetto dello Sport in Rome. However, this extraordinary construction unfortunately has not only many supporters but also opponents, including in the field of culture. In 2011, the idea of knocking it down was suggested by, among others, Jan Kaczmarek, a famous Polish composer and an Academy Award winner. But professional circles have clearly stated that this is a building of not only unique form, but also one that is fully functional and relatively easy to adapt to new operational requirements [Marciniak 2014:161]. Then, one of the newest cultural heritage objects, which is rather unsalvageable already, is the Forum Hotel in Kraków (designed by Janusz Ingarden, 1978-1989), an exceptional example of the late modernist architecture in Poland. Its monumental body, resting on reinforced concrete pillars, used to boast the most modern interiors of the late PRL era. Today, it is a ferroconcrete skeleton in a splendid location.

3. Modern Heritage – successful attempts to increase awareness and successful protection

Although modernist heritage is being mostly neglected and improperly transformed, there are certain projects and movements that offer hope for the future and may indicate a change in the levels of awareness of investors, both state-sponsored and private. Also, post-war objects are more and more often successfully adapted to new functionalities with the retention of their artistic values. It has become clear that the disappearance of historical function and the necessity of finding a new one applies in equal measure to modernist buildings and those historical buildings which do not arouse controversy or opposition. It is not only the artistic values of modernist architecture that have become apparent, but also its emotional dimension; gradually, it is being recognized as a factor in creating the identity and authenticity of a place.

Among other places, Rzeszów has shown understanding for post-war architecture. It needs to be added that after 1945 the town became the informal capital of the Central Industrial Region (whose foundations had been laid already before World War II) and dynamically expanded as a consequence. The locals appreciate this post-war modernization, which led to a significant improvement of their wellbeing. The objects built at that time, although not protected by recording in a cultural heritage objects registry, are being meticulously modernized and due respect is being given to the original design, a tendency which can be seen in the case of such buildings as the Regional Police Headquarters or the Marshall's Office.

Post-war objects which contributed to the creation of a unique character of a place, a sort of *genius loci*, are also (at times) appreciated in Warsaw. A case in point is the bodies of the cross-city railway stops, which date back to the 1960s, such as Powiśle or Ochota (designed by Arseniusz Romanowicz, Piotr Szymaniak, 1963), partially adapted to new functionalities (e.g. a café was set up in the ground-level entrance pavilion, in the so-called "pancake").

A lot of outstanding modernist objects were erected after 1945 for the purposes of the then-expanding higher education sector. Due to problems with adapting them to new educational requirements, these objects, and especially their interiors, were being unceremoniously destroyed. However, certain universities appreciated their legacy and a unique architectural form. This happened in Łódź: the Academy of Fine Arts (designed by Bolesław Kardaszewski, 1963) is one of the icons of late Polish modernism and one of few buildings housing a fine arts school built after the war from scratch. The building was designed according to a pavilion system, with a concentric functional-spatial layout, drawing upon the prime examples of the design of schools of art, such as e.g. the Bauhaus school in Dessau (designed by Walter Gropius, 1926). In order to adapt the building to new operational requirements, an upgrade was necessary. After 2000, the leaky window woodwork was replaced, its color changed into orange, and the wooden siding on the shielding walls was removed and replaced with gray aluminum panels. However, the identity of this late modernist complex has remained intact.

Part of the Polish modernism heritage is also outstanding sporting venues. These are the buildings which stand out in terms of cubature, dynamic form, and modern design, and they are the symbols of many Polish towns. They participated in the creation of the post-war history and became important factors in identity building. The Spodek in Katowice or the Oliwia, the Gdańsk multipurpose indoor arena, can be classified as well-modernized objects. The multipurpose indoor arena in Katowice (designed by Maciej Gintowt, Jerzy Hryniewiecki, Maciej Krasiński, Andrzej Żórawski, 1971) very quickly became an icon of Polish post-war modernism thanks to its unique, expressive, sculpture-like design (which was a direct corollary of its function), as well as because of the innovative construction of the roof. This venue was gradually upgraded inside, and in 2011, it underwent a wholesale refurbishment of the façade. Then, the building regained its original light-gray color. The new flakes have retained the dimensions and shape of the original ones, but were made from a different material. The mixture of concrete and asbestos was replaced by aluminum covered with special durable coating. Currently, discussions are taking place concerning further upgrading of the

arena's interiors in order to improve its functionality. Importantly, architects and professional circles are consulted so that modernization works will go hand in hand with the maximal retention of the original identity of the object.

The Oliwia indoor arena (designed Maciej Gintowt, Maciej Krasiński, constr. Stanisław Kuś, 1972), an extraordinary sporting venue, one of the most important modernist cultural heritage objects, characterized by an expressive, monumental body inspired by the shape of a boat, closed down in 2007 due to potential danger of collapse. Long discussions were held concerning the future of this historic building (it was the venue of Solidarity's first congress). Finally, it was decided that the building would be modernized. The object has regained its former glamor and has been adapted to present-day operational requirements in 2016.

Increasingly often, functions of modernist objects are changed with the retention of their artistic and spatial values in the course of private investments. One of the first actualizations of such a business plan was Poznań's "Okraślak" (designed by Marek Leykam, 1948-1955). Between 2011 and 2012, the elegant modernist department store was transformed into a class-A office block. The "Okraślak" is an 8-story cylinder, whose core is a spacious staircase with the diameter of 5 meters, which has three flights of stairs. The details of the interiors and façade have been meticulously recreated and in 2012 the building was awarded the "Modernization of the Year" accolade.

A different strategy was employed in the case of the Kosmos in Szczecin (designed by Andrzej Korzeniewski; mosaics by Sławomir Lewiński, Emaneul Messner, 1959), a model modernist 1950s movie theater characterized by a straight glass body and a unique mosaic façade. The movie theater, the first major architectural endeavor of the post-war Szczecin, a venue with a cult status among different generations of the locals, closed down in 2003. Although it was recorded in the list of modern cultural objects, its decay had continued. When the demolition seemed inevitable, an investor came forward who proposed a rather controversial solution, which, however, was the only way out for this creation: the investor agreed to keep the movie theater running and undertook to modernize it and restore its original identity, but in exchange he tightly screened the entire building, encircling it with new office blocks.

An interesting example of changing the venue's function without major interventions into its body is another case from Łódź, namely that of the final stop of the suburban tram (designed by Witold Wiśniewski, 1951). Although the object dates back to social realism, it is characterized by modernist forms close to the streamline. Presently, it is the regional headquarters of the Association of Polish Architects. The waiting rooms have been adapted to serve as a conference room and a gallery.

However, the most widely discussed and the boldest decision with regard to the approach to modernist creations concerns the Cracovia Hotel in Kraków (designed by Witold Cęckiewicz, 1959-1965). Lately, a public debate has been taking place surrounding the issue of the necessity of retaining the hotel's historic character, with a number of authority figures in the fields of the history of architecture and conservation underlining the historic value of the hotel and the need to keep the building as an exceptional example of post-modern architecture, not only in Kraków but also nationwide.

In 2017, the modernist building of the former Cracovia hotel became the property of the National Museum in Kraków. According to the plans of the Museum, the building, partly recorded in the register of cultural heritage objects (in 2016), will house a design and architecture gallery. Then, a new public space is going to be created between the former hotel and the Museum's main building to serve as a culture forum offering a great potential for the development of the city and culture. This would be an important urban arrangement for Kraków, which was repeatedly emphasized by Andrzej Szczerski, the National Museum in Kraków deputy director for scientific affairs [www.mnk.pl].

4. Tourism potential of postwar modernism architecture

The modernist heritage is an important for the identity of Polish cities, which were expanded, modernized, and rebuilt after 1945. This importance is presently more and more recognized and the potential is used in the course of revitalization and in the tourist sector. Examples from across Europe demonstrate that post-war heritage can positively influence the image of the town, reinforce its identity, and stimulate the growth of tourism. This is precisely what happened in the modernist town of Havre, which was recorded in the UNESCO World Heritage List in 2005. The number of people taking guided tours in Havre between 2001 and 2010 had increased from 2,000 to 30,000 [Chauvin 2014:131]. Conservatorial works, however, should go hand in hand with a marketing and educational strategy, especially in view of the fact that according to the latest tendencies, included in the UNESCO conventions, the care of cultural objects and heritage should also take on a social and civic character [Jankiewicz 2015:71]. Cultural heritage objects, including post-war ones, make up cultural heritage, which is a public good. This is best illustrated by Jacek Purchla's words: "Presently, cultural heritage is not merely a subject of protection, but also embodies a potential which should be exploited with a view to future development. For it is only a skillful and harmonious inclusion of heritage in the great civilizational change which we are witnessing that will guarantee its successful protection" [Purchla 2014:21].

Post-war modernism, in its turn, is heritage extraordinary. It offers sizeable potential for the development of culture and tourism and it is as interesting as historic architecture – or maybe even more interesting thanks to its novelty, originality, and innovativeness. It encourages the creation of outstanding narrations and new ways of presenting the latter. Pre-war modernism has already become an appreciated tourist attraction and the flagship brand of Gdynia, while post-war modernism is waiting its turn. However, tourist routes devoted to post-war architecture are gradually appearing e.g. in Poznań or Tychy, towns built mostly post-1945, or in Nowa Huta, one of the biggest industrial towns of the socialist era, presently a district of Kraków.

Since 2017, tourists have been able to once again visit the Śnieżka mountain chalet and observatory, a modernist icon of Lower Silesia, a building characterized by a futuristic body comprising three discs (designed by Witold Lipiński, 1974).

References:

Chauvin (2014) Chauvin Elisabeth, *Miasto Hawr – historia modernistycznej utopii*, in: „Architektura XX wieku dla lat sześćdziesiątych i jej ochrona w Gdyni i w Europie”, eds. by M. Sołtysik, R. Hirsch,, Gdynia 2014.

Hirsch (2014) Hirsch Robert, *Ochrona i konserwacja architektury modernistycznej Gdyni*, in: „Architektura XX wieku dla lat sześćdziesiątych i jej ochrona w Gdyni i w Europie”, eds. by M. Sołtysik, R. Hirsch,, Gdynia 2014.

Jankiewicz (2015) Jankiewicz Adam, *Spoleczne aspekty ochrony zabytków. Rola wspólnot, grup i jednostek w ochronie dziedzictwa kulturowego*, in: „Zabytek zadbane. Co to znaczy?” ed. by I. Liżewska,, Warszawa 2015.

Lewicki (2014) Lewicki Jakub, *Badania, definicje, wartościowania a rzeczywistość, czyli dlaczego utracono czołowe dzieła polskiego modernizmu*, in: „Architektura XX wieku dla lat sześćdziesiątych i jej ochrona w Gdyni i w Europie”, eds. by M. Sołtysik, R. Hirsch,, Gdynia 2014

Marciniak (2014) Marciniak Piotr, *Niewygodny zabytek czy zła architektura? O kryteriach i sposobach ochrony powojennego dziedzictwa modernizmu*, in: „Architektura XX wieku dla lat sześćdziesiątych i jej ochrona w Gdyni i w Europie”, eds. by M. Sołtysik, R. Hirsch,, Gdynia 2014

Purchla (2014) Purchla Jacek, *Dziedzictwo kulturowe a kapitał społeczny*, in: „Dlaczego i jak w nowoczesny sposób chronić dziedzictwo kulturowe”, ed. by A. Rottermund, Warszawa 2014.

Springer (2001) Springer Filip, *Źłe urodzone. Reportaże o architekturze PRL*, Warszawa 2011.

www.sarp.org

www.mnk.pl

IMPLICATIONS OF SMART TOURISM FOR DESTINATION COMPETITIVENESS: A CASE OF ISTANBUL

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Abstract

In parallel with economic, social and technological advances, the use of smart technologies has become possible and necessary in making cities smarter by contributing to the effective use and allocation of resources, ease of mobility, sustainability and in broader terms, the quality of life. In the context of tourism, these developments reflect upon locations that must implement technological solutions for visitors, in order to offer a smart experience and improve destination competitiveness. Istanbul is a large and crowded metropolis endowed with millennia of historic and cultural heritage, where the adoption of smart tourism initiatives is crucial to becoming “smarter” and strengthening the competitive stance of this globally significant destination. By means of case analysis methodology, the aim of this research is to identify the current state of Istanbul as a smart destination and to provide a conceptual roadmap for stakeholders and policy makers. Although various smart destination solutions are available, they have been found to be fragmented, and a general insufficiency in marketing efforts and smart governance was observed. Suggestions include the establishment of a comprehensive smart tourism platform and improved governance among stakeholders to devise sustainable strategies for destination competitiveness.

Keywords: Smart tourism, destination competitiveness, Istanbul

1. Introduction: Technology and Smart Cities

The relentless growth of urban population is creating new challenges for planners, policy makers, residents and travelers alike. According to McKinsey Global Institute (2016) today 100 cities constitute %30 of the world economic output while within a decade 600 cities are projected to constitute %58 of the global GDP and accommodate %25 of the world's total population. Lierow (2014) estimates that if this trend in urbanization continues, %70 of the world's population will have moved to cities in the next quarter of a century. This percentage will be %86 for more developed regions (UN DESA 2012).

In the past, services provided by local and national authorities consisted of basic infrastructural properties such as water, electricity and heating. Today dwelling and traveling in urban locations has become much more complicated and new necessities have arisen. There is thus a growing need for infrastructure and superstructure that satisfy people's needs in areas such as the flow of goods, information, security, health, education, and entertainment. These contemporary necessities generally require processes based on high technology, which are termed as “smart technologies” and that commonly translate into “smart cities” in the context of urban applications. Although there are various definitions of a smart city in the literature, it can be briefly described as an urban location which is characterized by the use of various ICT services, big data and application domains, and where the data input is mostly generated by people and the Internet of Things (IoT). These inputs, tools and processes are used to improve and develop infrastructures, policies, rules and regulations and for making decisions on key urban assets such as transportation systems, the water supply, medical services, power plants and waste management.

Today's technological urban infrastructure is facilitated by the evolution of information and communication technologies (ICT) which have become widespread in virtually every area of life since the early 1990s with the advent of the internet and internet based networks. Data is continuously collected from various sources and integrated in relevant centers to be utilized for specific purposes. Based on the supposition that population density in urban areas is going to rise especially due to the migration of people from pre-urban areas (Bohli et al. 2015), it is hoped that these ICT-based technological networks which use big data (BD) will provide solutions to crucial issues such as the preservation of natural resources, climate change, pollution, congestion, social inequality and health care to say the least (Herzberg 2017). Progress in ICT tools and processes contribute greatly to urban life by reducing costs, helping develop new products and services, and substituting products or mobility with digits and signals. Some examples to these tools and processes are instant messaging and networking, e-books, e-audio files, e-tickets, navigation apps and the general ease in telecommunication including the possibility to reach any information at any time, anywhere.

2. Smart Tourism and Smart Destinations

The continuous effort to generate new solutions and tackle the contemporary issues that urban locations are confronted with does not only concern city residents, but also travelers that visit these destinations. Smart technologies thus have significant implications within the tourism framework as well. The concept of smart tourism is directly derived from smart cities but it has its own particular dynamics. Six dimensions of smart cities can be derived from the literature: smart economy, smart people, smart governance, smart environment, smart living and smart mobility (Kumar 2015, Chatterjee and Kar 2015 cited in Chauhan et

al. 2016). In parallel with these dimensions, three main components of smart tourism can be derived: Smart experience, smart destinations and smart business ecosystems (Gretzel et al. 2015).

Smart destinations are characterized by the provision of an easily accessible smart infrastructure aimed at improving the quality of life and the travel experience for residents and tourists alike (Lopez de Avila 2015). They support mobility, resource availability and allocation, sustainability, and quality of life/visits by integrating ICTs into their physical infrastructure. Examples are interactive bus shelters in Barcelona, intelligent tourist information beacons in Brisbane, beacons used to translate signs into different languages in Amsterdam and free wi-fi and smart phones for tourists in Seoul (Gretzel et al. 2015).

Smart experience is using technology for real time monitoring, context awareness and personalization so as to contribute to the richness of the travel experience. (Buhalis and Amaranggana, 2015). Tourists are also producers during the process of smart experience in the sense that they share photos on Instagram and the like, write reviews of their experiences on social media and comment on points of interest making suggestions to other travelers. They thus contribute to the exposition of the location, acting as public relations agents which form online communities.

Smart business ecosystems create and support the exchange of touristic resources and the co-creation of the tourism experiences (Buhalis and Amaranggana, 2014). These ecosystems comprise multiple stakeholders ranging from public to private entities and consumers that use technology to create, supply, utilize and monitor infrastructure and data. These stakeholders thus also shape the governance structure of the smart ecosystem.

3. From Travel to Smart Experience

Devising and offering smart experiences may contribute to tourists' travel processes by making them more comfortable and the visit more entertaining. This notion has become increasingly important for destinations to gain competitive advantage in this age characterized by a growing influence of social media over consumer behavior. Tourists use their social media accounts to share their experiences and memories of good and fun times with their followers, acting as advertising agents for the places they visited and stayed at. They can use eWOM (Electronic Word of Mouth) to express their satisfaction or dissatisfaction of the services they consumed on social media platforms. The existence of virtual spaces where tourists can freely share their experiences creates new opportunities for travelers to have more comfortable experiences by decreasing their perceived risk. As an example, in a quantitative study conducted on the effects of social media on the decision making processes of foreign visitors to Turkey, it was found that %20 of participants used social media for gathering information about new cultures and places; %27 for gathering general information before traveling somewhere, and %13 in order to plan their trip and vacation (Eşitti and Işık 2015).

Smart technologies constitute a crucial aspect of smart experiences from the viewpoint of sustainability. One way by which smart technologies influence hospitality experiences is their applications in buildings. The use photocell sensors for illuminating common areas and for water faucets not only diminishes energy and water costs but also contributes to the preservation of valuable resources and creates an ecologically sensitive image in consumers' perception. Some examples of energy preservation initiatives from Istanbul's hotels include the Divan Istanbul City Hotel which has employed technologies such as night mode lighting, the utilization of tinted windows to decrease the loss in the heating system, improvements in the purification systems, the usage of Energy Saver in rooms, amounting to %12 savings on annual energy expenditures (TUROB 2013). Another example is from Hilton Hotels where their self-developed sustainability measurement system entitled LightStay generated substantial savings on energy and water consumption, resulting in lower carbon emissions and waste production (Hilton Worldwide).

Hotels can also redirect the savings gained from lower energy consumption to other areas such as improving the product and service quality or to provide better working conditions for their employees. They can thus increase both the loyalty and job satisfaction of their employees who are their internal customers while enhancing the brand loyalty of their guests, which can consequently lead to gaining competitive advantages in the global business arena. The use of smart technologies in hotels is a definitive factor in creating an ecologically sensitive image in the perception of their stakeholders.

One of the basic conditions for creating smart tourism destinations is to establish a system that acts as a source of information where instant sharing of data is available to tourism companies and tourists. This system will enable gaining insights regarding travelers' needs and wants, help personalize services and identify issues to which immediate solutions can be devised and provided. Location-based and proximity-awareness systems can be cited as examples that are used for real-time marketing to transmit personalized marketing messages about a destination to tourists. Personalized messages boost the comfort of the travel experience physically and emotionally (Buhalis & Amaranggana, 2015). A personalized travel experience will undoubtedly contribute to the travel satisfaction of tourists.

4. Analysis of Istanbul as a Smart Destination

As demonstrated in Figure 1 below, tourist arrivals to Istanbul have been steadily increasing in the past two decades, except for a few instances when geopolitical or financial risks were involved.

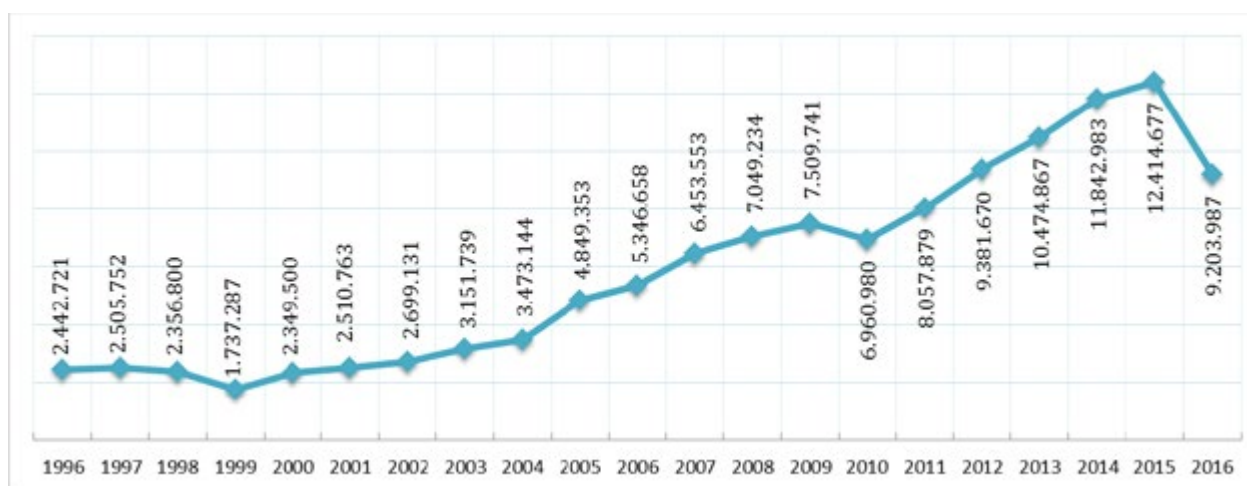


Figure 1 - Foreign visitors in Istanbul 2000-2016*

* The number for 2017, up to and including the month of November is 9.952.230.

Source: Istanbul Tourism Statistics Report, Istanbul Provincial Directorate of Culture and Tourism, November 2017.

Uniquely situated between two continents, Istanbul is a sprawling metropolis built upon millennia of historical and cultural heritage sites and an important business hub attracting investments and capital from all over the world. While all these characteristics make it a highly attractive destination for business and leisure tourism alike, they also make it a vast, overcrowded, complicated, confusing and ecologically troublesome location which has developed at a very high rate and is continuing to do so. New investments are continuously being made to develop the infrastructure of the city, but it is questionable whether new roads, bridges and public transport solutions are adequate to keep up with the unrelenting development in real estate and construction of high rise towers, residences, business and shopping centers. It is evident that investing in physical infra and superstructures will not be adequate in resolving the multifaceted issues confronted by Istanbul's residents and visitors. Smart city solutions are therefore extremely important for Istanbul's competitiveness as a destination and this study aims at examining the current state of smart tourism applications by identifying currently available services, discussing their adequacy and effectiveness, and making proposals for future improvements. In order to achieve this aim, a qualitative research methodology, specifically a case based approach has been employed. This methodological approach involves desk-research, observation, interviews and analyses of relevant documents and reports. The main sources for the case analysis were the relevant literature in the field of smart cities/tourism, the Turkish Ministry of Culture and Tourism, Istanbul Provincial Directorate of Culture and Tourism, Istanbul Metropolitan Municipality (IMM), Istanbul Development Agency and field research by the authors and attempted interviews with relevant individuals.

In the literature on destination management and characteristics of destinations, six core components have been identified and extensively used for the analysis of tourism destinations (Buhalis, 2000). These are termed as the "six As framework:" Attractions, Accessibility, Amenities, Available packages, Activities, and Ancillary services.

According to Buhalis, attractions would include natural, human built, artificial, purpose built, heritage and special events. Accessibility involves the entire transportation system comprising of routes, terminals and vehicles. Amenities are accommodation and catering facilities, retailing and other tourist services. Available packages are pre-arranged packages by intermediaries and principals. Activities include all activities available at the destination and what consumers will do during their visit. Ancillary services are services used by tourists such as banks, telecommunications, postal services, newsagents, hospitals and so forth.

This framework is helpful in analyzing what if any of these components are available and in which form at any destination. The analysis can then be used to develop and/or improve these parameters so as to strengthen the attractiveness, marketing and positioning strategies, and finally the competitiveness of a destination. In this study, the six As framework is thus used as a methodology to categorize the smart technology solutions offered in the city of Istanbul, analyze to what extent these are effective, and suggest improvements that can be offered as a roadmap to reinforce the strategic competitiveness of Istanbul as a major global tourist destination.

4.1. Smart Tourism Technologies in Istanbul

İBB Yol Gösteren: It is a navigation application which enables reaching a destination in the shortest time by following the routes created using live traffic information in all cities in Marmara Region, especially in Istanbul. İBB Yol Gösteren offers alternative routes, total distance and estimated time of arrival to take travelers to their destination in the shortest time. Using the selected route, it vocally guides travelers along the way to their destination. It is integrated with all public transport vehicles in Istanbul and offers environmentally friendly and sustainable transportation options. In the event of a traffic accident or any other situation affecting the traffic flow on the selected route, it automatically creates a new route to the destination. It shows live traffic

videos of IMM traffic observation cameras on the route of travel. It also shows the nearby Pol, pharmacies on duty, street view, live occupancy information of parking lots, other necessities such as gas stations, and how to navigate to these destinations. It operates in Turkish, English, German, French, Arabic and Italian languages. It has been found to be a comprehensive and reliable navigation solution for travelers.

Walk & Discover: This is a location-based history, culture and tourism application produced by the IMM and co-funded by Istanbul Development Agency (ISTKA). Users may find information and explore more than 250 historical and cultural locations within historical peninsula of Istanbul. Users may utilize predefined routes or create their own routes by choosing the desired locations, share experiences on social media and rate the locations.

Istanbul City Map: Offered by IMM, it offers search options for important places (pharmacy, sports facilities, social facilities, etc.), address lookup, shortest path analysis, panoramic views, and allows functions such as public transportation analysis together with basemaps.

howtoistanbul.com website and One Istanbul Guide application: The website is advertised as the official website of Istanbul, developed by the Istanbul Digital Platform Project with the support of the Istanbul Development Agency which is a government supported institution aiming at fostering coordination between government, private sector and NGOs. It is in Turkish and English languages and includes comprehensive up to date information on life, arts and culture in Istanbul. Content wise it is somewhat similar to *lamsterdam* project and website, including travel, business and education information. It directs visitors to download the official app One Istanbul Guide offered in Turkish, English, Arabic and German languages. The app includes information on major Pol, tourist routes, translation options, as well as currency exchange and ATMs, information about driver's license, hospitals, postal and communication, health insurance system and visa information. This website and app are by far the most comprehensive and professional ones among all smart tourism technologies available for Istanbul, but a standard keyword search would not yield these solutions immediately and are therefore difficult to find by users. The app was downloaded only 500-1000 times in the past two years, which is unfortunate, signifying a lack of publicity.

Miniaturk application: This application by IMM is for introducing Miniaturk (a miniature model of the foremost attractions in Turkey) to visitors. The application gives detailed information about the history of monuments in Miniaturk. Fixing the monument, nearest to the visitor's location with beacon technology, it provides a more interactive visit. The application has many foreign language alternatives. Moreover, for planning the visit, it specifies estimated routes and visit duration. The application can connect to free internet via wireless internet service in Miniaturk.

Piri Audio Walking Tours Application: This is a commercial application and some of its features require fees. It is basically an audio travel guide, makes route suggestions, navigates the visitors and offers options for café/restaurant breaks. After the routes are downloaded to smartphones, it can function offline as well. There is no mention of using beacons or QR codes, so it is a straightforward but useful application for tourists. Although it is a commercial application and may require fees, it was by far the most downloaded application among all smart applications that were investigated.

İBB Karekod: This is a data matrix (QR) barcode scanner app which provides information on historic monuments in Istanbul, among other services. Users can obtain information on attractions by scanning barcodes on their smart phones. The app is only in Turkish language and does not qualify as an international tourism service.

Look Turkey Mobile Guide/evliyacelebi.tv: An application prepared by a commercial company on behalf of the Turkish Ministry of Culture and Tourism as an official guide to Turkey, as part of the evliyacelebi.tv platform which is a comprehensive website for the publicity of Pol in Turkey. Look Turkey app was available but did not function when downloaded. evliyacelebi.tv is a functional website but only works in Turkish and malfunctions when it is attempted to use in the other language options which are English, German and French. Neither of these solutions are specific to Istanbul, rather include the whole of Turkey.

FatihAR: The website of the local municipality of Fatih district which houses the historic city and many tourist attractions was scanned for any information on smart tourism. An advertisement was found for an augmented reality (AR) application designed by the municipality which would provide information on an attraction in the historic area when the phone's camera was directed at it, but the application itself was not available on major platforms and could not be analyzed.

Besides these applications, most private museums in Istanbul such as Istanbul Modern and Sakip Sabancı Museum offer technology-based solutions to enrich the experience of their visitors. In addition, the public transport authority provides İstanbulkart which enables the use of any public transportation method in the city of Istanbul; the card is easily obtained in many central locations. Other private, commercial or individual solutions were deemed outside the scope of this study and not taken into account. IMM's applications for theaters and cultural activities in Istanbul were not included because they were only in Turkish language. The application Mobiett which is the city's transport authority's technology was not included because it is only in Turkish and many reviewers complained that it did not work correctly. TimeOut was not included because it is an international company offering solutions in many other destinations.

The six As framework can be used to classify these solutions as in Table 1, below. It can be seen that there are available solutions for each destination component and the corresponding smart destination dimensions.

Table 1 - Smart Tourism Applications in Istanbul

Destination Components	Smart Tourism Destination Dimensions	Applications in Destination Istanbul
Attractions	Smart people, smart mobility	One Guide Istanbul, Walk & Discover, Piri, Miniaturk, howtoistanbul.com
Accessibility	Smart living, smart mobility	Istanbulkart, Istanbul City Map, İBB Yol Gösteren
Amenities	Smart environment	İBB Yol Gösteren, One Istanbul Guide, howtoistanbul.com
Available packages	Smart people, smart mobility	Istanbulkart, Museum Pass
Activities	Smart mobility	One Istanbul Guide, howtoistanbul.com
Ancillary services	Smart living	İBB Yol Gösteren, One Istanbul Guide

In addition to this desk research and analysis, attempts to obtain interview appointments and direct information requests were made to add depth and breadth to the case analysis of Istanbul as a smart destination. IMM does have a “Smart City Department” under its IT division, but unlike other departments this department’s tasks and projects page was found to be blank. The Tourism Department under IMM Culture division was contacted by telephone to be consulted and to obtain an appointment for an interview about their initiatives in smart tourism; the representative kindly said that the authors will be called back, contact information was given to be never called back by the department. The Department’s tasks and activities are outlined comprehensively on their web page. Although the word “smart” was nonexistent on the page, one of the responsibilities of the department included providing ease of access and mobility to touristic areas of Istanbul, the means of which are not clarified. The authors also contacted the Turkish Ministry of Culture and Tourism regarding the Ministry’s activities in the field of smart tourism via the Turkish Republic e-government system which enables information sharing between citizens and government offices; no reply was received in the following months. The website of the Ministry did not have any reference to smart tourism but had a link to a “Turkish Tourism Portal” www.goturkey.com, which was offline and consequently not investigated. The Istanbul Provincial Directorate of Culture and Tourism website was scanned for any information on smart tourism but no direct reference was found except for a link to Museum Card/Museum Pass website which was found to be very well prepared and informative for foreign visitors who want to obtain a card which allows access to multiple historic sites at discount prices for certain periods of time. The English language version of the Directorate’s website was generally found to be of low quality due to many grammatical and spelling mistakes. As a result of failed attempts, the authors were unable to have any direct contact with or obtain information from primary policy makers and service providers regarding smart tourism in Istanbul, confining their analysis to desk research and observation.

5. Conclusion and Recommendations

Being a large, crowded city spread out on a vast area and endowed with millennia of historic and cultural heritage, the adoption and implementation of smart tourism technologies in Istanbul pose additional obstacles and challenges on the way to becoming “smarter” and improving the competitiveness of the destination.

Although there are numerous existent smart city and travel applications to improve and bring ease to the cultural and artistic experiences and travel needs of the guests, it is believed that these applications provide limited content and can be improved to a large extent by offering more diverse and personalized choices, with planning capabilities for tours and cultural artistic activities, experiences, and information on opportunities and special offers. It is necessary to develop state of the art mobile applications for platforms that are allowing users to share their experiences, pictures and comments on museums, exhibitions, concerts, historical and natural sites, creating an increased promotional effect, offering small gifts to re-shares likes, comments and tags, and providing real-time advertisements. The beacon and QR code technologies which are known to be widely utilized in other destinations for ease of mobility, accessibility and informational purposes were scarcely found to be implemented in Istanbul. These technologies could be adopted for sending reminders in accordance to the visitor’s itinerary, offering medical support in emergency situations, providing information to visitors with disabilities for simplifying and improving their travel experiences more effectively. Offering all these services in multi languages and advertising them is essential to attract and satisfy foreign visitors.

As a conclusion, smart tourism initiatives in Istanbul were found to be fragmented and generally difficult to reach, or ineffective due to the lack of language options or technological shortcomings. It is disappointing and bad for advertising that some of the solutions advertised by government agencies are dysfunctional. Moreover, their lack of support and feedback to researchers on such an important contemporary topic is discouraging and signals a pitfall in governance. As a recommendation, combining

all these support and information pages under one umbrella data platform will allow users to easily reach relevant and useful information so as to improve their travel experience. The platform should also be effectively promoted on major search engines and app stores so that it is easily accessible by users. This form of initiative would imply the necessity of smart governance on behalf of the stakeholders. Although collaboration can be observed to some extent among key actors to develop Istanbul's smart city technologies, the ties among central government, local municipalities and the private sector seem to be looser than they should be, as yet. Developing strong collaborative ties among stakeholders is imperative for developing sustainable smart strategies and achieving destination competitiveness in the long term. It is hoped that this study contributes to the literature and analyses in the field of smart governance and tourism for the globally significant tourism destination Istanbul, and can also serve as a case study for other destinations.

References

- Bohli, J.M., Skarmeta, A., Victoria Moreno, M., Garcia, D., and Langendorfer, P. (2015) *SMARTIE project: Secure IoT Data Management for Smart Cities*, Proceedings of the International Conference on Recent Advances in Internet of Things (RIoT), Singapore, pp. 1-6.
- Buhalis, D. (2000) *Marketing the Competitive Destination of the Future*, *Tourism Management*, 21(1), pp. 97-116.
- Buhalis, D. and Amaranggana, A. (2014) *Smart Tourism Destinations*, in "Information and Communication Technologies in Tourism 2014", ed. by Xiang, Z. and Tussyadiah, L., Springer, Dublin, pp. 553-564.
- Buhalis, D., and Amaranggana, A. (2015) *Smart Tourism Destinations: Enhancing Tourism Experience Through Personalisation of Services*, in "Information and Communication Technologies in 2015", ed. by I. Tussyadiah, A. Inversini, Springer, Heidelberg, pp. 377-389.
- Chatterjee, S., and Kar, A.K. (2015, August) *Smart Cities in Developing Economies: A Literature Review and Policy Insights*, in "Proceedings of the International Conference on Advances in Computing, Communications and Informatics (ICACCI)", Kochi, pp. 2335-2340.
- Chauhan, S., Chauhan, S., Agarwal, N., Agarwal, N., Kar, A. K., and Kar, A. K. (2016) *Addressing Big Data Challenges in Smart Cities: A Systematic Literature Review*, "info", 18(4), pp. 73-90.
- Çelik, P., and Topsakal, Y. (2017) *Akıllı Turizm Destinasyonları: Antalya Destinasyonunun Akıllı Turizm Uygulamalarının İncelenmesi*, "Seyahat ve Otel İşletmeciliği Dergisi", 14(3), pp.149-166.
- Eşitti, Ş., and Işık, M. (2015) *Sosyal Medyanın Yabancı Turistlerin Türkiye'yi Tatil Destinasyonu Olarak Tercih Etmelerine Etkisi*, "Karadeniz- Black Sea", no.27, pp.11-30.
- Gretzel, U., Sigala, M., Xiang, Z., and Koo, C. (2015) *Smart Tourism: Foundations and Developments*, in "Electronic Markets", 25(3), pp. 179-188.
- Herzberg, C., (2017) *Akıllı Şehirler Dijital Ülkeler*, "İnfoloji", İstanbul.
- HiltonWorldwide. Available online: <http://tr.hiltonworldwide.com/development/management-services/engineering.html>, accessed 03.02.2018.
- Kumar, T. V. (2015) *E-governance for Smart Cities*, in "E-Governance for Smart Cities", Springer, Singapore, pp. 1-43.
- Lamsfus, C., Martín, D., Alzua-Sorzabal, A., and Torres-Manzanera, E. (2015) *Smart Tourism Destinations: An Extended Conception of Smart Cities Focusing on Human Mobility*, in "Information and Communication Technologies in Tourism", ed. by I. Tussyadiah and A. Inversini, Springer, Heidelberg, pp. 363-375.
- Lierow, M. (2014) *B2City: The Next Wave of Urban Logistics*. Available online: www.supplychain247.com/paper/b2city_the_next_wave_of_urban_logistics, accessed 01.11.2018.
- Lopez de Avila, A. (2015) *Smart Destinations: XXI Century Tourism*, presented at the "ENTER2015 Conference on Information and Communication Technologies in Tourism", Lugano, Switzerland, February 4-6, 2015.
- TUROB, *Yeşil Otel Olma Şartları*. Available online: <http://www.turob.com/haber.aspx?id=16774>, accessed 03.01.2018
- Webrazzi, *The Best Activity Apps*. Available online: <https://webrazzi.com/2016/05/10/en-iyi-etkinlik-uygulamaları/>, accessed 01.02.2018.

United Nations Department of Economic and Social Affairs, Population Division (2012) *World Urbanization Prospects, the 2011 revision: Highlights*, available online <http://esa.un.org/unup/Documentation/highlights.htm>, accessed 01.12.2018.

Other websites:

Apple app Store: <https://itunes.apple.com/us/genre/ios-travel/id6003?mt=8>

Google Play Store: <https://play.google.com/store>

Istanbul Development Agency: <http://www.istka.org.tr/#>

Istanbul Fatih District Municipality: <http://www.fatih.bel.tr/en/>

Istanbul Metropolitan Municipality: <https://www.ibb.istanbul/>

Republic of Turkey Ministry of Culture and Tourism: http://www.kultur.gov.tr/?_dil=2

Republic of Turkey Ministry of Culture and Tourism, Istanbul Provincial Directorate of Culture and Tourism: http://www.istanbulturizm.gov.tr/?_dil=2

THE TOURIST ROUTES - THE POSSIBILITY OF PRESENTING THE REGIONAL CULTURAL HERITAGE

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Abstract

Cultural tourism is an important element of cultural heritage protection through appropriate presentation of valuable objects. One of the possibilities of exhibiting monuments is to create tourist routes.

The selection and appropriate grouping of facilities will enable better management and will ensure constant protection. It is also a way to promote regional heritage in the landscape - works of nature and man. The study will present tourist routes combining various of the cultural heritage from the Zalewo area commune (Warmia-Mazury).

Cultural heritage is a manifestation of the identity of societies. It manifests itself in intangible and material values. Its destruction affects the weakening of the sense of identity. The same is true of the cultural landscape, which is a manifestation of constant changes taking place as a result of people's actions.

Keywords: cultural heritage, tourist routes

Introduction

Cultural heritage is a manifestation of the identity of societies. It manifests itself in intangible and material values. Its destruction affects the weakening of the sense of identity. The same is true of the cultural landscape, which is a manifestation of constant changes taking place as a result of people's actions (Tomaszewski 1999: 15.). It is also the „source of memory” and the foundation of cultural identification for future generations (Kobyliński 2014: 13, 15, 17). One should look for various possibilities of presenting cultural heritage while maintaining it in a possibly inviolable condition.

One of the proposals may be cultural tourism, which combines various attractions and tourist attractions (Kowalczyk 2003: 5-6; Medlik 1995: 125.). When creating a product presenting this category of tourism, many aspects are taken into consideration, not only the destination itself offered. The World Tourism Organization defines this type as a „cultural tourism includes journeys made of essentially cultural motivation, such as study trips related to art exhibitions, cultural tours, travels to take part in festivals and other cultural events, visiting places and monuments, expeditions to familiarize with nature, folklore and art and pilgrimages” (Mikos von Rohrscheidt 2008)). Cultural tourism includes the cultural heritage tourism. Discussing this category of tourism should start with presenting the definition of cultural heritage.

The UNESCO organization presents cultural heritage as material, being movable and immovable monuments, as well as traditions and oral stories, that is, intangible heritage. It is a transmitter of a multitude of societies around the world. Cultural heritage should be used to enter into agreements between warranted parties for reasons of cultural diversity. It is also considered as a stimulus necessary for the flourishing of the economy and thus improvement of the living conditions of societies¹. It allows attempts to instill mutual tolerance and build respect for diversity through mutual learning (Panasiuk 2006: 36).

The main purpose of cultural heritage tourism is to present to tourists places and objects that have been defined not only of the world but also of the country and the region cultural heritage (Lipińska 2011: 15; Mikos von Rohrscheidt 2008a: 53-57). This field of tourism creates unique social and individual awareness in not only scientific and aesthetic terms, but also mutual tolerance. Cultural tourism creates a number of possibilities that allow attractive presentation of natural and cultural heritage, including archaeological heritage, in a way that would not threaten its further duration *dum mundus durat* (Kobyliński 1998: 7; Kowalczyk i Derek 2010: 121).

Sustainable development

Attractive presentation of cultural heritage and natural values, it contributes to the development of the economy. This leads to the creation of new jobs, becoming a prospect for less prosperous regions. Cultural tourism offers relaxation and scientific management of free time (Jachimowicz 2002: 33). They become economic capital (Jędrzyśiak 2008: 39). However, the use of these assets can lead to over-exploitation of resources. Therefore, development must be harmonious, just as for ecological, social and economic purposes, so that economic growth does not exceed the regenerative capacity of nature and does not degrade non-renewable resources (eg archaeological heritage). Sustainable and sustainable development, which is supposed to ensure comfort for tourists and local communities, should be closely related to the protection of the natural and cultural heritage (Jachimowicz 2002: 34-37). According to the sustainable development of cultural tourism, it can be noticed that the flourishing of tourism takes place thanks to the culture, which is simultaneously protected and popularized by it (Jędrzyśiak 2008: 13).

1 www.unesco.pl/kultura/dziedzictwo-kulturowe/

Tourist routes

One of the possibilities of presenting various elements of cultural heritage in tourism are cultural routes. These trails constitute selected places or objects that are connected with a certain idea, and they have themselves been connected by a route between them. This route can be both land and water. All available means of transport can be included in it. This trail must be marked, eg by setting information boards. In addition, it should be combined with additional infrastructure, the location of which is closely related to the course of the route (Kaczmarek 2005: 76). The theme trail shows tourists a fragment of space related to cultural heritage, already interpreted and organized in accordance with the theme of the trail. Visitors are offered contact with the authentic heritage, which leads one or several routes associated with the presentation of a living story. Thanks to such efforts, educational and recreational values are combined (Mikos von Rohrscheidt 2011a: 5.). Helpful in creating such a route can also be various types of events whose subject matter will be closely related to the elements of cultural heritage presented on the trail. The whole should be an image of a coherent tourist product (Mikos von Rohrscheidt 2013: 3).

Zalewo commune

The area of the Zalewo commune discussed in this work is located in the geographical province of Western Europe, called the Central European Lowland in the Iława Lake District. Part of the commune area is located in the Iława Landscape Park (Mikos von Rohrscheidt 2013: 3). The creation of the park was aimed at protecting the natural values of the Iława Lake District. Other objects for protection in the park are archaeological sites, for which two main zones of archaeological protection have been designated. Other objects located in the Landscape Park of the Iława Lake District include architectural monuments, eg houses with arcades characteristic of Dutch colonization. The last category consists of rural layouts of villages and manorial and park premises. Within the commune, the Natura 2000 area „Iława Forests” was marked out, which allows for the protection of natural values². The following list will be used in the next chapter to propose an attractive presentation of cultural heritage in order to use it in cultural tourism.

Analysis of tourism potential

Analyzing the tourist potential, first of all, attention should be focused on the advantages conducive to the development of rural tourism. Thanks to this, it is possible to use the natural resources of the discussed area. In the commune there is the Landscape Park of the Iława Lake District, the area covered by the Natura 2000 program. Also the presence of seventeen lakes in the commune are important elements for recreational values. In addition to natural values in rural tourism, accommodation in agri-tourism farms is also considered.

Another tourist use is the history of the region. In the case of the Zalewo commune, the history connected with the area of the former Pomezania is interesting. Tourism of cultural heritage allows for a broader familiarization with the diversity of the presented heritage: historical, archaeological, ethnic, etc.

The type of cultural tourism that allows to present a slightly narrower group of monuments is historical tourism. In this case, it is possible to present objects such as sacred architecture, residential architecture, cemeteries, etc. In addition, there is the opportunity to make the historical places more attractive to the public.

Another type of tourism that can be promoted in the Zalewo commune is archaeological tourism. Single or grouped archaeological monuments in a certain area, having their own field form, are an important element of the landscape for recipients - tourists. Placing information about them in their close vicinity, favors understanding of the history of the place and enables a full impression of the authenticity of the cultural landscape, of which archaeological monuments become an important element. Also, the identification of these objects can contribute to protecting the place from vandals.

An additional tourist offer, which may be an interesting addition to previous proposals, is the tourism of the place. It can include such monuments as defensive walls, single towers or city gates, urban planning and places associated with legends, as well as important historical region or city.

Tourist proposals for the Zalewo commune

There are many interesting objects in the Zalewo commune, which are the cultural potential of this area. The richness of the landscape also encourages tourists to visit the towns and their surroundings.

After selecting the types of tourism that can become a distinguishing feature of the tourist product offered by the commune, it is worth focusing on specific objects that may be associated with them. One of the most interesting forms of presenting a diversified heritage are tourist routes, described in more detail in the second chapter. Below you will find suggestions for tourist routes that could become an important element of promoting and protecting cultural heritage.

Due to the variety of facilities, it was considered that the most accurate offer could be their combination. The proposed trail called the “Zalewska Historia Trail”, creates selected monuments, diverse in terms of type and dating. The main advantages of

2 Protected areas were established by the ordinance of the Warmian-Masurian Voivode. Official Journal of the Warmian-Masurian Voivodeship. No. 52, item 725. Regulation No 21 of 14 April 2003; Study of conditions and directions of spatial development of the Zalewo commune 2009: 14-15

the route are its educational and recreational values. An equal factor is the authenticity of the presented heritage, which has been confirmed in the majority through historical and archaeological research. A logo was prepared for the proposed route, in which there is a part of the engraving from 1684, from the book „Stare i Nowe Prusy” by Krzysztof Hartknoch. This is the oldest representation of the city of Zalewo, therefore it has been chosen as the main theme of the designed logo.

The main axis of the proposed cultural trail can combine points of interest in terms of architecture. For this reason, the cities where manorial and farm complexes are located were selected. They have historical significance sentimental for the former Pomezania area, due to the fact that most of these buildings were erected at the end of the 18th or the mid-19th century and they have survived to this day. In addition, they were developed by generations of families until 1945. Presentation of these monuments together with information about the history of their creation, which is closely related to the history of the region, will allow you to feel the „genius loci”. In addition, the presentation of the architectural diversity of these facilities, as well as the whole farm estates will contribute to the increase of knowledge about the method of planning the court-park-farm estates and will enable a better visual imaging for tourists.

For this purpose, the cities where the park-court or palace-park complexes are located with a farmstead and a group in which the court and park complex is located or where only the court has left no clear signs of park establishment have been selected. The first group includes towns: Bądkki, Girgajny, Jańkowo, Pozorty, and Rudnia. An additional element of this route may be objects located in Półtysi, although the manor house there once was demolished, it remains the outline of the farmstead and park. Only the manor house has survived in Gubławki. In Rąbitach, you can still observe the surviving mansion-park layout. In Tarpno, however, the manor and park assumption was devastated. The next element of the route may be a route connecting sacred monuments, that is, churches and cemeteries located in the commune. The second group of objects promoted on this route should be cemeteries: Evangelical and Jewish. The third line of the trail may be associated with archaeological resources with its own landscape form. The second group of archaeological relics from the area of the commune are burial mounds, dated to the early Iron Age. Archaeological sites with their own field form are an important element for reading landscape values.

During the design of the „Zalewska Historia Trail”, a draft bilateral information brochure was prepared, which could serve as an advertisement for the tourist trail. It contained information on the diversity of the presented objects on three different routes. There is also a short presentation of the offer, including the nature one. Additional information applies to: the possibility of hiring a guide for groups and individual visitors, as well as a proposal of museum lessons for children, which can be offered at selected facilities throughout the entire route. The brochure includes: the address of the website of the route, encouraging you to find the trail on the social networking site Facebook and a QR code for those interested in mobile applications. On the outside, contact numbers for tourist information, trail coordinator and guide are provided. On one of the pages there is also a map of the route with three routes marked for visitors (Figure 81). For tourists’ convenience, there are also suggested ways of moving between objects on a given route or presenting a route to the information point of the route. Helpful for people moving around Masuria can also be a message about how to get to the area of the Zalewo commune and further opportunities to visit it, for example by riding bicycles.

Coordination of the trail

A suitable environment is needed for the created route, which facilitates communication along the planned routes. This helps in controlling the tourist movements and protection of the presented objects. Important It is necessary to create one place from which it will be possible to coordinate all routes, inform people dealing with particular objects about the arrival of a group of visitors and provide tourists with a constant opportunity to contact tourist information. In addition to the main route management center, it is important that there are several information points on the route itself (Fig. 1).

The next important step in the design of the trail along with its surroundings is to ensure proper route designation. The trail should include signs indicating the direction of movement, information about the nearest object, distance to it (Fig. 2). The second type of information boards should be those that inform about the trail itself. The whole route should be presented along with the map and basic information about the route. In addition, data necessary to contact coordinators and guides are also necessary. Additional elements on such a board may be QR codes that will allow you to download mobile applications or tablets with information about the route. The third type of tables should be located next to the objects themselves or in their immediate vicinity. Additional information about nature, including species of fauna and flora located in the closest vicinity of the monument.

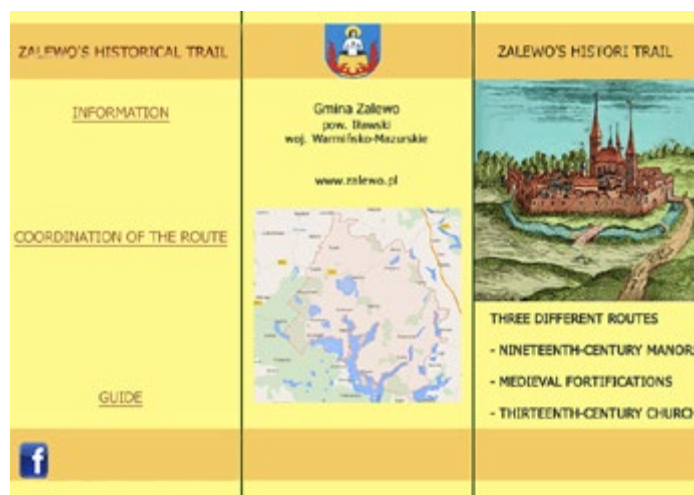


Figure 1 – Information about trail

Summary and Conclusions

This article presents the tourist values of the Zalewo commune, which constitute untapped, so far, potential for the development of many types of cultural tourism. There are many historic buildings in the area of the commune, dated to various ages. In addition, the landscape is rich in terms of aesthetic and natural values. Such a combination may be an interesting offer for tourists, however, these resources should be used appropriately.

Creation of a route in the commune will contribute to getting to know the rich history of the territory of the former Pomezania. Dividing it into three stages, offering diversity among the objects themselves, both material and chronological, diversify sightseeing. At the same time, it will be possible to introduce a multiple protection system so that increased tourist activity does not become a threat to the objects themselves and the surrounding nature.

Another argument for the development of tourism in the commune is the possibility of renewing the deteriorating monuments. It can be assumed that the influx of visitors will become an incentive to take care of and renew those who have already fallen into disrepair. Also from this motivation may be the desire to achieve a state reminiscent of the original one in order to increase the attractiveness of the object.



Figure 2 - Information about Zalewo's Historical Trail

Careful planning of the use of such a diversified anthropological and natural heritage in cultural tourism will contribute to preserving both of these resources, so important for the existence of man himself.

References

- Jachimowicz E., 2002. Edukacja w zarządzaniu turystyką zrównoważoną, [w:] Z. Przychodzeń, *Problemy rozwoju turystyki wiejskiej na Wileńszczyźnie*, s. 33-37. Warszawa-Biała Waka: Wydawnictw SGGW.
- Jędrysiak T., 2008. *Turystyka kulturowa*. Warszawa: Polskie Wydawnictwo Ekonomiczne.
- Kaczmarek K., 2010. Turystyka archeologiczna, *Turystyka Kulturowa* 1: 4-13.
- Kobyliński Z., 1998. Ochrona i zarządzanie dziedzictwem archeologicznym w Europie – wprowadzenie, [w:] Z. Kobyliński (red.), *Ochrona dziedzictwa archeologicznego w Europie*, s. 7-12. Warszawa: Res Publica Miltiethnica.
- Kobyliński Z., 2014. Krajobraz jako pamięć, [w:] J. Wysocki (red.) *Konserwacja zapobiegawcza środowiska 2: Krajobraz kulturowy*. Archaeologica Hereditas 3: 13-22. Warszawa - Zielona Góra: Fundacja Archeologiczna.
- Kowalczyk A., 2003. Fortyfikacje, pola bitew, cmentarze wojenne... Jako przedmioty zainteresowania geografii turystycznej, [w:] G. Białuński (red.), *Fortyfikacje jako atrakcje turystyczne*, s. 5-13. Giżycko: Wydawnictwo Mazurskie.
- Kowalczyk A i M. Derek, 2010. *Zagospodarowanie turystyczne*. Wydawnictwo Naukowe PWN.
- Medlik S., 1995. *Leksykon podróży, turystyki, hotelarstwa*. Warszawa: Wydawnictwo Naukowe PWN.
- Mikos von Rohrscheidt A., 2008. Turystyka Kulturowa – wokół definicji, *Turystyka Kulturowa* 1: 4-21.
- Mikos von Rohrscheidt A., 2011. Szlaki kulturowe jako skuteczna forma tematykacji przestrzeni turystycznej na przykładzie Niemieckiego Szlaku Bajek, *Turystyka Kulturowa* 9: 4-27.
- Mikos von Rohrscheidt A., 2013. *Szlak Piastowski w przebudowie. Struktura, zarządzanie, oferta kulturowo-turystyczna*. Kraków: Proksenia.
- Panasiuk A. (red.), 2006. *Ekonomia turystyczna*. Warszawa: Wydawnictw Naukowe PWN.
- Tomaszewski A., 1999. Przemówienie, [w:] K. Gutowska i Z. Kobyliński (red.), *Zabytki i społeczeństwo. Czynniki społeczny w ochronie zabytków w warunkach reformy samorządowej*, s. 15-18. Warszawa: Res Publica Multiethnica.
- UNESCO www.unesco.pl/kultura/dziedzictwo-kulturowe/
- Wysocki J. i P. Górny, 1999. Park Krajobrazowy Pojezierza Iławskiego, *Warmińsko-Mazurski Biuletyn Konserwatorski* 1: s. 47-62.

MEDIAEVAL OR EARLY MODERN BUILDINGS AND PRIVATE OWNERS IN POLISH REALITIES. PROBLEM OF LIABILITY AND THEIR PLACES IN TOURISTIC TRAILS

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Abstract

After the Second World War, all mediaeval and early modern buildings in Poland, even manors, have been nationalized. Since 1945 many manors and castles served as administrative centers of national agricultural farms, holiday centers or educational outposts. Now Polish law admits on property of mediaeval and early modern buildings by private possessors. However this buildings are still under control of provincial offices of heritage protection. This double control causes problem of liability and taking decisions concerning use and repair as well as mutual expectations of incurring of indispensable repairs. Change of manner of building utilization is detached problem.

Some of these recuperated manors are accessible for tourists. Their owners try to create or make use legends and local stories to attract people interested in history. Sometimes a manor and surroundings are got involved with famous persons or popular books which allow to map out touristic trails.

Keywords: national heritage, mediaeval buildings, early modern buildings, touristic trails

1. Legal situation of historical buildings in Poland

After the Second World War, all mediaeval and early modern buildings in Poland, even manors, have been nationalized. Communist authority had no ideas what they wanted to do with all those buildings and ruins. Many manors and castles served as administrative centers of national agricultural farms, holiday centers, schools, orphanages or another educational outposts, even flats for agricultural farm workers. Their internal dispositions have been often demolished and rebuilt and furnishings have been scattered and stolen. It has occurred not only in territories recuperated by Republic of Poland after the Second War, but also in central Poland.

Since 1989 Polish law admits on property of mediaeval and early modern buildings by private possessors. It has created a possibility for people to get back their old mansions or to buy historic estates that potential owners don't exist. Some of properties have been recuperated by their prewar owners or theirs descendants. Most of all, it concerns rather small properties, state authority limits capability of recuperation historical castles and manor houses that have particular meaning for national heritage, such as Wilanów Palace, still National Museum in spite of efforts of Branicki family descendants.

For years there were no bidders to buy large, wrecked castles, often in ruins since XIXth century and even earlier. After 1989, castles and manors that have no private owners, passed to municipalities. Municipalities have organized in castles remaining in good conditions museums (case of Ostróda Teutonic Knight castle – now regional museum, or Dąbrowa manor house, administrative district Siedlce, passed down by Dąbrowa municipality to regional museum at Siedlce in 2011, a museum of squirearchy has been set up there) administrative centers (case of Ogiński Palace at Siedlce, passed down by municipal authority to Academy of Siedlce in 2006, the administrative center of Academy has been set up there). Municipalities, especially small rural ones, try to get rid of this historic buildings, because of the problems they produce – they need expensive protection and renovation.

According to Polish law most historical buildings has been listed in national register of historic monuments that contains historical buildings, objects of art and archaeological sites, even when such buildings or areas are in private hands. Act about protection of national heritage¹, Article No 5 imposes on owner a duty of conduct of conservatory works, protection and maintenance of antiques, enclosing in as fairest condition and use of antiques to manner providing permanent behavior its value. Provincial offices of heritage protection perform oversight of proper execution of this Act and they could enforce owners for execution of indispensable protections of historical buildings and architectural complexes. It constricts an ownership – a proprietor can't fully exploit his estate, he need to coordinate all renovations with provincial offices of heritage protection. Of course, an owner can't rearrange antique foundation according to his requirements. This double control over historical building causes problem of liability and taking decisions concerning manner of use and repair as well as mutual expectations of incurring of indispensable repairs. Change of manner of building utilization is detached problem.

Although the development of castles may contribute to the development of local communities, necessary repairs and adaptations must be made with due caution. Numerous investments at the ruins require the development of a current diagnosis

¹ Act about protection of national heritage published in: Dz.U. 2003 Nr 162 pos. 1568 with later changes: Dz. U. z 2017 r. pos. 2187, z 2018 r. pos. 10.

in several areas: a reminder of conservation procedures and decision-making criteria, documentation standards and the scope of interference in the historic substance (Maławska 2007).

2. Capabilities of utilization of objects in organizing touristic trails

According to cited Act (Art. 5.1 and 5.5) an owner should enable scientific research concerning his historical estate and popularize knowledge about it. In spite of this many early modern manor houses are inaccessible for tourists, as private residences. Fortunately some of these recuperated manors are accessible for tourists. Private owners of historical manors try to attract tourists. They organize restaurants and hotels in their mansions, collecting legends and local stories to attract people interested in history. Sometimes manor houses and surroundings are got involved with famous persons or popular books which allow to map out touristic trails. Of course localization in region attended by tourists is useful.

2.1. A case of Przewmark castle ruins

Man can observe capabilities of utilization of a ruined castle potential on example of a gothic castle in Przewmark (Stary Dzierzgoń municipality, administrative district of Sztum).

Przewmark is a small and picturesque village situated in northern Poland, in lake region, but quite far away from expressways. Jeziorak, one of the largest and the longest lake in Poland is placed in region of the castle as well as several mediaeval strongholds and some gothic castles (including Malbork castle) or its ruins. Lack of comfortable ways, public transport and places of lodging makes difficult touristic movement.

The village is located near Motława Wielka lake (Fig. 1). In the village there are some buildings and a church constructed in the end of XIXth century, but the most impressive monument are ruins of the gothic castle. It is situated in a peninsula. The castle had been constructed in the beginning of the XIVth century for the Teutonic Knights Order. It is quite a large foundation cut off from the village by a moat and it consisting of two parts: high castle and middle castle separating by a dry moat. After the secularization of the Order in 1525 it has served as an administrative center and official siege. It has been ruined in XVIIIth and XIXth centuries. Only one complete tower survived. In early thirties of the XXth century it has been an ownership of German Third Reich authorities and a place of conservation activity (Wunsch 1935).



Figure 1 – Localization of Przewmark castle in the village.

After the Second World War Przewmark castle ruins have been taken by Polish authorities. They had no idea and money to cope with such a large castle. Because of its localization – in Pomerania, by a lake, rather close to historical places – they have organized here a holiday center: small wooden summer houses and a restaurant were built inside the mediaeval middle castle enclosure and an open space for tents was organized inside the ruins of mediaeval high castle. Many trees has grown on and outside ruins. After 1989 legal situation of Przewmark castle was clear – there were no descendants because the last owner before 1945 was Third Reich, so no one could recuperate the ruins. Just in 2000 the ruins has been bought by a private person. The owner has regularized a space inside fortifications of middle castle and removed most of wooden summer houses. He built a house for his family in a place of the holiday center kitchen. He can do nothing to regularize the high castle because in Polish law it is forbidden dispatching of trees – only fruit trees can be dispatched without a permission of environmental department. For over 60 years trees has grown even on walls and their roots have burst brick constructions. So degradation of the high castle progresses. Now an owner asked a provincial office of heritage protection in Gdańsk to obtain such a permission.

In spite of inconvenient localization and poor condition of the castle there are some possibilities to create in Przewmark castle a place visited by tourists. Of course not all the tourists are interesting in history so you have to find something in the foundation that may interest people with different interests. You can find four ways to promote the castle:

2.1.1. Education in the field of daily life in historical epochs:

Przezmark is situated in the middle of distance between Grunwald fields and Malbork castle. Grunwald field was a place of one of the biggest battles in Middle Ages, the battle that has terminated the power of Teutonic Knights Order in 1410. Malbork castle is one of the biggest mediaeval castles, the capital of the Teutonic Knights Order, with a large museum visited every day by a crowd of tourists. At Grunwald as well as at Malbork there were many tourists, especially in summer: 15th of July, when the battle of Grunwald was and 25 of July, when the siege of Malbork castle was begun. In both places there were a famous, several days long reconstruction festivals. One of this reconstruction group, travelling between Grunwald and Malbork by horses, in mediaeval dress, always stops in Przezmark to make a show (Fig. 2).



Figure 2 – A group of middle ages reconstructors in way from Grunwald to Malbork, 2017 (Photo by M. Żurek).

High castle in Przezmark is difficult to access for tourists – the only stairs are damaged and the terrain is weedy and overgrown by bushes. Fortunately the only gothic tower is in quite good condition (Fig. 3). An owner collected there tile stove found in ruins and copies of mediaeval and early modern vessels and clothes. He shows round tourists and school young people groups willfully.



Figure 3 – A north-eastern tower of the middle castle in Przezmark, view from the south, 2017 (Photo by M. Żurek).

2.1.2. Informations for history and archaeology lovers:

In 2017 archeological excavations at Przezmark castle has been begun (Żurek 2018). Archaeologists unearthed some of infrastructure of the high castle (Fig. 4 and 5). After its protection tourists can visit it. Information boards will be useful as well as a board with a map with listed trails close to the entrance. Small objects found during the excavations will be passed down to a local memory chamber that will be organized in the tower. So Przezmark castle can be visited as one of the Teutonic Knights residences in a way from Ostróda, by Miłomłyn, Przezmark, Dzierzgoń, Sztum to Malbork. Names of this castles and villages are well-known for historians interesting in mediaeval history of Poland, especially of Teutonic Knights Order history of Prussia revolts against this Order.



Figure 4 – Ruins of the high castle in Przezmark, view from the south-west, 2017 (Photo by M. Żurek).



Figure 5 – A staircase of the high castle in Przezmark, leading from the court to the cellar, view from the south, 2017 (Photo by M. Żurek).

2.1.3. Return to childhood literature:

Another possibility, available not only for history and archaeology lovers but for families, is to emphasize connections Przezmark ruins with books written by Zbigniew Nienacki. In seventies, eighties and nineties a series of books of this storyteller written for children and elder children was very popular. It was a series of stories about a history of art man called Mister Vehicle because of his characteristic car. His main activity was to search and find collections of artefacts stolen or hidden during the Second World War or to recuperate historical objects from the criminals. An author put historical facts and real places in his books. Many of Nienacki's stories took place in north-eastern Poland, in Mazury, because he used to live here. One of his novel – “Mr Vehicle and the man called Winnetou” takes place probably at Przezmark – Nienacki's fans checked it, following the topography of the described ruins compared it with Przezmark castle disposition (Fig. 6).



Figure 6 – A logo of Forum of Mr Vehicle's Adventures Lovers, 2017 (Photo by M. Żurek).

As Nienacki used to live at Jerzwałd in Mazury and he is buried on a local cemetery, each summer his fans gather in his house and visit places described in his books: Jeziorak lake environments (“New Advantages of Mr Vehicle”), Zalewo town (“New Advantages of Mr Vehicle”), Kamieniec palace (“Mr Vehicle and Invisible Men”), Iława church with (“Mr Vehicle and a golden knight’s glove”), Boreczno gothic church and Przewmark castle. Information board with selected vilages and places mentioned in Nienacki’s books should be situated close to the entrance.

2.1.4. Something for sensationalism hotheads:

Last one can mention Przewmark ruins connections German Third Reich. In Poland Third Reich legends are still alive, especially those about stolen art collections and hidden technologies. As Przewmark castle formerly belonged to Third Reich authorities and German leaded conservation activity and excavations there, members of one of local associations fascinating in miraculous local stories are sure that Przewmark castle was a research and laboratory center when in late thirties and during the Second World War German researchers and engineers constructed miniature submarines. They are sure that in castle dungeons (wherever and whatever they are) man can find workplaces and factory halls. Of course there are no traces of such an activity, but they try to find it and persuade owner to let them look it up. Such an interest is dangerous for castle ruins.

Przewmark ruins can be an attractive place on touristic trails from different causes. This short list of capabilities shows us that even tourists which are not found enough in history, archaeology or architecture can visit medieaval of early modern foundation and find something interesting for them in it: true history, bloodcurdling or fantastic stories, picturesque scenery, education and even return to childhood times, as they like.

References:

Iga Maławska (2007) *The establishment of an advisory college for protecting mediaeval castles in Poland* in “Ochrona zabytków” 4, pp. 2.

Carl Wunsch (1935) *Zur Baugeschichte des Schlosses Preußisch Mark vom Ausgang der Ordenszeit bis zum Ende des 18 Jahrhunderts* in “Bericht des Konservators der Kunstdenkmäler der Provinz Ostpreußen über seine Tätigkeit im Jahre 1934 an die Provinzialkommission zur Erforschung und zum Schutze der Denkmäler in der Provinz Ostpreußen” 33, pp. 14.

Magdalena Żurek (2018) *Zamek w Przewmarku, gm. Stary Dzierzgoń po pierwszym sezonie badawczym* in „Archaeologia Historica Polona” (in press)

SESSION 2
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**DIGITAL TECHNOLOGIES:
SAVING IDENTITY OR FEEDING
GLOBALIZATION?**

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SESSION 2

UGIS BRATUSKINS¹

MAIN CONCLUSIONS REPORTED BY THE CHAIRMEN OF THE THREE SESSIONS OF THE INTERNATIONAL SYMPOSIUM “HERITAGE FOR PLANET EARTH 2018”

1. Wide range of use of digital technologies in survey, documentation, building databases which can be used for heritage preservation and fruition practices etc. serve also as the link between education and practice and vice versa, illustrates diversity of practices in heritage and popularizes the digital potentialities in heritage preservation and management;
2. Wider usage of the digital tools of information storage and transition (for instance, the use of cloud technologies) advocates the ethics of digitalization – the importance of understanding the correct practices of data sharing, copyrights, etc.;
3. Application of smart technologies in heritage sites may provide the visitors chance for deeper exploration of the site (for example, by adopting internationally recognized criteria for digital reconstruction of the different historical layers) without intervention in the authentic substance of the preserved parts thus promoting educational tourism rather than consuming tourism;
4. Use of the digital technologies advocates reconciliation and multidisciplinary approach in the heritage preservation as well as extends the educational and social mission of heritage protection promoting adaptation and reuse of the heritage for the up-to-date needs.

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INTER-UNIVERSITY TRANS-DISCIPLINARY CROSS-CULTURAL PROJECT ON SMART URBANISM

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Abstract

The continuity of urban cultural processes, the entire spatial environment is the most important condition for the all-round harmonious movement towards Smart Cities.

Before a “Smart Urban Movement” begins, it is necessary to study and evaluate the existing urban unit in trans-disciplinary way. We assume that the key areas of trans-disciplinary scientific research can be: history, urban studies, ethnography, archeology, theory and art history, ecology, earth and life sciences, anthropological sciences, biomedicine, public health and its management, economics, sociology, psychology, information, construction, communication and other technologies, etc.

The laboratory of such trans-disciplinary research can be a modern University. Due to the fact that the scientific project on the preparation of a platform for the beginning of a “Smart Movement” in our cities can be comprehensively expanded, the effort of several Universities can be combined and, thus, the project can be turned into an Inter-University one.

The cultural dimension of the process of Smart City Movement is characterized by the existence of a two-way mechanism of interaction between historically established and emerging functions and structures in the present – traditional national and global (of multicultural society), cultural heritage and modern culture. To orientate in this complex space, in addition to the above, cultural urban studies are required.

Keywords: Smart City, Smart Urbanism, Smart City Movement, inter-, trans- and multi-disciplinary research, cross-cultural communication and dialogue, information, construction, communication and other modern technologies.

Each country, every province, every city, every ethnic integrity or society based on its worldview, its understanding of the problems of the modern world, its cultures or social life, differently define what a smart city is.

The term “smart city” we usually apply to cities that actively use modern information, communication, constructive and other technologies in a variety of ways.

The purpose of creating a “smart city” is more efficient operation and compliance with the needs of citizens, and the idea of it is as follows: collecting and processing information in real time, you can use available resources with greater productivity and thus save money, act more rationally and provide service to a higher level.

Such a process provides for the integration and coordination of city services, as well as monitoring of their work, the regime of which should be built taking into account the correspondence of the demand for these services to their accessibility.

In addition to the idea of productivity, smart cities embody the concept of conscientious and intelligent management.

This is a way of bringing the city government closer to its inhabitants, so that, expressing their wishes and needs, the townspeople get an opportunity to be heard (M. Thorn, 2016).¹

Thus, it would seem, that, in order to become smart, the city itself should be equipped with sensors (transducers) integrated in real-time mode to accumulate data from city residents and devices, and then process and analyze. The collected information is considered the key to solving the problems of inefficiency.

However, we believe that it is not enough for a smart city to have information and other technologies, that is, material resources.

It needs a scientific laboratory or center that will not only react to data received through processing and analysis, decide what to do, but (a) plan and manage the life of a smart city both in the present and in the future, (b) prevent coming problems, (c) find the best ways of collaboration with the partners, (d) compare the individual needs of residents with the public and (e) find optimal and adequate ways to harmonize them, (f) check the received information and (g) discover the nature of errors, etc., based on scientific research following.

The establishment of such a scientific center is associated with considerable economic costs. Therefore, in order not to nullify the money saved by the smart city, it is necessary to find a solution to the problem of the presence of a scientific unit in the city.

Our task is also to prove the necessity of creating such a scientific laboratory and to present the features of the character of such scientific work.

Each modern university, responding to the requirements of a world that is changing before our eyes, should contribute not only

1 Cited by T&P: Masters of Future. – <https://future.theoryandpractice.ru/12002-ie-smart-cities> (03.12.2017)

to studies of the objective laws of these processes, but also to prevent the emerging diverse global problems of our era with the level of human activity that plays a significant role in the formation of the environment.²

The modern world, the environment of human activities and habitation, the entire world surrounding the human being, including both the natural and anthropogenic environment, including natural landscapes, and biodiversity, change with amazing rapidity in the processes of global, demographic, urban or climate developments (Manifesto..., 2016).

These processes should be balanced to prevent a variety of threats that may arise from unprecedented population growth in some countries or sub- and / or false (slum) urbanization in other countries, as well as the urbanization of nature and other phenomena.

The continuity of urban cultural processes, the entire spatial environment is the most important condition for the all-round harmonious movement towards Smart Cities.

Before a “Smart Urban Movement” begins, it is necessary to study and evaluate the existing urban unit in trans-disciplinary way.

We assume that the key areas of trans-disciplinary scientific research can be: history, urban studies, ethnography, archeology, theory and art history, ecology, earth and life sciences, anthropological sciences, biomedicine, public health and its management, economics, sociology, psychology, Information, construction, communication and other technologies, etc.

What does this mean and where does it come from such a long list of scientific disciplines when it comes to urban planning? And what a scale of mind and imagination! How to connect the above scientific disciplines with the notion of “Smart City”.

We should not understand the “smart city” only as a “city-machine” or “city-technology”, a certain set of sensors, video cameras, robots, laboratory and other devices capable of collecting information, analyzing and making decisions, not always, by the way, the most effective. A real smart city is impossible without the participation of people – different specialists, scientists, residents, representatives of the third sector, public figures, artists and all interested persons – and without creating a comfortable, healthy and safe environment for their lives.

On the website of Smart Cities Council we can read: “The smart city sector is still in the “I know it when I see it” phase, without a universally agreed definition. The Council defines a smart city as one that has digital technology embedded across all city functions”.³

In our opinion, it is not correct to reduce the essence of a smart city only to digital technologies that are embedded in all city functions. As [Frost & Sullivan](#) (2014) identified eight key aspects that define a Smart City: smart governance, smart energy, smart building, smart mobility, smart infrastructure, smart technology, smart healthcare and smart citizen.⁴

However, on the other hand, in all cases it must be taken into account that “the concept is not static: there is no absolute definition of a smart city, no end point, but rather a process, or series of steps, by which cities become more “liveable” and resilient and, hence, able to respond quicker to new challenges.”⁵

Real development in modern cities is often disorderly, irregular and erratic. It seems to us that in the first place, it is precisely this phenomenon, this disorderliness, that is opposed to the concept of a smart city and to improve it so that people get cities more adapted to high / ideal / adequate quality of life for residents.

The reason for such a negative development of the city’s improvement is the simultaneous presence in city planning of various, often opposite, interests belonging to institutions that have not cooperated. In other words, we need a research-based collaboration of local authorities, businesses, academic structures and organizations of the third sector.

In the 21st century, the state of the urban environment is not determined only by the availability of infrastructure, that is, by material resources. A smart city needs smart solutions that provide a qualitatively new development, based on the results of scientific research.

We have already noted, that a smart city is the provision of a modern quality of life. And this is achieved through the use of innovative technologies that provide for the economical and environmentally friendly use of urban life systems. Without recommendations received by scientists involved in this field, it will be difficult to cope.

The complex nature of “smart” initiatives implies inter-, multi- and trans-disciplinary cooperation involving specialists in architecture, archeology, economics, social sciences, cultural studies, public health care, ecology, psychology, ethnology, biology, system analysts, process engineers, etc. This is the large-scale challenge associated with the need to overcome the narrow mono-disciplinary thinking of experts, to develop in them the willingness to take into account the different from one’s

2 We also wrote: “King Tamar University as a modern university provides the students of diverse backgrounds with equal opportunities to learn, explore, and attain the knowledge and skills necessary to realize their career objectives and empower them to contribute positively and effectively to their community, country, and the world/international society. Our university is committed to opening new frontiers of cultural studies by focusing on the coexistence of diverse cultures, and by establishing a new paradigm for understanding cross-culturalism”. – Adam Akhaladze. From Architectonics of University Life to Scenography of Intercultural Dialogue. – 19th General Assembly and International Conference of the Fondazione Romualdo Del Bianco “HERITAGE for PLANET EARTH 2017: Smart Travel, Smart Architecture, Heritage and its Enjoyment for Dialogue”. – Auditorium al Duomo, via de’ Cerretani 54r. – Florence, March 11-13, 2017. – Abstracts Book. – P. 48-49.

3 <https://smartcitiescouncil.com/smart-cities-information-center/definitions-and-overviews> (30.11.2017).

4 Sarwant Singh. “Smart Cities – A \$1.5 Trillion Market Opportunity”. – Forbes, 19 June 2014. – <https://www.forbes.com/sites/sarwantsingh/2014/06/19/smart-cities-a-1-5-trillion-market-opportunity/#6d5a8d5bb6053> (25.11.2017)

5 Smart Cities: Background paper. – Department of Business, Innovation and Skills, Great Britain. – October, 2013. – https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/246019/bis-13-1209-smart-cities-background-paper-digital.pdf. (23.11.2017)

own – “external” point of view [Robinson, 2015].

The cultural dimension of the process of Smart City Movement is characterized by the existence of a two-way mechanism of interaction between historically established and emerging functions and structures in the present – traditional national and global (of multicultural society), cultural heritage and modern culture⁶. To orientate in this complex space, in addition to the above, cultural urban studies are required.

Our understanding of inter-, cross- and multi-culturalism is very important for Smart City Movement: inter-, cross- and multi-cultural polylogue is not a synthesis, a fusion of cultures and their subordination or submission to one another, but a space where cultures meet, interact, preserving their right to “opacity” (“non-transparency”) (Adam-Vakhtang Akhaladze, Archimandrite, 2016).

Today, we continue to experience exactly that time in the short term of which the face of the future of human culture is forming. The inter-, cross- and multi-culturation model seems a sort of right to be different (Adam-Vakhtang Akhaladze, Archimandrite, 2016).

The model of inter-, cross- and multi-cultural communication requires a special type of translation and decryption of cultural codes of each subject. In this regard, the international community put the task to adequately respond to the new challenge in the field of New Urbanism.

As we have already seen, the process of intelligent urban movement is a new urbanism, a new word in the understanding of city life, urban planning of the future. Many factors impede this movement for a comfortable urban environment, balanced for sustainable development and a high quality of life.

We should analyze not only the “green” buildings, but also the urban aspects, since without understanding the habitat, without understanding the place of man in the city, the most “green” buildings may remain unclaimed.

Maturity of a smart city will manifest itself not only in the use of information technology, but primarily in shifting the emphasis from the production / construction processes of the material environment to the processes of efficient operation of the continuous life cycle of objects. An integral part of a smart city is the creation of a single urban geo-information environment (M. Argunova, 2016).

Human life is multifaceted. Representatives of only all anthropological scientific disciplines can discuss the quality of human life. Human needs are also studied in many branches of knowledge. If we add to this the scientific disciplines that study the environment, technical sciences, without which neither construction, communication, nor information technologies are unthinkable, we will get a picture of a multidisciplinary scientific approach to urban development.

The introduction of “smart” solutions requires a cross-sectoral management approach. Such spheres of municipal economy as energy, water supply, waste utilization, transport and health are considered and managed in isolation, which limits the range of potential opportunities for stakeholders. Cross-sectoral approach allows overcoming this tendency [BIS, 2013].

However, the need to move to inter-disciplinarity is a complex challenge. It requires specialists able to go beyond the narrow professional thinking, having an idea (at least basic) of related disciplines and possessing the skills of modeling multi-level processes (Boykova M. et al., 2016).

An analysis of the current situation in our and many other countries has allowed us to conclude that the strategies of “smart” development still rely primarily on a narrow, mono-disciplinary, “technological” approach, suggesting that the availability of a “smart” infrastructure in itself can solve many urban problems and improve the quality of life in the city.

However, unlike an expanded, integrated scientific approach, many social, economic, cultural, anthropological, ecological and other factors, real needs of the population are not taken into account, which is why the indicated goals are most often not achieved. The implementation of a comprehensive scientific approach implies a number of conditions, such as the ability to integrate management decisions taken at various levels, to anticipate how changes in one system will affect others; orientation to inter-, multi- and trans-disciplinary interaction; skills of working with factors of resistance to change, etc.

At present, the development of science and technology is moving along the path of their convergence, that is, interpenetration. The new scientific and technological way is based on the so-called NBIC – nano-, bio-, information technologies and cognitive (based on the study of consciousness, behavior of living beings) science.⁷

6 See: Adam-Vakhtang Akhaladze, Archimandrite (2012). Georgian-Turkish Cultural Relations. Nowadays and the Perspectives of Their Development (Preface). – Georgia and Turkey: The History of Cultural Relations, the Present Day and Perspectives. Thesis Reports of International Scientific Conference Dedicated to Ahmet Ozkan Melashvili's 90th Birthday. Tbilisi, June 21-24, 2012. – P. 12-15.

7 In J. Canton's opinion, “Never before has any civilization had the unique opportunity to enhance human performance on the scale that we will face in the near future. The convergence of nanotechnology, biotechnology, information technology, and cognitive science (NBIC) is creating a set of powerful tools that have the potential to significantly enhance human performance as well as transform society, science, economics, and human evolution. As the NBIC convergence becomes more understood, the possibility that we may be able to enhance human performance in the three domains of therapy, augmentation, and designed evolution will become anticipated and even expected. In addition, NBIC convergence represents entirely new challenges for scientists, policymakers, and business leaders who will have, for the first time, vast new and powerful tools to shape markets, societies, and lifestyles. The emergence of NBIC convergence will challenge us in new ways to balance risk and return, threat and opportunity, and social responsibility and competitive advantage as we step into the 21st century”. – <https://www.ncbi.nlm.nih.gov/pubmed/15194614> (05.01.2018)

However, since the multidisciplinary approach cannot effectively protect us from the fragmentation of both knowledge and worldview⁸, which is so important for exploring the processes of the new urbanism, we consider the use of trans-disciplinary meta-methodology to be more acceptable for understanding the phenomena under investigation within a global trans-disciplinary system without strict boundaries between disciplines.⁹

The laboratory of such trans-disciplinary research can be a modern University. In the mid-1990s, along with public organizations and groups, federal, regional and local authorities, the University of Maryland (USA) established the National Center for Smart Growth, which became a leader in research and education, dealing with a wide range of problems in the preservation and development of territories, the creation of affordable housing and sustainable communities.¹⁰

Without university scientific and educational support, society cannot cope with absolutely new challenges and opportunities that open up to humanity the transition to the latest technological innovations (the sixth technological order (E. Kablov, 2010)). Synthesis of achievements in the main technological areas (bio- and nano-technologies, genetic engineering, membrane and quantum technologies, micromechanics, photonics, thermonuclear energy) can lead, for example, to the creation of a quantum computer or artificial intelligence. It is also possible to reach a fundamentally new level in the management systems of the state, society, and economy. We are going to improve the quality of people's lives. Informatization leads to redistribution of labor: the machine will do hard work, the person – smart (M. Parshin, D. Kruglov, 2014).

In order for new high-tech applications, services, automated regulatory systems to work really effectively, they cannot do without modeling of urban processes. That's what university laboratories will do. Modeling allows us to track not only the causes of the events that took place, but also to predict the situations that have not yet occurred. In this case, the joint work of programmers, sociologists, psychologists, etc. is necessary. Computer simulation is based on knowledge and information about urban processes. At the same time, it is important to take into account that it is impossible to collect absolutely all the data on the processes that take place in a smart city, to some extent they will be inaccurate and incomplete. That is why in the work of the urbanist the presence of inter-, multi- and trans-disciplinary knowledge and the ability to work in a team with different specialists, which can fill the gaps in the projects on the basis of scientifically developed models, becomes the determining factor. Due to the fact that the scientific project on the preparation of a platform for the beginning of a "Smart Movement" in our cities can be comprehensively expanded, the effort of several Universities can be combined and, thus, the project can be turned into an Inter-University one.

References

Adam-Vakhtang Akhaladze, Archimandrite (2012). Georgian-Turkish Cultural Relations. Nowadays and the Perspectives of Their Development (Preface). – Georgia and Turkey: The History of Cultural Relations, the Present Day and Perspectives. Thesis Reports of International Scientific Conference Dedicated to Ahmet Ozkan Melashvili's 90th Birthday. Tbilisi, June 21-24, 2012. – P. 12-15.

Adam-Vakhtang Akhaladze, Archimandrite (2016). Activities of Anthim the Iberian in the context of intercultural communicative competence. – International Symposium "St. Anthim the Iberian (+1716) – the European and Caucasian Culture and Spirituality from late 17th c. and early 18th c.". – Abstracts. – 15th-18th September, 2016. – Constanta-Ramnicu-Valcea (Romania). – P. 8-9.

Adam-Vakhtang Akhaladze, Archimandrite (2017). From Architectonics of University Life to Scenography of Intercultural Dialogue. – 19th General Assembly and International Conference of the Fondazione Romualdo Del Bianco "HERITAGE for PLANET EARTH 2017: Smart Travel, Smart Architecture, Heritage and its Enjoyment for Dialogue". – Auditorium al Duomo, via de' Cerretani 54r. - Florence, March 11-13, 2017. – Abstracts Book. – P. 48-49.

Argunova M. (2016). Model Umnogo Goroda kak Proivavlenie Novogo Nekhnologicheskogo Uklada [The „Smart City” Model as a Manifestation of the New Technological Mode]. – <https://cyberleninka.ru/article/n/model-umnogo-goroda-kak-proyavlenie-novogo-tehnologicheskogo-uklada> (24.10.2017)

BIS (2013). The Smart City Market: Opportunities for the UK (BIS Research Paper № 13). London: Department for Business, Innovation and Skills. – https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/249423/bis-13-1217-smart-city-market-opportunities-uk.pdf (28.12.2017)

8 Cf.: Transdisciplinarity: Stimulating Synergies, Integrating Knowledge Division of Philosophy and Ethics UNESCO, 1998, pp. 37–38. Available: <http://unesdoc.unesco.org/images/0011/001146/114694eo.pdf> (12.12.2017)

9 Cf.: B. Nicolescu. Transdisciplinarity – Past, Present and Future. // Moving Worldviews: Reshaping sciences, policies and practices for endogenous sustainable development. – COMPAS Editions, Holland. – 2006. – P. 142-166. – http://basarab-nicolescu.fr/Docs_articles/Worldviews2006.htm#_ftn1 (12.12.2017)

10 NCSG (National Center for Smart Growth Research and Education): Smart Growth in Maryland. – <http://smartgrowth.umd.edu/smartgrowthinmaryland.html>

Boykova M., Ilina I., Salazkin M. (2016). The Smart City Approach as a Response to Emerging Challenges for Urban Development. Foresight and STI Governance, vol. 10, no 3, pp. 65–75. – <https://foresight-journal.hse.ru/data/2017/06/14/1170591062/6-%D0%93%D0%BE%D1%80%D0%BE%D0%B4%D0%B0-65-75.pdf> (28.12.2017)

Canton J. (2004). Designing the future: NBIC technologies and human performance enhancement. – Annals of New York Academy of Sciences. – May;1013. – P.186-98.

Kablov E. N. (2010). Shestoy tekhnologicheskii uklad [The Sixth Technological Order]. – Nauka i zhizn [Science and Life]. – No. 4. – P. 2-7.

Manifesto (2016). The Smart Cities We Need. – Ed. be N. Busho. – Innovative City SAS. – http://crimea.gov.ru/content/uploads/files/mohelp/Manifest_full1.pdf. - (30.11.2017)

Nicolescu B. (2006). Transdisciplinarity – Past, Present and Future. – Moving Worldviews: Reshaping sciences, policies and practices for endogenous sustainable development. – Ed. B. Haverkort and C. Reijntjes. – COMPAS Editions, Holland. – P. 142-166. – http://basarab-nicolescu.fr/Docs_articles/Worldviews2006.htm#_ftn1 (12.12.2017)

Parshin M. A. (2014). Perekhod Rossii k Shestomu Tekhnologicheskomu Ukladu: Vozmozhnosti i Riski [Russia's Transition to the Sixth Technological Order: Opportunities and Risks]. – M. Parshin, D. Kruglov. Sovremennye Nauchnye Issledovaniya i Innovatsii [Modern Scientific Research and Innovations]. – No. 5. – <http://web.snauka.ru/issues/2014/05/33059> (24.10.2017).

Robinson R. (2015) Six Inconvenient Truths about Smart Cities. – <https://theurbantechnologist.com/2015/02/15/6-inconvenient-truths-about-smart-cities/> (15.10.2017)

Singh S. (2014). “Smart Cities – A \$1.5 Trillion Market Opportunity”. – Forbes, 19 June 2014. – <https://www.forbes.com/sites/sarwantsingh/2014/06/19/smart-cities-a-1-5-trillion-market-opportunity/#6d5a8dbb6053> (25.11.2017)

Smart Cities: Background paper (2013). – Department of Business, Innovation and Skills, Great Britain. – October, 2013. – https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/246019/bis-13-1209-smart-cities-background-paper-digital.pdf. (23.11.2017)

Smart Cities Council (2014). Definitions and overviews. – <https://smartcitiescouncil.com/smart-cities-information-center/definitions-and-overviews> (22.11.2017)

HERITAGE FOR PLANET EARTH - SMART CITY AND HERITAGE CONSERVATION BY MEANS OF MODERN BUILDING TECHNOLOGIES: THE FUTURE OF HERITAGE SCIENCE AND TECHNOLOGIES

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Abstract:

This research is based on the theory of formality and modernity of materials. After documenting the building as a surveyor, architectural and historical. , We find that the classification of the two thousand points is likely to form on building materials. Illustrates the direction of attention from the material to the shape. Modern materials can hide in an aesthetic way, at the expense of the originality of the material. Article development tools provided great products. But electronic development has contributed to highlighting the aesthetics of the finished product. Pan wanted tourists a final product showing national achievements. Sustainability of the form of sustainability of construction materials. It was agreed here with UNESCO that true sustainability lies in culture. Concluding with the originality of form and modernity of materials. It outlines the limits that science must adhere to in the direction of conservation and restoration the final product also forgive a number of transgressions.

Keywords: future, technology, renovation, restoration, authenticity, smart cities, heritage, antiquities, modernity, architectural details, UNESCO, world heritage site, tourism, sustainability, preservation, historical, society, culture, ICOMOS.

Introduction

There are many ways in the current era to preserve the heritage and the use of modern technologies in the preparation of perceptions that help greatly in the restoration and preservation of monuments. And documenting the nature and even predict what it was on the day of its birth.

In this research, I will adopt a theory which I have adopted in my work, namely, "Authenticity of form and modernity of materials". This means preserving the original form of the archaeological or heritage building, so as not to prevent the use of modern materials and techniques in the process. This is contrary to classical theory in the restoration and used for centuries on the need to preserve the authenticity of materials and modernity of form. Which we observe in most of the buildings that have been restored since the middle Ages.

Factors affecting the future of restoration:

1- Classification: After documenting the building, surveying, architecturally and historically. We are in the classification of this building, and the most dependent way is the classification of the millennium or the one thousand-point classification, which consists of twenty major items and each item includes five points and each item ten degrees. Therefore, we are subject to a set of criteria for registration in the Department of Antiquities and Heritage under a particular classification, according to points and grades due. One of the most important items in the classification hierarchy (which I worked on a lot in the past) is building materials. As well as its nature and quality and how they reached us in their current form, despite the lengthy passage of time.

The other item that concerns us here from the classification hierarchy is (the authenticity of the overall appearance). This item is as follows:

1. The ability of the building to adapt to its social environment. (10)
2. Building's connection to the elements and history around. (10)
3. Architectural details that tell a group of special customs and traditions (10) d
4. Social and national importance. (10)
5. Geography of the place. (10)

Distinctive architectural blocks also play an active role in the item of symmetrical urban fabric and in the one thousand-point classification.

The strict and real classification of heritage buildings can determine the ideal restoration process in the future.



2. Future orientation of heritage restoration (restoration technology)

Modern techniques have come to mimic the ancient antiquities and create identical copies of the original through the three-dimensional survey and print it as was done in a live experiment of the Arc de Triomphe, which was exhibited in Britain and displayed in Trafalgar Square.

The struggle of material and form: We suffer in the management of historical sites of the duality of preference between the authenticity of materials and formality, I want here to emphasize the decision: that the return of the place to what it was with a few cosmetic operations is a priority. Knowingly, we always suffer from the scarcity of materials corresponding to the original and may have obtained a different technology to the original. (The Umayyad Mosque in Damascus).

Conflict of speed and sustainability: The secret of the development of project management lies in quality and workmanship within a specified time, and heritage projects are not an exception. But what distinguishes them is the need to accomplish them in a way that makes them more sustainable than usual to be a continuation of the work accomplished thousands of years ago. (Beit Nassif in historic Jeddah)

Conflict of originality and simulation: in the case of the loss of large parts of the heritage monument, or reconstruction. I would probably suggest a simulation of the heritage site, and keep the minimum originality. Perhaps using it in modern ways (Palace of a name in Istanbul)

Conflict of original use and future use: (original job and tourist function), for example, when the house of a great history turned into a museum, and be called for restoration, I find the problem of rehabilitation of space and the need to restore it in a way that allows the exploitation of tourism.



3. Materials used for restoration

We currently have a huge amount of materials used to restore life to historical buildings. We will deal with it in two parts: Infrastructure materials (air conditioning, heating, drainage, fire, alarm, etc.) are all important for rehabilitation, however, should not affect general appearance i.e. hidden yet maintain authenticity.

- Structural materials: so that I can replace structural or perhaps architectural elements done with modern techniques and lead the same original hypothesis. There are many examples. To save time and effort.

4. Modern technologies: divided in terms of its direct impact on research restoration to the following

- Computer technology: which has developed rapidly from the stage of normal photography and documentation to digital and spatial documentation to GIS to the stages of digital completion of the missing parts, up to the three-dimensional printing
- Machines and technical machinery: such as machines, saws, cranes and access to laser devices. All aiming to the tradition of the authenticity of historic buildings.
- Laboratory and quality tests: which also produced alternatives for materials we could not obtain directly, so that the results of the laboratory to approach the production of sustainability materials similar to the original.

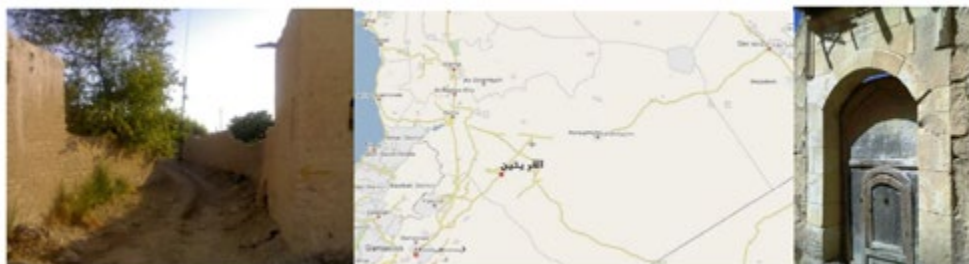


5. Sustainability

- (Green Heritage), the subject of my book, concerning the maintenance and rehabilitation of heritage independently of technical development, while at the same time utilization of natural resources.
- Exploiting available material: It is called a local reflection on global experiences.
- The relationship of shape to the environment: and consequently the community's response to the factors of sustainability
- Economic product: The stages of restoration to delivery, rehabilitation and economic feasibility, scientific and national.

6. Comprehensive example

The Syrian villages (Madinat Qaryatain) west of Tudmur 60 km - we find here a heritage of seven thousand years varies between Assyrian and Chaldean and Byzantine and Roman and then Islamic and Mamluks and Ottomans. Taking care of such a location with this historical density requires great planning and effort, and it also imposes the use of all future tools to be used here. Before they become available for tourism. In addition to all the above, it is of exceptional value in terms of cultural and intellectual diversity.



7. Conclusion (the future of restoration)

Perhaps in the near future, nanoscience and phonetics, linking ancient civilizations and linguistics can predict what the historic building was. But we must remember that the authenticity of the place and the real sense of events took place in this location and environment. Is what gave the civil building its importance and value.

It is necessary to see the tourists or citizens in their country or even students, to see a complete heritage perfectly beautiful and not distorted or collapsed, in which they could comprehend it through the reasons that called for its establishment in this way without any other. And how the time and place in which it was built and the weaknesses and strengths in this heritage or monuments were chosen.

Therefore, we are as professionals required to embrace a thought that believes in the speed of an integrated and beautiful image of our heritage and away as far as possible from distortion and decorative restoration. To approach as much as possible the original material of the cultural monument and simulation of the unique origin.

We desperately need to find the original shape perfectly even if we have to use tricks, materials and crooked ideas to accomplish the real picture of the monument.

We do not deny the authenticity of the basic product and the materials by which these great works were accomplished, but when the interest of a group of people represents only 1% of this subject, compared to 99% of people looking for pleasure to visit the archaeological sites and heritage and fully interact with the respectful view that they can be proud of what their parents and grandparents have accomplished.

When a calculation is done using the calculator and another is done without the help of the machine, it does not mean that I lost my connection to the solution or exceeded any values imposed in solving the complex issues and therefore the statement is about the outcome. Thus, we are faced with specific objectives of achievement within values known for their accuracy. I would like to mention here that the originality of the form and the modernity of materials. Perhaps you can reach us to make a quantum leap in the science of heritage restoration and lay the parameters of the boundaries that modern science must adhere to and its tools in keeping with the development and preservation of heritage.

At the same time everyone is waiting for great steps in the development of historical and archaeological research tools to provide the world with unknown periods of human history and answer many old questions.

The Orientalization of new horizons for the development of scientific research in this field is wide and open to a large extent and it allows us to secure effective methods and strict provisions by ensuring the best ways to accomplish the restoration work. Cost estimation and classification that can be ventured.

And identify the risks and the actual duration of the completion of any civil projects related to the work of excavation and restoration and rehabilitation and thus tourism.

References

- Abdel Moez Shaheen, "Restoration and Maintenance of Historic Buildings, Archaeological and Historical Culture Series". Egyptian Ministry of Culture, "Project One Book", Press of the Supreme Council of Antiquities. HRH The Prince of Wales; HRH Prince Sul Sulayn bin Salmān bin'Abd al-'Azīz Āl Sa'dd " Back to Earth Adobe Building in Saudi Arabia" Second Edition.
- Bazara T.G, AL-Sagaf M.A and AL-Sagaf O.A (Received August 27, 2008 Accepted May 13, 2009), "ENVIRONMENTAL STUDY FOR DEVELOPER HISTORICAL ZONES IN TOWNS OF HADHRAMOUT VALLEY", Department of Architecture Environmental Planning, Faculty of Engineering & Petroleum Hadramout University of science & Technology. Website: <http://documents.albankaldawli.org/curated/ar/754861514406923221/China-Shandong-Confucius-and-Mencius-Cultural-Heritage-Conservation-Project-19/12/2017>Zeppel, H.; Hall, C. M., Material Culture Unit/Department of Tourism, James Cook University of North Queensland, Queensland, Australia. 1991

INNOVATIVE PRINCIPLES AND METHODS OF PRESERVING ORTHODOX HERITAGE IN SARATOV REGION

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Abstract

The article presented the relevance of scientific research in the field of restoration of Orthodox churches on the example of Saratov Region. There were proposed the innovative principles and methods of reconstructing the surviving Orthodox religious objects. In particular, this is a 3D modeling and electronic cataloging of Orthodox objects in the Saratov Region. The advantage of this technique is that it makes it possible to re-compose an Orthodox church, even if there is no archival graphic information. Some recommendations for improving the reliability of measurements and the quality of the final result are also considered. The efficiency of using modern technological equipment for measuring objects is shown. This leads to a more accurate study, and therefore a more qualitative approach to the reconstruction and restoration of the building. The experience of the presented concept on the re-creation of temples can be applied to most Orthodox churches.

Keywords: preservation, Orthodox churches, heritage, regional architecture

Before the October Revolution of 1917, over 800 Orthodox Christian churches were built in Saratov Province, while currently just 360 churches are present within the area. Most of those are in dilapidated state (23% of the total amount), of which 11% are in ruins. (Fig.1).

The history of constructing Orthodox Christian churches in Saratov Region exceeds 300 years: it began as early as the end of the 16th century and continued until the beginning of the 20th century. After 70 years of destruction and persecution of the church and religion, by the beginning of the 21st century, we observe a significant increase in the interest towards religion. At that time, the construction of churches resumed, and cult monuments were being restored throughout the country, including Saratov Region.

For example, there were 36% of newly erected churches in the area by 2016, while 12% of the total church number was restored. Unfortunately, for various reasons, a considerable fraction of Orthodox Christian churches remain in dilapidated state despite the growing spiritual needs of the population.

Despite the growing trend in construction and restoration of Orthodox Christian churches, a number of contemporary issues exist: technical, social, and architectural (stylistic, volumetric, and related to compositional planning). Three major problems that apply to both newly constructed and restored churches are reviewed below.



Figure 1 - Schematic map of the Saratov Region showing the surviving Orthodox churches.

First, needs of parishioners and modern conditions of church buildings are changing at present. For example, until the beginning of the XXth century, churches were heated with stoves and lit with wax candles. Currently, modern technologies facilitate the use

of various heating systems, such as subsystems with thermal energy transfer by convection or by heat irradiation. Those can be used in combination with heated floor and convection heater as well as ventilation.

Now, churches use lighting based on electric light in addition to both natural and candle lightings. Provision is made for water supply and sanitation, along with other conveniences for the churches. To ensure correct approach to development of the reconstruction project, Construction Standard “SP 31-103-99 for Buildings, Structures and Complexes of Orthodox Churches” was established. Individual approach is necessary for the reconstruction and restoration of church buildings and complexes, as well as for the changes in engineering and technological parameters of facilities. Both technical and architectural factors should be taken into account. Second, we observe the scope expansion of cult complexes and spiritual needs of parishioners. Churches become social, educational and cultural centers, their functions ranging from establishing charitable centers to various educational, cultural and museum-related activities. All of the above leads to the enlargement of their territory and enrichment of their infrastructure.

The third major and acute issue of the kind is the restoration of Orthodox churches without taking into account local regional peculiarities.

Many Orthodox objects have been little studied or not studied at all. The lack of archival documents and historical drawings creates a great problem for the restoration of these structures.. Often this leads to violations of the church’s proportions during the reconstruction of its main elements. And most importantly, this leads to a distortion of its historical appearance. Thus, for example, in the village of Lapshovo, the Church of the Savior 1831 was rebuilt. We see a completely wrong approach to choosing the domed completion of the church, which in total violated its stylistic direction (Fig.2.)

In the process of studying this issue, the author proposed the concept of reconstruction of the preserved Orthodox religious objects thanks to the electronic cataloging of religious objects on the Saratov Region example. This method can be used when the restored object has not got sufficient number of the historical documents. The traditional ways of storing information, such as descriptions of the object, its technical passport, archival sources, graphic images (plans, facades) to the end did not allow us to identify the typological features of building churches, as well as could not help in finding the necessary individual elements of building, specific to a certain period of construction, stylistic direction, etc. With the advent of modern means of storing information - electronic archives, it became possible to automate a number of operations related with extracting information stored in the archive. For example, searching for a material by the date of construction or by the author’s name. But this again didn’t provide complete information about the possible reconstruction of such facilities. And the next stage of processing information about church buildings was its structuring.



Before restoration



After the restoration

Figure 2 - An example of an incorrect reconstruction of the church in the name of the Savior in the village Lapshovka of the Saratov Region.

For this research the surviving material on Orthodox objects of the Saratov region from the end of the XVII th century till the beginning of the XX th was collected.

These are archival drawings and photos, objects’ descriptions, modern research of churches and their photo fixation. Also, not only existing objects were used, but also graphic materials of lost churches.

The study reveals three major construction periods. The first one took place from the end of the 16th to the end of the 18th century, the second occurred at [during] the first half of the 19th century, and the third period lasted from 1850s through 1917. For each period, it was characteristic to build churches of a certain type and stylistic orientation.

The study was conducted for more than 10 years. On the equipment of the collected material, a comprehensive analysis of existing temples was carried out and an electronic catalog of Orthodox buildings was created Saratov Region. All objects are structured and classified according to their typological characteristics: volumetric spatial and compositional planning decisions, as well as stylistic direction. All objects are placed in chronological order. This technique can be used in cases when doesn’t have sufficient material or completely missing historical documents for the recoverable object. More than 30 objects were collected and examined. Building measurements were carried out in different ways including using modern tools, such as laser roulettes and 3D scanning.

In some cases, in hard-to-reach places, was used a traditional manual measuring method. The research carried out with the help of modern instruments allowed us to more accurately measure the churches, both their external volume and internal space. In contrast to traditional methods, this type of research is the most productive. Then, churches' drawings with preserved structural elements derived from the collected measurement materials were created with the help of computer programs. Also their 3D models were built there. The characteristic volumetric spatial elements of the structure are revealed by the ratio of the total volume, by the plan's configuration (rectangle, circle, square), by the separate structural elements (for example, 2 or 3-tier belfry), etc. And compositional planning decisions.

So it was revealed 3 basic types of temples: "ship", centric type and synthetic. And several subtypes of each species. All this was also taken into account when classifying objects (Fig.3.).

Separate attention was given to the constructive elements such as completion, belfries, galleries (gulbischa), porticos, etc. As well as decorative elements: kokoshniki, decorative friezes, denticles etc. All elements were systematized relative to the corresponding stylistic direction.

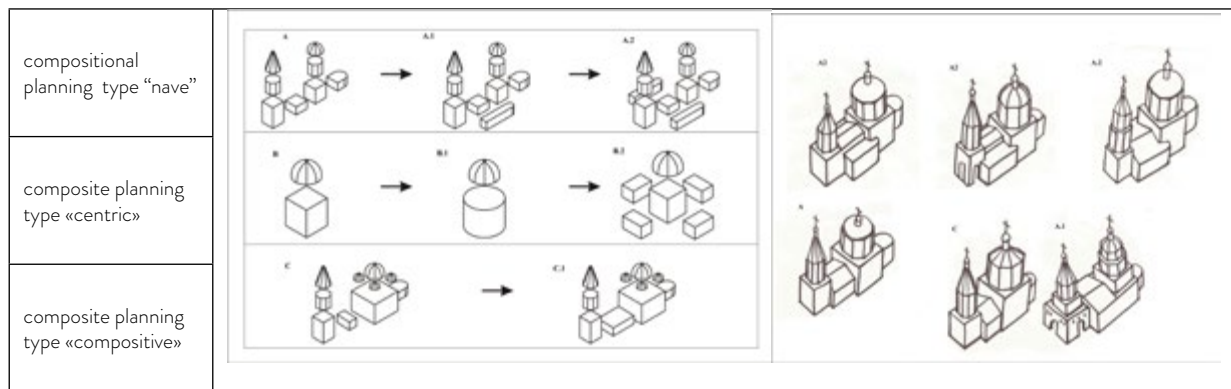


Figure 3 - Volumetric - spatial models of churches.

Classification of windows												
Baroque				Classicism								
rectangular with a pediment		arched		rectangular window				rectangular window with a false arch				
arched		arched		arched		arched			arched		arched	
Eclecticism												
Russian - Byzantine			"Brick architecture"				Russian style					
arched			arched double				arched					

Figure 4 -Fragment of the table catalog with the details of the windows in accordance with the stylistic.

The entire catalog is presented in the form of spreadsheets, in which the basic form can vary in proportion to the total volume, without losing its main features. Thus, these data can be used in the reconstruction of Orthodox church buildings, especially in the absence of any elements, since they can be recreated most closely to the authentic, without destroying the overall appearance of the building and in accordance with the peculiarities in this case of the Saratov Region. It should also be noted that catalog data can be constantly updated with new information

So, on the basis of the received research it is supposed to develop projects of reconstruction of 25 Orthodox Christian churches of the Saratov Region with various degree of safety. For example, consider the project of reconstruction and recomposition of

the church in the name of Archangel Michael in the village of Svishchevka Rtishchevsky district, Saratov Region. The church was built in 1824. Currently not functioning.

For the proposed reconstruction of the temple, the following stages were identified:

1. Measurement of the structure with modern laser instruments laser roulettes and 3D laser scanning.
2. Creation of drawings with extant elements and 3D models in computer programs AutoCAD, Sketch Up, 3D Max, Wings 3D
3. Use of the author's electronic catalog for the restoration of lost volumetric constructive elements.

For the research of this object, facades' measurements were made, and the main damage was recorded. As well as photos and video were collected. During the visual inspection of the temple it was found out that the porticoes of the entrances of the western, southern and northern facades and the altar part are now lost. Also shattered the completion of the bell tower and the completion main volume of the temple. There are no staircases to climb the bell tower. The entrance to the temple from the south side of the building was dismantled for the purpose of the arrival of agricultural machinery. As a result the laying of the southern facade of the temple was severely damaged. The positive moment is that all the windows of the building, as well as the inner opening connecting the central part of the church and the narthex, were laid with brickwork, which contributed to the preservation of the building from complete destruction. Partially preserved brick vault of the main volume. Inside the temple there are remains of frescos.

For the development of the 3d model of the volume of the building, we conducted its typological and stylistic analysis. This is a cross-shaped volume with an east-west expand. On the west side, it had a built-up bell tower, consisting of one tier. This is a rotundal volume inside, which is not a standard solution for the Saratov Region in general. The temple is built in the traditions style of classicism. In the process of research, objects of the same period, similar in typology, were analyzed, as well as projects from the album of churches in 1824. (Fig.5 a.)

Based on the analysis of analogues, as well as analysis of the classical layout of temples for 300-400 people, the basic concept for the restoration of the temple was proposed. It was found that the bell tower of this type is characterized by the use of a spire finish, and four-column porticos have a Doric order system (Fig.5 b.). That corresponds on the whole to the historical appearance of the temple, and the individual structural and decorative elements of the building have proportions specific to the Saratov Region. With the help of 3d programs, a model was created with the supposed reconstruction of lost architectural elements.

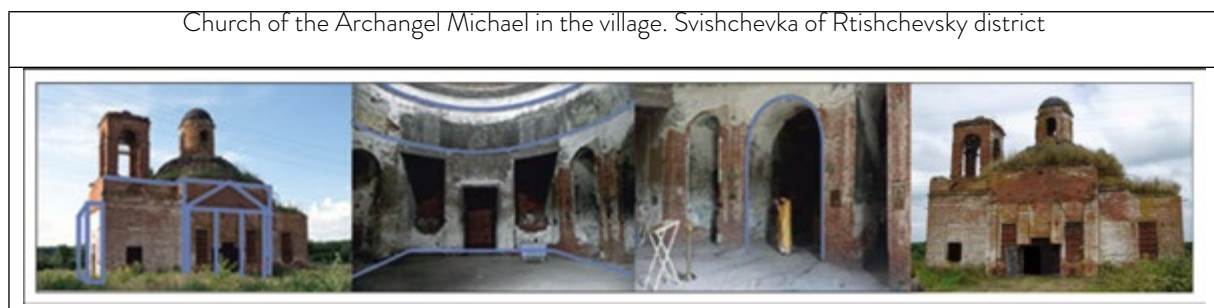


Figure 5a - Photo fixation of the church in with. Svishchevka



Figure 5b - Restoration of the historical appearance of the temple of the Archangel Michael in the village. Svishechka of Rtishchevsky district.

Of course, we should not forget that for the modern reconstruction of religious orthodox buildings (which carry a certain functional activity and are not a monument-museum), as a rule, the reception of reconstruction with imitation of style. Any later changes in the architecture of the surviving structure deprive it of some genuine historicity, but considering that this object is functioning for its intended purpose, its preservation even with non-authentic elements, but similar in stylistic, typological and other characteristic features in this case are justified. We can conclude that on the one hand, this is adherence to the canons of construction of the churches architecture, on the other - the use of new technologies in construction that makes it possible to restore a cult object for its direct purpose. Based on the experience of using modern equipment and cataloging system, the most qualitative restoration of cult Orthodox objects is possible.

References

Evstratenko M. A.

Informacionnoe strukturirovanie fasadov arhitekturnyh ob"ektov i ih katalogizaciya : Na primere yuzhnorossijskoj ehklektiki Avtoreferat Rostov-na-Donu 2006

Nesgovorova G.P. Sovremennye informacionno-kommunikacionnye i cifrovyte tekhnologii v sohranении kul'turnogo i nauchnogo naslediya i razvitii muzejnogo dela // Problemy intellektualizacii i kachestva sistem informatiki. Novosibirsk, 2006.

Spravochnaya kniga Saratovskoj Eparhii – Saratov 1912g, 1992

SHeina S.G., Upennikov D.K. Sovremennye tekhnologii, pribory i oborudovaniya dlya trekhmernogo modelirovaniya pamyatnikov arhitekturnogo naslediya // Internet-zhurnal «NAUKOVEDENIE» Tom 7, N°3 (2015) <http://naukovedenie.ru/PDF/103TVN315.pdf> (dostup svobodnyj). Zagl. s ehkrana. YAz. rus., angl. DOI: 10.15862/103TVN315

WAYS OF SAVING THE ORIGINAL LOOK OF CULTURAL HERITAGE MONUMENTS

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Abstract

The use of modern information systems is of great importance for preserving the look of objects of cultural heritage existing in living urban environment. The article provides the description of some relevant information systems, their advantages and drawbacks and analyzes the possible ways of their use in preserving historical and cultural heritage. The technique of laser scanning is regarded as an upgrade variant for existing information systems methods used in creation of architectural heritage databases. The upgraded information systems should provide the possibility of maximally identical restoration of historical and cultural heritage monuments in the case of their partial or complete loss. The output of the restoration investigation is fixed in a special information passport of a heritage object which could help to make a monument's most precise restoration providing the nearest approximation to its original look.

Keywords: historical and cultural heritage object, object's look preservation, information systems, laser scanning technique, restoration identity, object's informational passport, digital surveying

The use of modern information systems is of great importance for preserving the look of objects of cultural heritage existing in living urban environment. The article provides the description of some relevant information systems, their advantages and drawbacks and analyzes the possible ways of their use in preserving historical and cultural heritage. The technique of laser scanning is regarded as an upgrade variant for existing information systems methods used in creation of architectural heritage databases. The upgraded information systems should provide the possibility of maximally identical restoration of historical and cultural heritage monuments in the case of their partial or complete loss. The output of the restoration investigation is fixed in a special information passport of a heritage object which could help to make a monument's most precise restoration providing the nearest approximation to its original look.

In saving historical and cultural heritage it is important to implement the most efficient measures to ensure the safety of the existing architectural monuments (Bal'zannikova, 2011). Among the latter there are many unique objects characterizing the origins of contemporary architecture environment. An example is shown at Fig. 1.



Figure 1 - The building of the Zhigulevsky Brewery in Samara

In addition to their historic and aesthetic value such buildings provide increased touristic attractiveness to urban historic districts and they can also play an important educational role. Figure 1 shows an example of such a architectural monument in the city of Samara, the building of the Zhigulevsky Brewery, now having the status of a federal cultural heritage monument.



Figure 2 - Other examples of Samara architectural monuments in different styles

That is why a great attention is given to the development of effective ways to save the look and the parameters of architectural monuments in the city (Vavilonskaya, 2009). Saving the images of many them is even more urgent because they are under threat of destruction in the nearest future. The transformations that Samara has suffered over the centuries are still visible today along the streets of downtown, at the streets of many of those historical neighborhoods that were less affected than speculative policies of urban construction of the twentieth and twenty-first century. The lack of adequate citywide planning involved the uncontrolled appearance of contemporary multifunctional buildings with disproportionate size, completely out of scale compared to the skyline of the city, accomplices of the progressive loss of identity of the place.

One of these ways is the use of modern information systems and technologies. A number of existing modern information systems have been analyzed, their technical solutions, structure and characteristics of their elements, their opportunities for their use for abovementioned purpose were described. One of them is “System of Environmental Data Collection on the Conditions in the Region” (Lukenyuk et al, 2008) which includes the basic elements, such as a unit of parameters registration, communication channels, information storing equipment, a monitoring block and a decision-making block. This system has essential shortcomings for registration of the look of architectural monuments and shows inability to be used for the purpose of their preservation. In particular, the information of high cultural and (or) architectural value (monument) collected by this system is incomplete, it is of low reliability, it is not possible to edit information stored, as well as the identification of the object by the parameters stored in the information storing equipment is not available, there are no ways to ensure the reconstruction of the object in the case of its full or partial loss.



Figure 3 - Neglected monuments under the threat of destruction

From this point of view the significant advantages are provided by another option “Visualization of Three-Dimensional Images in Combination with the Two-Dimensional Projection Images” Homan Robert, Johannes Frederick (NL), application 2009118382/08, 10.10.2007. published on 27.12.2012). However, this invention relates only to the field of digital image processing, especially for the medical purposes and its application could only improve the quality of visualization of three-dimensional images of an object. There are no means to trace the architectural features of the object, and it cannot be used for saving an architectural heritage values.

A more complete Information Collection System is presented in the patent (Kleyменова et al, 2012). This system includes a block of registration parameters, communication channels, information storing equipment, a monitoring block, a decision-making block, an information correction block and of the consumer information. The storing facility provides the opportunity to store the comprehensive information on the object, the information correction block makes it possible to add refined (updated) details. A consumer information block uses the data for acquaintance with the object and its parameters in order to its identification.

A new way to the preservation of the look and parameters of the architectural monuments in the city of Samara was suggested by team of the students from the University of Florence headed by Dr. Francesca Picchio during their field research in Samara (Picchio, 2016). Among other things the Italian students prepare a number of folders documenting the state and conditions of the existing buildings. They combined photography, drawing and computer simulation and representation to make up a comprehensive digital survey which could be regarded as a kind of a monument’s information passport. The researched was conducted in the central part of the old city.

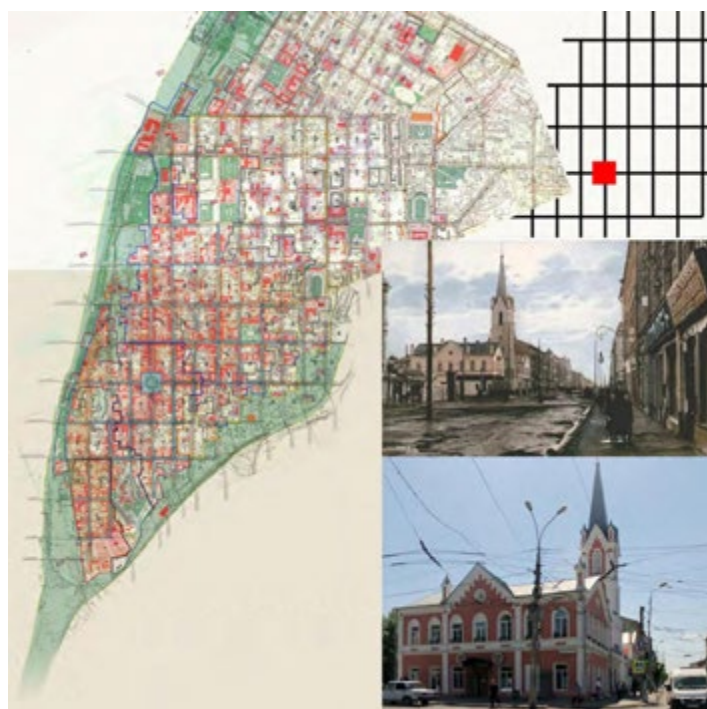


Figure 4 - The location of the majority of architectural monument in the old part of the city

Photography and representation have always been closely related: photography as a recording of the real world, and graphic representation as a tool of documentation. With structure from motion it is possible to combine both these techniques in order to create a model of the object and digitally recreate the environment that is around it. This is a new approach to survey, study, knowledge, and codification of architectural forms. It takes into account the geometry of an object and its background which are fundamental elements for the survey.

During making up a general survey every complex architectonic element should be broken down in simple elements that will become description models. In order to make an effective survey it is important to start from the morphology of the object. Each morphology needs a different survey strategy. In structuring from motion is important to associate each geometrical model with a specific procedure in photo taking. The photos need to have different points of view of the object; the position of the camera is always the best to be able to collect all the available information on the space relations between a monument and its surroundings as well its illumination and other factors. All these help to overcome the drawbacks of conventional systems, namely insufficient completeness of the necessary data, their low reliability, as well as inability to recreate the object in the case of its full or partial loss.

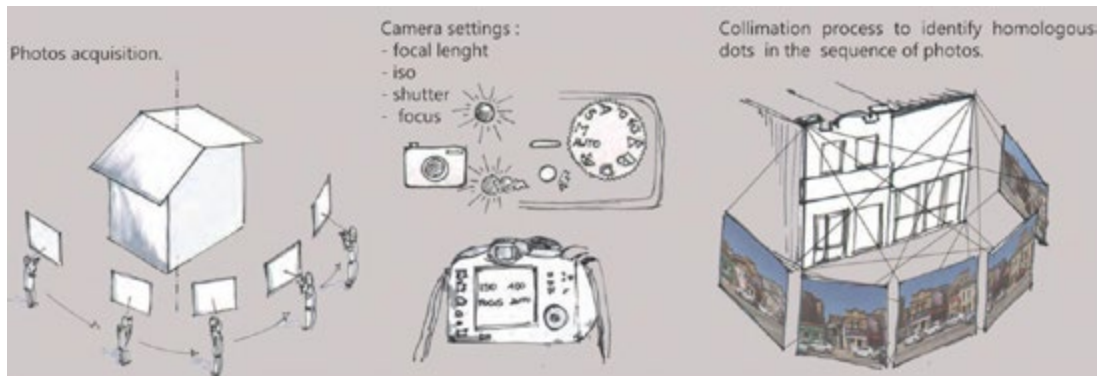


Figure 5 - Stages of digital surveying

The transformations that Samara has suffered over the centuries are still visible today along the streets of downtown, much more than the streets of many of those historical neighborhoods that were less affected by construction of the twentieth and twenty-first century. The lack of adequate citywide planning involved the uncontrolled appearance of contemporary multifunctional buildings with disproportionate size, completely out of scale compared to the skyline of the city, adding to the progressive loss of identity of the place.

Although the old town seems unscathed from these operations of transformation, the new urban views that are taking shape are witnessing an uncontrolled new building process, which will eventually affect even mains of the old town and the traces of its glorious past. Preserving the memory of what is the architectural and cultural heritage of the cities in which we live is an ethical and moral duty of every citizen and especially of those who, for one reason or another, has had the opportunity to get in touch with a reality as singular as fascinating as the one represented by the city of Samara. Many have tried to catalog what is the architectural heritage of the city, and many operations have been made in order to record its most famous monuments and buildings, from the most ancient made entirely of wood to the modern concrete buildings of the Soviet period, striking examples of brilliant past of which the city has witnessed. Many buildings, as already mentioned, are in poor condition, often to the point of structural stability, abandoned for too long and, therefore, excluded from any list of priorities for their maintenance. With the exception of some sporadic cases, most of the historic structures belonging to different architectural periods and styles are definitely recoverable, even if at first glance appear as dilapidated buildings, abandoned to themselves and deprived of the intrinsic value that helps defining a urban image quality. But, beyond the catalog, which is a fundamental operation to the complete documentation of the historical heritage, it's also necessary to set a task of enhancement of the relations between these buildings, the intangible value that they bring with them and the weight that take on the collective imagination.



Figure 6 - Replacing “historical” buildings with “modern” ones

Evaluating the intangible aspect of a place is far from a trivial purpose, since the image of a system such as that of a city is not given only by the sum of its components. In this historic images, photographs, vintage postcards and original documents jointly contribute to preservation of the memory of the cultural and historical heritage, of the changes and they can explain how the alterations have affected the success of the consideration that we have today the same monuments. The contrast or the harmony between elements of the same heterogeneous system generates a dynamic dialogue, capable of triggering more relational states within which no involved part is expendable because everything finds a definition only if analyzed as a whole. Each element of the urban system tells its own story, from who lived there to its construction technology, its stylistic and functional transformation, and how you can change the assignment of the value depending on the era that crossed. Even an urban void is able to tell his story, and like a building it deserves to be part of the documentation process to give the city a historical and architectural dignity of all the elements of its history. Only through an operation of documentation, analysis and knowledge it will be possible to gain a greater awareness of the phenomena that affect the urban space. Enhancing those apparently invisible traces of history and proposing design solutions less invasive and more integrated with the environment are necessary to build the relationship between citizen and the city at the base of the notions of belonging and living in a place.

References

- Balzannikova (2011). Bal'zannikova E.M., Gradostroitel'noe formirovanie Samary i razvitie promyshlennosti goroda v kontse XIX - nachale XX v. [The formation of the city of Samara and its industrial development at the turn of the XX century] // Vestnik SGASU. Gradostroitel'stvo i arkhitektura. No 1. pp. 44-48.
- Vavilonskaya (2009) Vavilonskaya T.V. Zadachi sistemnogo planirovaniya v usloviyakh arkhitekturno-istoricheskoy sredy [Systematic townplanning in the historical architectural environment] // Vestnik MGSU. No 2. pp. 14-17.
- Lukenyuk et al (2008) Lukenyuk E.V., Lukenyuk A.I., Bal'zannikov M.I. Ekologicheskaya sistema sbora informatsii o sostoyanii regiona [Ecological System of Environmental Information Collection] // Patent RF na poleznuyu model' 70026. Opubl. 10.01.2008. Byul. 1.
- Kleymenova et al (2012) Kleymenova E.F., Bal'zannikov M.I., Tiranin V.E. Sistema sbora informatsii // Patent RF na poleznuyu model' 117688. Opubl. 27.06.2012.
- Picchio (2016) Picchio F. Samara e il suo paesaggio urbano. Metodologie di analisi e acquisizione dello spazio pubblico [Samara and its urban landscape. Methodologies of analysis and acquisition of the public space]. - Edizioni Firenze (Edifir), 2016. 216 p.

EMPOWER LOCAL IDENTITIES THROUGH TECHNOLOGY

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Abstract

CoopCulture is one of the largest cultural companies working in the field of cultural heritage in Italy and its core business is strictly linked to the promotion and the access of cultural heritage through specialized services' systems and new storytellings.

Over the last 15 years CoopCulture has designed and implemented digital platforms for the promotion and commercialization of territories; augmented reality systems with detailed and scientific reconstructions of well known archeological areas; apps and games aimed to attract visitors to culture in a less traditional and more friendly way.

We have approached every single project aiming to engage people, by widening audiences and enriching cultural experiences, and give power to heritage and territories and, therefore, to the extraordinary widespread heritage disseminated all around Italy.

From our point of view, this should be the aim of technology applied to culture: empower local identities despite of the modern race to globalization.

Keywords: Identities, Territories, Empowerment

1. Introduction

In Italy the management of cultural heritage owned by the Ministry of Cultural Heritage and Tourism is more often ruled by private identities who work on behalf of the Government through specific calls for bid.

In this Italian context, CoopCulture stands out to be the largest cooperative company working in the field of cultural heritage and its core business is strictly linked to the promotion and the access of cultural heritage through specialized services' systems and new storytellings.

CoopCulture works in almost every region of the country, managing 250 cultural sites including some of Italian main landmarks -such as the Colosseum in Rome or the archaeological park of Pompeii- and many less known cultural sites and areas historically and artistically very rich.

CoopCulture offers work position to more than 1200 employees who welcome about 12 millions visitors per year, that benefit of multiple cultural products designed and implemented by the Research & Development division.

As one of the leading companies of the cultural scenario in Italy, it has been all over the last twenty years that CoopCulture has started facing the challenge about audience development and, more recently, about audience development and engagement through technologies applied to culture.

Before going to the very heart of the contribute it is useful here to remind what the European Commission means by "audience development", as one of the new priorities of Creative Europe. According to the EC: "Audience Development is a strategic, dynamic and interactive process of making the arts widely accessible. It aims at engaging individuals and communities in experiencing, enjoying, participating in and valuing the arts through various means available today for cultural operators".

Audience development can be therefore understood in various ways, depending on its aims:

- 1.1 widening audiences (attracting audiences with the same social profile as the current audience)
- 1.2 deepening relationship with the audiences (enhancing the experience of the current audiences)
- 1.3 diversifying audiences (attracting people with a different social profile, including people with no previous contact with culture).

The concept of deepening relations, diversifying audiences, engaging the so- called *new users* has recently been stressed through the powerful raid of the new technological paradigm and the digital revolution which have fully and deeply modified the access and the distribution of cultural products despite of social and economical barriers.

Digital technologies are effecting every aspect of our society, economy and culture. Arts and cultural organisations can now connect with the public in new ways, bringing them into a closer relationship with culture and creating new ways for them to take part. That is why it is so important to exploit the impacts of the digital shift on audience development policies in order to address them properly and maximize those impacts from a quantitative and qualitative point of view.

2. Coopculture's Process to Audience Development

As careful observer of the changing of time and paradigms within the cultural sector, CoopCulture has accompanied and supported such revolution step by step, introducing and offering instruments and technological devices able to explore new audiences and enrich people's cultural experiences.

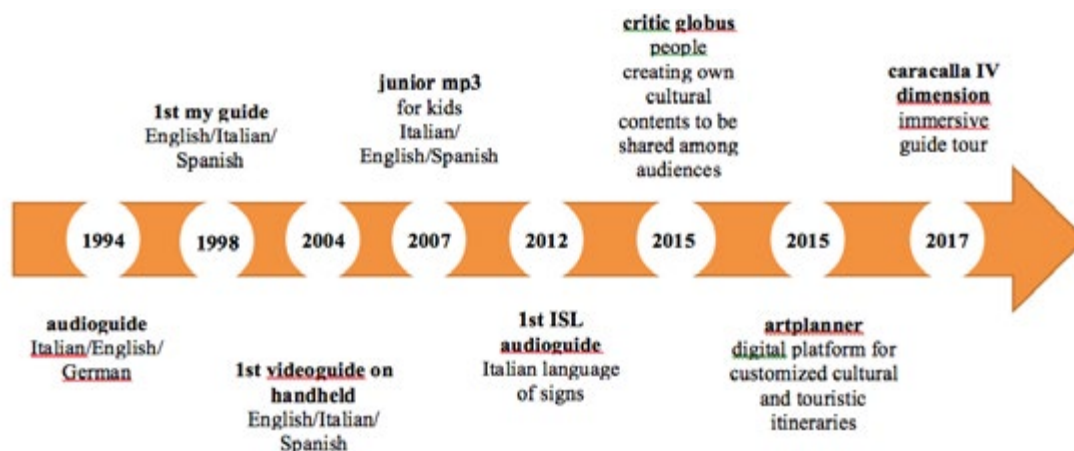


Figure 1 - Coopculture's way to audience development and engagement.

From the '90s till up today, all around Italy our audiences (coming from different countries, speaking different languages, belonging to different age ranges, disadvantaged or not) have been able to count on several technological tools: from the audio and video guides, which started supporting guide tours at the end of the last century, to the first MP3's for kids and the first audioguide based on the Italian language of signs. Later on, our researches for new ways of engaging people have brought us, first, in 2015, to the experience of the *Critic Globus*, a big egg placed at the second stair of the Colosseum, which visitors entered in order to record own evaluations about the Earth "mother of life", main topic of a linked temporary exhibitions; then, in the same year, to analyze users' needs while travelling within territories in order to design the *ArtPlanner*, a digital platform dedicated to local areas and overspread heritage and to those temporary citizens who want to explore and experience different cultural life styles by customizing their own itineraries; to *Caracalla IV Dimension* in 2017, a headset housing a mobile phone and dedicated software, which allows visitors to explore, in virtual reality, the ancient Baths of Caracalla in Rome as they really looked like in 216 AD.

The fil rouge that combines all our efforts is made of many elements CoopCulture has deeply cared about:

- users' social and cultural growth, which can be supported nowadays through new languages and smart technologies;
- visitors' emotional engagement through the sharing of digital cultural contents that enrich their cultural experience and maximize their learning experience;
- the importance of the relationship among users, cultural heritage and territories, in order to shift the paradigm from
- the traditional cultural tour to a new tourism made of sensorial and authentic experiences;
- a proper application of technologies to culture which must enrich visit experiences (without substituting them) and be instruments able to give evidence to cultural identities and less known local itineraries within territories.

Our attention on people, culture and territories in the light of the 21st century technological revolution let us often talk about a "Digital Humanism", able to put in deep connection digital and humanist know hows and backgrounds to build an Italian way to Culture within the cultural European workframe.

CoopCulture has applied the concept of Digital Humanism while developing two main tools above all, which give full evidence to those principles and values that stay at the heart of our work: the ArtPlanner platform and the Caracalla IV dimension.

3. Artplanner

The idea of a digital platform dedicated to territorial cultural itineraries was born reflecting on:

- the composition of the Italian cultural heritage, which is made for the 95% by the so called widespread heritage;
- the fragmentation of the ownership (and therefore of the administration) of cultural heritage within same areas;
- the difficulty for so many small cultural entities to sustain training, investments and new technologies needed to promote cultural sites.

The deep connections built within the cooperative context (1600 cooperative companies and 73.000 members belonging to

the Legacoop system) in so many local areas of our country let CoopCulture give evidence to the European strategies about participatory approaches and social innovation in culture (Horizon call CULT- COOP- 06- 2017) through the development of a digital platform dedicated to: visitors, who can enjoy a tool that highlights the attractions of the area and help them to make the most of it by customizing own trips and journeys; small cooperatives as parts of local productive chains, who can share the know how and the experience of CoopCulture by enriching the platform with own cultural contents (events, handicraft, special tours,..); to territories which can finally show their cultural and touristic richness without being overshadowed through big attractors.

ArtPlanner allows visitors to: find info about place to visit, artworks, services, events, typical products;

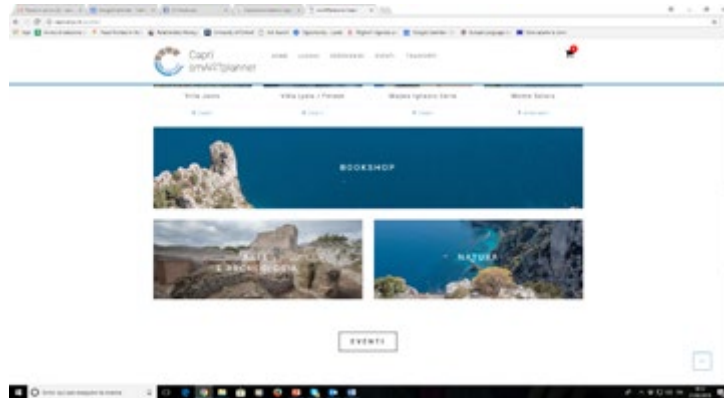


Figure 2 - SmArtPlanner

choose the cultural sites that will compose the customized itineraries according to tours' timetable and specific interests;

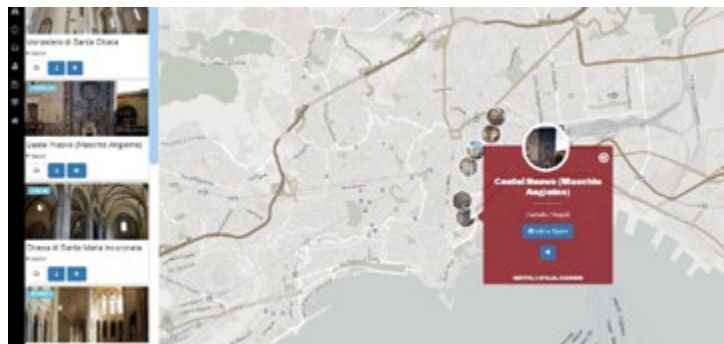


Figure 3 - Giotto ArtPlanner- the map of the georeferenced itinerary

visualize on the webmap the itinerary tourist has built, enriched through estimated travel timings; read the textual info and listen to audio contents;

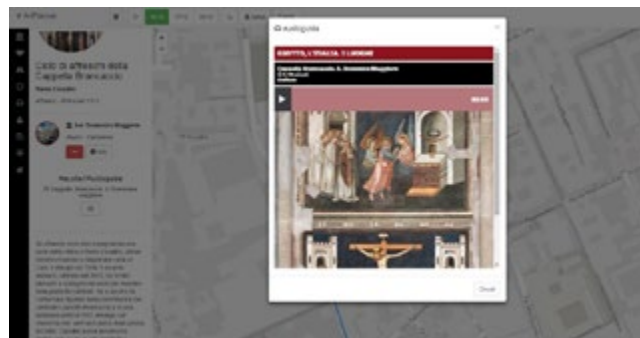


Figure 4 - Giotto ArtPlanner- the audioguide to download and listen to.

create customized guide and buy all entrance tickets related to the sites composing the chosen itinerary.



Figure 5 - SmArtPlanner Capri- shopping on line

And it can be used through various channels: kiosks, mobile devices, personal computers and self printed guides.

ArtPlanner combines technological and social innovation since it gives power to territories, local identities and stakeholders through one of the latest generation technological applications.

4. Caracalla IV Dimension

On the 19th December 2017 the Baths of Caracalla became the **very first large archaeological site in Italy that can be toured entirely in 3D**. Virtual reality allows visitors to see the Baths as they looked like in 216 AD, when they had opened.

The project, sponsored by the Special Superintendence of Rome and CoopCulture, helps visitors make sense of and understand the spectacular remains of the Baths built by the emperors of the Severan dynasty, based on a continuous comparison between physical and virtual reality, past and present.

The technology features a headset housing a latest-generation mobile phone and dedicated software. The entire set-up, controlled by means of a single button, can reproduce the appearance of the monument in ancient times wherever the user gazes, thanks to a georeferencing system, providing an **immersive experience** over the entire visual field. The headsets can be hired at the entrance during normal opening hours.



Figure 6 - How to use the headset at the Baths of Caracalla.

The tour, featuring ten areas, six of which can be appreciated in virtual reality, is based on a historically accurate reconstruction of the bath complex, based on the research work and studies carried out over the last thirty years by the monument's General Direction. The National Research Council gave his technical contribute to the project.

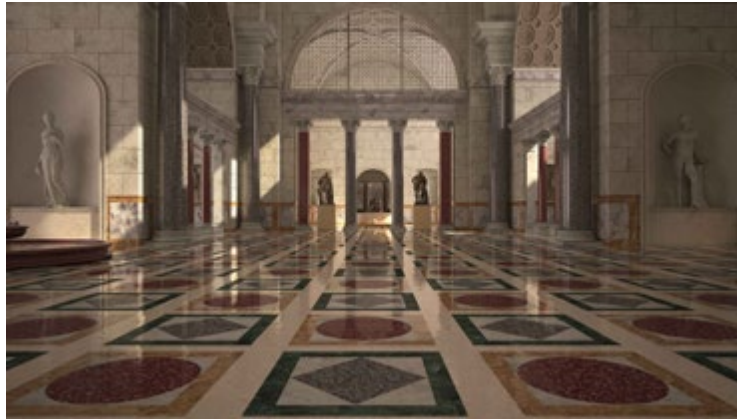


Figure 7 - The Frigidarium as it looked like in 216 AD.



Figure 8 - The Natatio as it looked like in 216 AD.

The digital reconstruction features real images of statues and decorations preserved and displayed today in a number of different locations, such as the Archaeological Museum of Naples and the Royal Palace of Caserta, which have collaborated in the project, and Piazza Farnese in Rome, so to let artworks finally rejoin places and territories they had originally placed in.



Figure 9 - The Toro Farnese statue as it situated nowadays at the National Archeological Museum in Naples and as it was placed in 216 AD at the Baths of Caracalla.

Caracalla IV Dimension combines together artworks and cultural sites with territories and cultural identities, working strongly on audience development and engagement through innovative languages and emotional experiences.

5. Conclusions

In 2017 Italian museums have welcome over fifty millions of visitors, with a percentage increase of 10% towards 2016. Tourists are not lacking at all.

That is why, in our country, despite of feeding globalization on traditional destinations, we need actually to lighten the big attractors by strongly focusing on the widespread heritage which must be supported in order to be visited and appreciated.

CoopCulture is strongly working on this way through the designing and the implementation of new digital technologies aimed to redefine the identity of territories by giving evidence to and putting in relation local features and peculiarities for a new cultural awareness; support visitors' access to culture through instruments which aren't just playful ways to experience culture but tools able to engage different audiences towards powerful cognitive goals.

This is the challenge CoopCulture decided to face and to win. This must be the Italian challenge for 2018 European Year of Heritage.

SMART QUARTER PALE ROYAL OF ODESSA. INTERNATIONAL EXPERIENCE OF RESEARCH AND DOCUMENTATION USING INNOVATIVE LASER SCANNING TECHNOLOGIES

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Abstract

The aim of the international scientific seminar was to develop a dynamic approach to determining the image and history of the quarter Pale Royal, assessing the role of the place in the urban system, using drawing techniques and methods for quantifying the architectural system. An interdisciplinary approach contributes to the objective assessment of the environment changes. First of all, sketches were made for the complex perception of the all elements of the quarter. Determination of spatial characteristics of all elements of the quarter, buildings was carried out on the basis of laser scanning technology. A single scan object (a cloud of points) contained millions of individual points representing the surfaces of facades and other objects. The development of thematic atlases, the systematization of all features and specific characteristics of the historical center, can become the basis for urban development legislation, regulation of this historical environment in its socio-economic aspects.

Keywords: quarter Pale Royal, research and documentation, laser scanning technology

*The situation, climate, distance from the central government (the air of freedom),
mercantile marriage of the Black Sea with black earth, supply and demand, ethnically motley,
energetic population, reasonable administrators - all this coincided.
All this together has given that you can not repeat or simulate - the Odessa phenomenon.
Patricia Herlichy (1987)*

1. The potential of international cooperation in the field of education and research heritage

The Charter UNESCO/UIA (International Union of Architects) for Architectural Education noted that the methods of education of architects are diverse, and this constitutes a cultural wealth that must be preserved (Charter UNESCO/UIA, 2011). The long-term cooperation of the Odessa Academy with the Romualdo del Bianco Foundation and the University of Florence is a real integration in the development of projects under the auspices of UNESCO (rehabilitation of the San Gimignano Monastery, the concept of the Cinque Terre Park), numerous scientific conferences, Degree & Profession festivals, workshops in Florence and Odessa. Thanks to international cooperation, Odessa students have the opportunity not only to get acquainted with the experience of organizing European architectural education, but also to become participants in the process of implementing the provisions of the Bologna Declaration. Joint development of specific urgent social problems and projects contributes to the study of the anatomy of social and professional situations and gaining experience of their experiences and solutions. The main objective of the international scientific seminar of the two architectural schools of Odessa and Florence was the study of the potential, the genetic code of the unique polis culture of Odessa, in particular, the public cultural district of Pale Royal and the Theater Square (Parrinello et al. 2015). The architectural and spatial environment of the historic city is part of the cultural heritage, a carrier of information, which reflects the diversity of all stages of the development of its cultural content.

2. Quarter of the Pale Royal. Story in pictures

The condition of successive development, the sustainability of the whole is a continuous communication between the present, past and future. The principle of continuity is the best tool to explore reality. It is sometimes necessary to understand and evaluate objectively the logic of changes of the living environment - that of cultural (partly mental) and physical, as well as valorization of "smart" material and spatial systems. The birth of a new Polis named "Odessa" determined a number of objective (geo-strategic, economic, climatic) and subjective (complete professionalism, noospheric thinking of its founders) prerequisites (Yeksarova et al. 2016). At the first stage of the birth of Odessa (1794-1830) - the genetic code of the fate of the city was laid, the basis of its economic and cultural prosperity. The geographical location of the city determined the main destination of Odessa - the port city

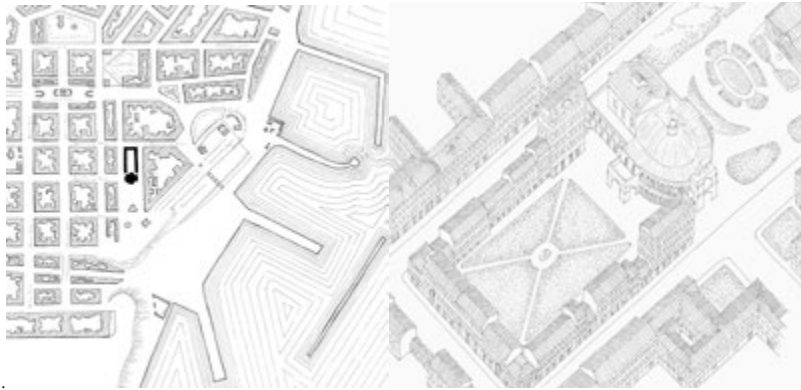


Figure 1 - The quarter Pale Royal - the first public and sacred centre of the Odessa

A series of events took place in the city to create and maintain a “live”, “bubbling” environment, designed for all national groups of residents and covering the entire city as much as possible. The city is a mirror in which every resident or guest is reflected in his attempts to create - as on the stage of the theater - his dreams and his own ambitions, desires. The author of the master plan of Odessa engineer F. de Volan predetermined the first public and sacred centre of the city (the theatre, aristocratic club, commercial casino, hotel, restaurant, quarter Pale Royal) - the analogue of an ancient forum. The central core of Odessa, with a global examination, is very rich in information. To understand it in all the complexity of micro-stories, it was necessary to conduct a preliminary selection and separation of topics of consideration. Considering the city as a cultural product, one should take into account its architectural shape, imaginative and artistic theme. The problem was the identification and preservation of values and psychological core culture. The study, systematization and preservation of traces of the past is the access to information about different moments of the history of the multilayered structure of the city. Starting the study of the Palais Royal quarter, the first sketches for a comprehensive perception of the panorama elements of the city were made. The facades of buildings - their random combinations, stylistic differences, the presence or absence of ornamentation - create a continuous play of contrasts and similarities that carry the historical memory and the individuality of the city. The beginning of sketching was preceded by the breakdown of the block into building units with their alphanumeric coding. The breakdown of the territory into macro-zones promotes faster cataloging of the elements. The first results are the identity of each unit. Drawing by hand provides the first cognitive approach and the first stage of control over the whole project. Drawing means defining boundaries, finding interpretations that order space. Drawings are not just pictures that describe the situation, they are reservoirs of information. Thus, students not only studied, they “lived” the space, trying to understand its dynamics, finding suitable species points.

3. Integrated research experience

The aim of the seminar was to develop a dynamic approach to determining the image and history of the quarter Pale Royal, assessing the role of the place in the urban system, using drawing techniques and methods for quantifying the architectural system. An interdisciplinary approach contributes to the objective assessment of the environment changes, as well as a holistic picture of the world. First of all, sketches were made for the complex perception of the elements that make up the panorama of the quarter. Thus, the program for assessing the historical setting is a preliminary stage of analysis and cataloging. The use of special digital technology allows the creation of a database for assessing structures in terms of their degree of safety and subsequent use.



Figure 2 - The first sketches

Carrying out such practical exercises, data processing, involves not only the analysis of documentation and a simple “reading” of the place. The study implies, in addition to a critical view of the object, the development and use of tools and methods to “see” the nature of the site, as well as the reassessment of space through specific actions, including virtual ones. The process of cataloging begins with watercolor sketches made on the spot. To create a color matrix, the façade painting was analyzed using the NCS (Natural Color System). Determination of spatial characteristics of all elements of the quarter, buildings was carried out on the basis of laser scanning technology (Bertocci and Parinello, 2015). A single scan object (a cloud of points) contained millions of individual points representing the surfaces of facades and other objects. This product was then interpreted using point cloud post-



Figure 3 - The watercolor sketches

processing software, for example, Cyclone from Leica Geosystems. On the point cloud from the previously used Cyclone program, the level is selected and assigned to UCS (the user coordinate system), with an orthogonal projection of this level. Thus, we get a two-dimensional image of the city’s facade, which will become part of the unfolding of the quarter. In order to import point clouds into the AutoCAD program, we use the plug-in for AutoCAD CloudWorx, with the UCS system pre-configured in Cyclone. The cloud of points remains an editable sub-base, on top of which the facade drawing is done through the “polishing” operation. To obtain a more accurate graphical representation of the facade, five different line thicknesses were used. Point clouds in the Cyclone program can be presented in shades of gray or on a scale of intensity. It is not enough simply to use a laser scanner to create a correct, reliable relief. The subsequent phase of creating a cloud of points is the most important, and it requires experience and a critical understanding of the whole project. The decoding of the elements and images opens the way to the historical reality that is still alive: the walls remember it and the stone from which the houses were built, the palaces of the quarter can be told about it. Detailed documentation of the historical center implies cataloging and creating an extensive database that can be applied in various fields and integrated into the legislative framework for the protection and preservation of the city center. The innovative aspect of this project, implemented by a competent international team, is the application of this methodology for the first time to analyze the main historical quarter of the city of Odessa. The main idea of the project is to create a special tool for studying urban areas. This tool reveals the specific characteristics of the urban image of the Palais Royal quarter, inseparable from the interrelationships that exist between each structure and the environment, also in the light of new interventions and changes.



Figure 4 - Point clouds in the Cyclone program



Figure 5 - The two-dimensional image of the city’s facade

Conclusions

International scientific cooperation, especially in conjunction with aspects of didactics and research, creates a fundamental opportunity for the development of critical thinking about the complex topic of understanding urban quality. Many of the beautiful historical palaces of Pale Royal have been demolished and rebuilt. This approach inexorably destroys the value of the city. Its walls store information about technology, historical memory not only in their symbolic or spiritual meaning. It is not just an outer shell of identity, but a lot of valuable information about the past, cultural variations that influenced the formation of the city, is a source of irreplaceable knowledge for thoughtful decisions for its further development. The development of thematic atlases, the systematization of all features and specific characteristics of the historical center, can become the basis for urban development legislation, regulation of this historical environment in its socio-economic aspects.

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References

- P. Herlichy (1987) *Odessa: A History, 1794-1914* (Harvard Series in Ukrainian Studies) Cambridge, MA: Harvard University Press, 1987, pp 440.
- Charter UNESCO/UIA for Architectural Education (2011), Electronic resource <http://www.uia-architectes.org/sites/default/files/charte-en.pdf>
- S. Parrinello, N.Yeksareva et al. (2015) **PALEROYAL ODESSA. Analisi per pianificazione e la documentazione dell'immagine urbana.** Firenze, Edifir, pp 219
- N. Yeksareva, V.Yeksarev, A.Dobrolubsky. (2016) Smart port city of Odessa. Brilliant embodiment of Vitruvius` theories of beauty. *Vitruvio: International Journal of Architectural Technology and Sustainability*, Vol 1, No 1 (2016), Universitat Politècnica de València, pp 1-10
- S. Bertocci, S. Parinello, (2015) *Digital Survey and Documentation of the Archaeological and Architectural Cities.* Unesco World Heritage List. Firenze, Edifur.

KOSCIUSZKO – WORLDWIDE ORIENTED DIALOGUE

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Abstract

The 200th anniversary of Kosciuszko's death, which fell on October 15, 2017, was an occasion for creating a special, international platform to share ideas on the unique cultural heritage and establish an intercultural dialogue for safeguarding both the ideas he advocated and the equally important material legacy associated with his life. It resulted in a number of values-oriented travels, rich in multicultural aspects, which can play a significant role in promoting the dialogue among cultures. Many sites in the US associated with the War of Independence have been recalled and visited quite often this year. They include the battlefields and fortifications, such as Fort Billingsport, Fort Mifflin, Fort Mercer, Ticonderoga which were crucial elements of the city's defense system. Important events celebrating the anniversary took place at West Point Military Academy, USA.

In Australia, the Bicentenary of Kosciuszko's Death were celebrated, among others, by a group of Poles centered around Kosciuszko Heritage Inc. Their activities were a huge success on an international scale, especially the multicultural dialogue between that Polish Community and the Ngarigo people was highly appreciated by local and Polish authorities.

Keywords: Kosciuszko, intercultural, dialogue, independence, defense

Introduction

Thaddeus Kosciuszko is a national hero of Poland and the USA as well as an honorary citizen of France. His memory is cherished on four continents. He is not a controversial figure so he unites people of different convictions making possible the creation of platforms for mutual understanding as well as intercultural and international dialogue. However, in order to understand such grandiloquent statements it is necessary to have some knowledge about his achievements. Below is a very brief summary.

2. USA

Wars of American independence were fought in the British colonies. The empire's subjects in North America went to war with the British army. In 1775, first shots were fired at Lexington and Concord. They initiated a regular fight for rights and liberties and from July 4, 1776, when the Americans announced the Declaration of Independence for the sovereignty of the proclaimed state. It is worth noting that the American colonies rebelled against the greatest world power which Great Britain was at the time.

In the autumn of 1775, Kosciuszko left for Paris. There he learned about the start of the American revolution. The French supported the colonists in their fight against Great Britain. When Kosciuszko heard about the first skirmishes at Lexington and Concord, he decided to back the fighting Americans as he shared their enlightenment ideals of human rights, freedom and anti-monarchy attitude.

Kosciuszko received information from America that they needed military engineers. Recruitment of European volunteers was the responsibility the Committee of Secret Correspondence and, first of all, Benjamin Franklin. Kosciuszko arrived in America in August, 1776, a month after the issuing of the Declaration of Independence of July 4. On finding out that the Congress resided in Philadelphia, he went there to offer his services to George Washington who was commander-in-chief to the Continental Army. On August 30, 1778, Kosciuszko was admitted by the Congress and referred to the War Department of the USA which assigned him to the construction of fortifications.

2.1. Philadelphia's protection

On the proclamation of the United States there was a real danger that the British fleet could attack important towns such as Philadelphia where the Continental Congress, then the most important authority of the revolutionary America, convened. Therefore its defense became a priority. Kosciuszko, who was among the first volunteers to arrive in the town, gave the Americans hope that they would hold the town in their hands as he had sufficient theoretical qualifications, albeit little experience in the field.

Philadelphia had no fortifications at the time, especially on the side of the Delaware River. Kosciuszko indicated this site for building a new, well-strengthened fort to defend the approach to the town. It was called Fort Mifflin also known as Fort Island Battery of Mud Island Fort (Daszynska J.A., 2017). Fort Mifflin aimed to protect Philadelphia on the side of Pennsylvania while the approach from New Jersey was to be safeguarded by Fort Mercer built on a high bank across the Delaware River.



Figure 1 – During American Revolution Fort Mifflin and Fort Mercer were intended to control the activity on the Delaware River. Fort Mifflin by S. Eastman, 1870.

However, Kosciuszko started with the construction of Fort Billingsport which was considered the most important of the three points of defense. It was also located on the Delaware River and built during the American Revolutionary War. Although not all of Kosciuszko's projects were implemented, he succeeded in fortifying the Delaware River. Palisades known as chevaux de frise were stuck in the riverbed hindering the progress of the British Navy and directing the ships to the places where they could be fired at from the river bank. They consisted of wooden planks tipped with iron rods and placed under water at a sharp angle so that they were not visible but could severely damage the ships sailing in. Kosciuszko installed 70 chevaux de frise. While building the fort he also devised defensive strategies. For him, it was a period when he put his theoretical knowledge into practice. For his service, he was commissioned a Colonel of Engineers in the Continental Army in 1776. The Congress gave him the right to give orders to all the officers and soldiers under his command and obliged them to obey his orders as an engineer.

The news about the fortifying of the most important town in the USA spread across America and Europe. Unfortunately, the fate of the revolution changed in the autumn of 1777. George Washington lost the battle of Brandywine making it possible for the British to capture Philadelphia. The forts failed to defend the city. Fort Billingsport was the first to fall and then the British entered Fort Mercer. Fort Mifflin was nearly completely razed to the ground as a result of bombarding.

In the spring of 1777, Kosciuszko was transferred to the Northern Army under the command of General Horatio Gates. At the time, he had a reputation of a renowned and experienced builder of fortifications so he was entrusted with the task of strengthening Fort Ticonderoga which was built on the border with Canada in the years 1755-1757 and was considered one of the largest in the USA. It was constructed by French military engineer Michel Chartier de Lotbinière. It was a stone stronghold which remained in the American hands at the beginning of the Revolutionary War but was also of great strategic significance to the British. It allowed efficient control of the waterway between Montreal and New York thus impeding British supplies. The strategic significance of the fort lay in its location as much as in its size.

Kosciuszko's plans and strategies were not implemented and the British captured the fort. Despite temporary failures, a decisive battle was fought and won by the Americans at Saratoga (Chrzanowski M., 2017) a few months later. Kosciuszko contributed to the victory by designing effective fortifications. Kosciuszko was praised for his courage, fervour and commitment as well as great engineering skill, military talent and a remarkable ability to properly assess the situation.



Figure 2 – Kosciuszko monument - Saratoga, N.Y.

On the site of the battle of Saratoga, National Historical Park was created in 1933. The complex includes some historic houses and many kilometers of walking routes provided with viewing platforms and boards with information about the historic events. There is also period furniture and weapons as well as people in historic costumes. A special attraction is the Boot Monument commemorating general Benedict Arnold. The organizers have created a unique atmosphere conducive to historic reflection thus attracting crowds of visitors. The place is interesting not only because of its historic value but also the beauty of the surrounding.

2.2. West Point

Another important fort in the American Revolutionary War is West Point. The construction site was chosen by George Washington himself who, together with the Congress, appointed Thaddeus Kosciuszko as its Chief engineer. In 1778, Kosciuszko designed fortifications with a very modern system of redoubts. General Washington considered West Point to be the most important strategic defensive object in the whole north American continent since the high hills over the bends of the Hudson river gave the American army total control of the river traffic during the revolutionary war. He also realized that the new state needed a military academy. When Thomas Jefferson became president, he signed a bill establishing the Military Academy which was opened on July 4, 1802. It is still believed in America that West Point owes its defensive value to Thaddeus Kosciuszko. In 1828, the United States Military Academy Corps founded a pedestal with an engraving of the name of Kosciuszko who was a general at the time. In 1913, Kosciuszko's statue was placed at the top.



Figure 3 – Remaining earthworks of Fort Clinton with Kosciuszko's Monument in background

Kosciuszko came to the United States for the second time in 1797 and received an enthusiastic welcome worthy of a national hero. It was also then that he established a long-lasting friendship with Thomas Jefferson. He returned to Europe after spending less than a year in the United States.

2.3. American monuments

There are two groups of monuments to Kosciuszko and events associated with him: American and Polish. The former includes nine objects memorializing Thaddeus Kosciuszko: the first is the best-known monument at West Point, then others in Chicago (1904), Washington (1910), Boston (1927). In 1975, a copy of the statue on Wawel Hill by Leonard Marconi and Antoni Popiel was placed in Detroit. Two monuments were made by the sculptor Gaetano Trentanove: in Milwaukee (1905) and Cleveland (1904). The last two are relatively new: in Philadelphia (1979) and St. Petersburg, Florida (1999).

The Polish diaspora in America has great merits in the fight for Poland's independence. An example of activities to propagate Poland's cause is the Monument to Kosciuszko erected in 1910 as a gift of Poland's National Congress to the American nation. It was placed in the northeast corner of Lafayette Park near the White House. Its author was Antoni Popiel, an outstanding Polish sculptor. Thaddeus Kosciuszko was presented as wearing the uniform of an American general and holding West Point fortification plans in his hand. The figures on the right side of the plinth, such as a scytheman, symbolize the battle of Raclawice while the figures on the left side refer to the battle of Saratoga. The gift aimed to draw US President Taft's attention to the issue of Poland's independence on the one hand and to encourage volunteers to fight for the country's independence, on the other.

In Chicago, the city with the largest Polish diaspora in the USA, the monument to Kosciuszko initially stood in Humboldt Park overlooking Lake Michigan and the city centre. It was funded by contributions from people, including a donation from I.J. Paderewski. The committee for the erection of the monument commissioned Polish sculptor Kazimierz Chodziński to make the statue of a bronze equestrian figure. The unveiling ceremony took place in 1904 and President Theodore Roosevelt's letter was read on the occasion. For many years the Polish diaspora had celebrated important anniversaries at the monument until it was removed in 1970.



Figure 4 –Kosciuszko was awarded the Cincinnati Order Medal by General George Washington

In 1978, the Polish National Association (PNA), the Polish Roman Catholic Union of America (PRCUA) and the Polish Women's Alliance of America (PWAA), caused the memorial to be transferred to the new site in East Solidarity Drive.

There are various stories behind the monuments which are worth mentioning. The statues in Cleveland Museum of Art and Milwaukee Kosciuszko Park were made by sculptor Gaetano Trentanove in 1904 and 1905, respectively. He was professor of sculpture at the Academy of Fine Arts in Florence. For many years, he travelled between the two continents – he had a studio in Italy and another one in the USA. As he had many commissions in America, he spent summers in Milwaukee making models of his sculptures which he took to Florence where he spent winters making their bronze casts or sculpting them in marble.

He made the first statue after a careful study of Kosciuszko's old portraits and pictures. He also produced its clay model. The statue was cast by Galli Brothers' foundry in Florence. The sculptor himself supervised the mounting of the seven-ton equestrian statue showing Kosciuszko as a victorious hero. The other statue depicts Kosciuszko on horseback and brandishing a sabre. It was also cast in Florence.

A relatively recent monument to Kosciuszko is the one by Marian Konieczny which was erected in Philadelphia in 1979. The idea of funding a monument originated in 1976 with Edward Gierek, general secretary of the party at the time, who planned it to be a Gift of the Polish Nation to the Americans on the bicentennial of the proclamation of the United States. M.Konieczny's design won a competition. The design was cast in bronze and handed to the American ambassador in Polish Parliament (Sejm). After some problems with the location of the statue, Philadelphia was finally chosen as the first capital of the USA and a city associated with Kosciuszko. The monument was situated near the cathedral. It was made in the author's studio and cast in Gliwice.

The last statue was erected in St.Petersburg, Florida in 1999. Following the approval of the city council it was situated in Pinellas Park. In the 1990s, the Polish diaspora in Florida numbered some 20 thousand people. Now the number of Americans of Polish heritage there has risen to 430 thousand. Hence the need to mark their presence. The statue was donated by the American Institute of Polish Culture whose members declared that the main reason for their existence was to familiarize Americans with the contribution of Poland and the Poles to the western world.

3. Australia

Although Kosciuszko had never been to Australia, the highest mountain in the continent was named after him. It is important to find out how the Australians, including the Aborigines, feel about the remote figure of Kosciuszko and the fact that their Mount was given his name. It seems that Kosciuszko's legacy promoting the ideals of freedom and equality is fundamental to preserving the Mount's name and making Kosciuszko popular in Australia.



Figure 5 – Kosciuszko Mountain in Australia

The mount itself was discovered and named by Polish traveler Pawel Edmund Strzelecki. The Poles consider it an excellent monument to Kosciuszko but the name has provoked controversy with the local tribes of Aborigines and state authorities alike. However, there is a group of remarkable Poles centered around Kosciuszko Heritage Inc. as well as some Aborigines who collaborated in order to commemorate the bicentennial of Thaddeus Kosciuszko's passing and the Kosciuszko Year under the UNESCO auspices.



Figure 6 – Kosciuszko festival 'Mound and Mt Kosciuszko', Cooma, 2010, dancers of Ngarigo tribe

The history of this international dialogue, focused on the promotion of Thaddeus Kosciuszko, a famous fighter for freedom in a broad sense of the word, dates back to the year 2007. It was then that a forum for a mutual dialogue was established with a view to breaking barriers and developing understanding. The common ground was mutual care for the Mount and its promotion on a larger scale. The collaboration between Poland and Australia was to be symbolized by Kosciuszko Mound in Krakow and Mount Kosciuszko in Australia so that *...it would not only be bringing closer the two Commander's monuments: Kosciuszko Mound and Mount Kosciuszko..., but itself (...) another important monument to Commander* (Kozek A. S., 2017).

The first meeting by Kosciuszko Mound and the first Kosciuszko festival 'Mound and Mt Kosciuszko' took place in Jindabyne and Cooma in April, 2001.

The festivals aimed to familiarize the Australians with the figures of Kosciuszko and Strzelecki as well as to establish friendly relations with the local Aborigine tribe of Ngarigo who are traditional custodians of the land where Mount Kosciuszko is located. Kosciuszko festivals were held annually until 2013. The program included quizzes of knowledge about Kosciuszko and Strzelecki as well as concerts of folk groups and individual artists from the Polish diaspora, Poland and even the USA, to mention pianist Roy Eaton enamoured with Chopin and Kosciuszko (Kozek A., Filip B., Karasiuk P., 2017).

4. Conclusion

Even two centuries after his passing, Thaddeus Kosciuszko is known to international community. His memory is traditionally cherished in Poland and helps to build bridges of national understanding across four continents. Large- and small- scale commemorative events were organized and included jubilees, conferences, issuing of publications. Kosciuszko-oriented dialogue is worth continuing so that the ideals of equality and freedom are further promoted and the somewhat forgotten fragments of general history are brought back to mind.

References

Daszyńska J.A. (2017), Kościuszko w walczącej Ameryce (Kosciuszko in American war) [in:] Tadeusz Kościuszko : historia, współczesność, przyszłość : relacje i zależności, (Thaddeus Kosciuszko: history, modernity, future: relations and interdependencies) ed. M. J. Żychowska. Published by Politechnika Krakowska , Kraków 2017, pp. 37-55.

Chrzanowski M. (2017), Przykład przestrzennej realizacji muzealnej w krajobrazie naturalnym (An example of a spatial museum exhibition in natural landscape) [in:] Tadeusz Kościuszko : historia, współczesność, przyszłość : relacje i zależności, red. M. J. Żychowska. Wydaw. Politechniki Krakowskiej, Kraków 2017 (Thaddeus Kosciuszko: history, modernity, future: relations and interdependencies) , ed. M. J. Żychowska, published by Politechnika Krakowska, Krakow 2017 pp. 181-189.

Hirsch D. (2002), Statue of Polish general ready for Williams Park, St. Petersburg Times, published May 1, 2002, retrieved: 5/02/2018, http://www.sptimes.com/2002/05/01/news_pf/SouthPinellas/Statue_of_Polish_gene.shtml.

Kozek A. S. (2017), Znana i mniej znana historia nazwy góry 'Mt Kosciuszko'(Well- and less known story behind the name of Mt Kosciuszko), mps., 2017, p.16.

Kozek A., Filip B., Karasiuk P., Festiwale Kościuszkowskie pod górą Kościuszki 2007 – 2013, (Kosciuszko Festivals by Mt Kosciuszko) katalog wystawy/exhibition catalogue, Wydawnictwo Politechniki Krakowskiej, /published by Politechnika Krakowska Kraków 2017.

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UP-TO-DATE PUBLIC OPEN SPACE IN INTERACTIVE HISTORICAL ENVIRONMENT: RIGA CITY CENTRE

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Abstract

City development in the 20th century has resulted in extension of the semantic boundaries of urban centres, while public open space within the medieval cores still maintain attractiveness. Increasing interest to cultural history and easy travel options result in growing number of visitors in historical sites.

In order to increase awareness in all the groups of users of urban environment up-to-date digital technologies take significant place. Recently several digital online tools have been developed in Riga, the capital city of Latvia and UNESCO World Heritage Site, to help various groups of users to be informed of the city and to promote active exchange of information.

The study summarizes the needs of the users of up-to-date urban environment and analyses their correspondence to the historical spatial system. Digital tools allowing different groups of users to better estimate the quality and promote use of the urban environment are characterized.

Keywords: heritage site, public open space, interactive tools, degraded structure, public involvement

1. Introduction

Although the 20th century transformations in the urban structure of the historical parts of many European cities have caused severe changes, the scale and the nature of the medieval space mostly has remained. The historic centres represent a strong sense of place and identity by the historic and cultural associations they provide. Historic cores attract different groups of people and have variety of users like workers, shoppers, tourists and people who lives in these areas (Tiesdell et. al., 1996). Also due to the location and to the traditional causes of decay, these areas are in risk of deterioration and physical destruction (Doratli, 2005). In line with the changing social and economic conditions through time historical urban centres often lose their attraction. However, the historical significance of the urban centres is the reason to promote development there and to improve these areas treating them as the main parts of cities.

The public space as significant element of the urban environment affects its quality, promotes social communication, keeps the signs of the origin and history of the site, creating identity of the place, and thus enhancing the sense of belonging to the place for the population. Increasing global concern regarding the essential value of those spaces has led to comprehension of diverse and multi-use public open space as indicator of liveable and well-used by population space. The question of provision and maintenance of the quality of public open space has climbed to the top of political and policy agendas in different cities. This increasing interest is the result of growing evidence of the importance of public open space with regard to the improvement of economic, social and environmental qualities (Carmona, 2010).

In up-to-date rapid-changing era, along with economic and technological development, the urban community is becoming a more and more important player in creating a high-quality environment, meaning that the demand for high-quality public open space is growing. In this regard planners and urban designers should have deeper understanding of users' needs; especially when intending to create a diverse and multi-use public open space.

With the ongoing changes in social lifestyle where one of the most evident indicators is the growing wish of the population to spend more time outdoors, open spaces need to provide higher quality to attract public. Not always this is met by the authorities in urban planning and development. There is a clear shift in the public's interest in using public spaces from being work-oriented to leisure and enjoyment related (Gehl, 2007). There is a new global trend in planning procedures which provides increased integration and a holistic institutional framework which means a shift towards integrated planning (Illsley et al, 2010). Recently there has been great concern for the changes in the nature of governance and the extent to which planning systems can cope with current worldwide challenges, such as sustainability and urbanization. Thus, both urban design and planning practice are playing a significant role in providing more liveable public open space which entices and encourages the public to choose to spend more of their spare time in these spaces (Gehl, 2007).

This research analyses the values of public open space from users' perspective in Riga Historic Centre focusing on public involvement in the process of identification, management and maintenance of the problematic places and buildings. The study estimates the role of the online digital tool developed by the city municipality in the current work of monitoring the quality of public open space.

2. Continuous Urban Development: public open space in the up-to-date historical city

Characterizing the relations between built-up and open spaces in the medieval towns Latvian architectural theorist Ivars Strautmanis has stressed the presence of clear link between the city centre (town hall with the town hall square) and a periphery that was spatially manifested both by the street



Figure 1 - Urban structure of the Riga Old Town is a characteristic medieval system of open spaces connected with narrow street network. Model of Regeneration project of Riga Old Town, 1983–2012. Photo U. Bratuškis.

network and by the character of the built-up development (Strautmanis, 1977) as the distinct feature of urban morphology, while architect and historian Andrejs Holcmanis illustrating the spatial framework of the medieval Riga Old Town, at present part of the Riga Historic Centre, the UNESCO World Heritage Site, has mentioned that the impact of various types of authorities on the city life through history may be most precisely observed by the city skyline (Holcmanis, 1992), where both the secular and spiritual powers have left distinct dominants, both in spatial and volumetric terms (Figure 1). The poles of the secular and spiritual powers in the urban structure are expressed as dominants of public open space – squares nearby the important buildings. Squares near the Town hall buildings and squares nearby churches were the first wider public open spaces, while the buildings in the streets linking them created “a unique syntagmatic system, based on the coherence of adjacent shapes” (Strautmanis, 1977). Diversifying functionally by time, separate areas obtained specific characteristics (Figure 1). “Quality public open space meets user needs for comfort, safety, enjoyment and meaning. Furthermore, they are accessible to all people who might wish to be there” (Francis, 2003).

Thus, in many European cities developed Cour d’Honneur, Parade Square or Market Square (Pozo). The syntagma changed, and, since functional diversification become more distinct, the public activities taking place in the open space became more and more intense. Due to the growing economic relations between cities and outskirts, the role of urban centres increased in a regional context (Briņķis, 2003), and this phenomenon is especially significant also nowadays, when constitutive part of the visitors of the city centres are non-residents of them.

3. Users facing environment as the paradigm of urban diversity

The number of visitors or participants of urban activities is becoming the determining factor characterizing the specifics of the event in the particular public open space. More significant the event is, more visitors are expected, thus, wider the public open space is needed. Consequently, the semantic role of the definite public open space in the overall public open space system nowadays is characterized by the intensity of ongoing social activities there.

Riga Old Town is the medieval part of the city centre, busy area of intensive multifunctional activities (Figure 2). Due to the attractivity of its urban landscape the public open space is used both on a daily basis and on special occasions there. Interests, expectations and needs of the various groups of users considerably vary, and one of the present challenges of the city is to meet them. As the consequence of the intensive use of the urban environment, is the attempt of the property owners to rise the competitiveness of their properties, also by means of new construction and repairs of the existing buildings. Due to that, Riga Old Town is one of the intensive areas of spatial transformations over the last fifty years, nevertheless of the fact that the overall area of the up-to-date Riga city centre several times exceed the area of the medieval town. Sustainability and quality of the changes like that depend on the place and role of existing and emerging structural elements in a common system in the contemporary context. Since the Old Town is one of the popular visiting places both of the inhabitants of Riga as well as the visitors, its attractiveness is determined not only by the considerable number of entertaining institutions, but also by the pleasant network of public open spaces, allowing people to choose the most suitable urban scale areas and places of public activities.

Riga Old Town is the registered abiding place to about 3000 permanent residents. This figure has been relatively stable with a

slight upward trend over the last decade – from 2851 residents in 2006 to 3265 in 2014 (Apkaimis, 2017). In consequence of the location in the city centre, compact and intensively used area, the living conditions show risks. About one half of the respondents in the survey on the quality of life in the historic centre of Riga indicated to the lack of the open space yards in their homes. As the most urgent improvements regarding the living environment, upgrade of the street furniture of the inner courtyards were mentioned (Rīgas dome, 2014). In terms of the high-density built-up environment and shortage of semi-private open space, the public open space is the only option to provide those functions that are usually expanded in wider areas in public, semi-public or semi-private spaces. In the Old Town, public open space is the only option for children playgrounds, recreation spaces for people of all ages, pet-walking and other specific activities related to residential functions.

A significant group – the Old Town users – is the school youth. At present there are two high schools in Old Town with more than 1.000 pupils together in 2017 (Rīgas dome, 2017). This group of users needs space for typical for them types of outdoor activities – playgrounds and sportsgrounds. There is no suitable open space in Old Town for that, thus these activities partly are to be implemented indoors.

Old Town contains also significant number of workplaces – more than 20`000 people (Apkaimis, 2017) work in this part of the city. Their usage of public open space mostly relates to getting to workplaces and return, as well as meeting the daily household needs – making purchases, visiting public utilities and credit institutions, etc. This group of users mainly is interested in faster and more convenient tracks and purposeful organization of traffic – pedestrian, cycling and car traffic. Same interests characterize also those Old Town public open space users, who daily cross this part of the city in transit.



Figure 2 - The Dome Square is the largest and the most diverse used public open space within the borders of Old Town.

Photo U. Bratuškins

A group of users having direct and important impact on the quality of Old Town public open space is entrepreneurs whose businesses relate to the provision of services, especially in the field of public catering. They are the most active converters of urban landscape, in particular in the warm season, when deploy of outdoor business units in addition to those indoors extend their services. It attracts visitors' attention and promotes the diverse use of the city environment. Nevertheless, the quality of the street furniture and amenities used for the business expansion does not always correspond to the criteria for high-quality design, the private initiatives from this group of users anyway present those driving forces that contribute to the dynamic layout and appearance change of public open space in Riga city centre.

Growing actor in the Old Town is the hospitality industry. Since the number of visitors coming to Riga increases from year to year (1.248.358 guests used the accommodation services in 2016 (Centrālā statistikas pārvalde [CSB], 2017), and the survey of visitors' interests in Riga show that over 65% of the respondents indicate the Old Town as the goal of their visit to Riga, the number of tourist accommodations grow accordingly there. Thus, in 2017, there were 78 hospitality service institutions with several thousands of beds in the Old Town. This expanding business sector is increasingly focusing around the city centre, and new and renovated hotel buildings are being opened mainly in and around Old Town.

The up-to-date city centre is the place where the urban life is the most intense (Melbergs, 1987; Gehl, 2001). However, the place for public activities is not the only functional priority of the public open space in Old Town. Different groups of users enjoy the historic city and each of them demands distinct public open space, that not always can be found within the borders of the Old Town.

4. Digital tools: the up-to-date means of communication and public involvement in the city management

Within the development of technologies, innovative solutions are needed to ensure public involvement in the actual processes of life, also in those of urban development. The innovation is always heavily influenced by a wide variety of impact factors that

the innovator cannot completely control and may not even be aware of in some cases. For instance, when developing a radical innovation, uncertainty becomes the determining factor of the system's future (Steiner, 2009).

Participatory approach as an organized process by which non-experts – users, residents, visitors, or stakeholders – work with planning and design experts to construct open space into valuable places can be creatively design-oriented, technically-oriented, or management and policy-oriented. It has the potential to help both leaders, experts, and users understand a place, engage cross-differences, and introduce design innovative, effective changes. Thus, the practices of participatory design vary and are complex. Goals change over time (White, 1996) and may be contradictory within and between individuals. “Participation builds the problem-solving capacity of the public to tackle future problems, but usually only if the participants are there voluntarily, and are supported in their efforts to contribute (through learning new skills, and improving their competence, or from social support – no fear of retribution by their involvement). It takes time and commitment to cultivate a collaborative mindset” (Kaner et al, 2007).

Considering that most of the buildings in the city historic centre have been built a long time ago and their age has been measured for tens or hundreds of years, their maintenance is often a major concern. If more attention is paid to the maintenance of cultural monuments, the aesthetic and technical condition of the background and auxiliary buildings often are problematic. To monitor the visual, aesthetical and technical condition of the buildings and opens space of the city and manage it, the Riga City Council with the support of the EU *URBACT III* project *REFILL* in 2015 developed a digital tool. Within two years of operation it has proved itself being a powerful instrument of control of the environmental quality and public involvement in the city management process.

The digital tool <http://grausti.riga.lv/> (Figure 3) aims at rising public activity in identification of environmentally degrading buildings in order to promote their arrangement. The main goals to achieve are:

- to promote exchange of experience and ideas for the arrangement of degraded territories and degraded structures;
- to share experience on the temporary use of empty buildings as an effective tool to prevent the emergence of slums and revitalize the degraded urban areas;
- to create a sustainable platform of collaboration between Riga and other European cities.

The digital tool widely welcomes public activity in identifying the problematic properties. In total, from the opening of the tool the webpage has had more than 107 000 visitors, and about 130 signals were registered about the degrading objects in 2015. At present, 1251 problematic objects are registered in the digital tool, of which 542 are considered environmentally degrading, 143 are appointed for supervision, and 566 are subject to evaluation. Of the problematic sites around 200 are located in the territory of the historical centre of Riga, and about 200 in its protection zone (Rīgas domes Īpašuma departaments, 2017).

For the consideration of issues related to problematic objects, a special 29-person large commission at Property Department of the Riga City Council – the leading authority in the field of degrading building management within the administrative territory of the Riga Municipality has been established – consisting of architects, officials and administrators of various municipal institutions in Riga and representatives from the non-governmental organizations. One of the tasks of the Property Department is to organize and ensure the maintenance of real estate in unsatisfactory technical condition or creating damage to urban landscape, including demolition and other coercive measures if necessary.

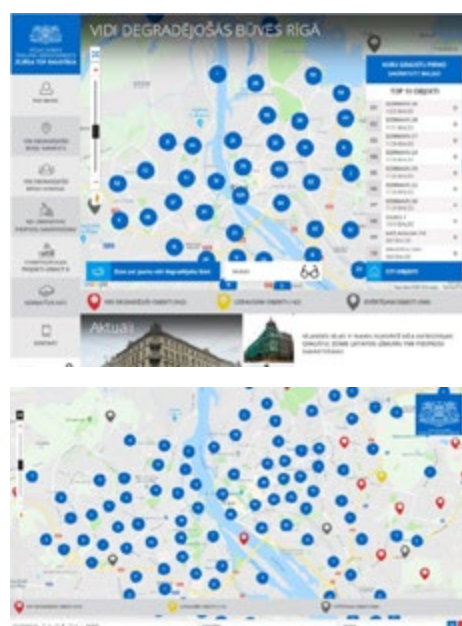


Figure 3 - The digital tool allows to visualize the overall situation with the problematic objects in the city as well as to communicate online and get actual detailed information. Screenshot form <http://grausti.riga.lv/>

In cases where real estate presents a danger to public safety or permanently degrades the urban environment, the Property Department initiates the coercive adjustment of it at the expense of the property owner. In 2016, the commission examined in total 325 cases, of which 211 applied the incentive instruments for adjustment of the property, including, the increase of the real estate tax rate, while in 114 cases recognized the property being arranged and repealed the previously determined sanctions. For better evaluation of the results of the implementation of the digital tool and work of the Commission of the Environmentally degraded structures there follow the figures characterizing the activities in 2015:

in total 21 meeting was held of the Commission, including two external meetings;

422 cases were considered;

in 8 sites the Commission initiated the coercive adjustment of the properties;

in 229 cases it was decided to apply the increased real estate tax rate (3%);

in 94 cases the former decisions of the Commission were appealed.

Since the introduction of the digital tool, the overall situation in property maintenance has improved considerably – if in 2011 there were registered only 16 arranged formerly problematic properties, then in 2015 their number reached 141. The digital tool is linked to topical international social networks – *twitter*, *facebook*, *google*, as well as to the local social network *draugiem.lv*, providing wide public access to the Riga city management issues.

5. Conclusions

Nevertheless, of the changes caused by time in the urban structure and built environment in the historical city centres, their present liveability strongly depends on the visual diversity and multi-functionality of usage of the public open space. Development of the smart technologies promote new challenges in maintenance and management of the public open space, including intensive public involvement in the actual processes.

Since the public interest in spending leisure time in Riga city centre is growing, the intensity of usage of public open recreation space in the Old Town is increasing, too. Recreational activities tend to expand, and they attract more and more visitors to the public open space. Due to more pleasant spatial conditions, public activities more intensively prefer taking place in spatially closed areas. Thus, the visual and technical quality of the foreplan of the built environment becomes one of the most important issues in the overall estimated by the population spatial quality of the site.

The needs of the permanent residents in terms of a comprehensive service quality cannot be met within the framework of the present Old Town, therefore they usually find leisure facilities outside the borders of the city centre. However, presence of permanent residents is an important condition in terms of the urban liveability, thus the needs of this group of users of urban space are to be, as far as possible, respected and implemented in the planning process and practice.

The experience with the digital online tool focused on the quality monitoring of the public open space in Riga city centre shows the high interest and activity of both residents and visitors to participate in identification of the problematic objects that allows the municipality to take definite measures to promote arrangement of them thus improving the overall condition of the quality of public open space.

References

- Briņķis, J. (2003) *Rajonu centru un pilsētu teritoriālās struktūras un to tieces lauki*, in “RTU zinātniskie raksti: Arhitektūra un būvzinātne”, Rīga: RTU, 2003, pp. 23–27.
- Carmona, M. (2010) *Contemporary Public Space: Critique and Classification. Part One: Critique*, in “Journal of Urban Design”, 15(1), Routledge, 2010, pp. 123–148.
- Doratli, N. (2005) *Revitalizing Historic Urban Quarters: A Model for Determining the Most Relevant Strategic Approach*, in “European Planning Studies”, vol. 13, no. 5, Taylor & Francis, 2005, pp. 749–772.
- Francis, M. (2003) *Land and Community Design Case Study Series: Urban Open Space, Designing for User Needs*, Washington: Island Press, 2003, 96 p.
- Gehl, J. (2001) *Life Between Buildings: Using Public Space*, Copenhagen: Arkitektens Forlag, 2001, 202 p.
- Gehl, J. (2007) *Public Spaces for a Changing Public Life*.
- Holcmanis, A. (1992) *Vecrīga – pilsēt būvniecības ansamblis*. Rīga: Zinātne, 1992, pp. 256.
- ledzīvotāju aptauja par dzīves kvalitāti Rīgas vēsturiskajā centrā un tā aizsardzības zonā [online].

- Vecpilsēta [cited 10.11.2017]. http://www.sus.lv/sites/default/files/media/faili/rvc_az_atskaite_vecpilseta_29102014_2.pdf.
- Illsley, B., Jackson, T., Curry, J. and Rapaport, E. (2010) *Community Innovation in the Soft Spaces of Planning*, in "International Planning Studies", 15: 4, Taylor & Francis, 2010, pp. 303–319
- Kaner, S., Michael, D., Lenny, L. and Toldi, C. (2007) *Facilitator's guide to participatory decision-making*. San Francisco: Jossey-Bass.
- Melbergs, G. (1987) *Dažas Rīgas centra rekonstrukcijas problēmas*, in "Latvijas PSR arhitektūra un pilsētībūvniecība", Rīga, 1987, pp. 86–100.
- Pozo, A. G. *Public Open Spaces: Flexibility of Their Uses in Historic and Vernacular Environments* [online, cited 10.11.2017]. https://www.icomos.org/monumentum/vol18-19/vol18-19_18.pdf.
- Rīgas Centra daiļamatniecības pamatskola [online]. *Rīgas Domes izglītības, kultūras un sporta departaments* [cited 10.11.2017]. <http://dati.e-skola.lv/lestade/CDAPS>
- Rīgas Valsts 3. ģimnāzija [online]. *Rīgas Domes izglītības, kultūras un sporta departaments* [cited 10.11.2017]. <http://dati.e-skola.lv/lestade/RV3G>
- Roze, A. (2002) *Pilsētas publiskā telpa*, in "Latvijas Arhitektūra". 2002, Nr. 4 (42), 104 p.
- Statistika par iedzīvotāju skaitu Rīgas apkaimēs [online]. *Apkaimes* [cited 10.11.2017]. http://www.apkaimes.lv/stat/iedzivotaju_skaits/
- Statistika par nodarbinātību Rīgas apkaimēs [online]. *Apkaimes* [cited 10.11.2017]. <http://www.apkaimes.lv/stat/nodarbinatie/>
- Statistika par tūristu skaitu [online]. *Centrālā statistikas pārvalde* [cited 10.11.2017]. <http://www.csb.gov.lv/statistikas-temas/turisms-galvenie-raditaji-30321.html>
- Steiner, G. (2009) *The concept of open creativity: Collaborative creative problem-solving for innovation generation - a systems approach*, in "Journal of Business and Management" 15, no. 1, pp. 5–33.
- Strautmanis, I. (1977) *Dialogs ar telpu*. Rīga: Liesma, 1977, pp. 136.
- Tiesdell, S., Oc, T., Heath, T. (1996) *Revitalizing Historic Urban Quarters*. Oxford: Architectural Press.
- Vidi degradējošas būves Rīgā [online]. *Rīgas domes Īpašuma departaments* [cited 12.02.2018]. <http://grausti.riga.lv/lv/Refill/>
- Thompson, C. W., Travlou, P. (edi.) (2007) *Open Space: People Space*, Oxon: Taylor & Francis.
- Marcus, C., Francis, C. (1998) *People Places: Design Guidelines for Urban Open Space*, Part 4, second edition. New York: John Wiley and Sons Inc.
- Marshall, S. (2008) *Them and Us – Thinking of the User*, in "Urban Design and Planning", 161 (DP2), pp. 45–45.
- White, S. C. (1996) *Depoliticising development: The uses and abuses of participation*, in "Development in Practice" 6, no 1: (February) pp. 6–15.

100 ANNIVERSARY OF THE SAINT-PETERSBURG STATE UNIVERSITY OF CULTURE (SPBGIC, RUSSIAN FEDERATION - RF MINISTRY OF CULTURE) AND ITS PREMISES CONSERVATION STORY

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Abstract

In the given paper the focus is made on the case study of the Internet of things (IoT) - integration of contemporary information technology and the conservation way of the cultural heritage «saving identity not feeding globalization». The important topic of installing digital hardware facilities is discussed suggesting a solution using the example of an inscribed Russian Federation cultural heritage monument of the institution famous for its intercultural dialogue. Daily effort is required for the protection, conservation and enhancement of any monument in contemporary life conditions in the center of the 2nd largest city of the RF especially the premises of one of the biggest and significant cultural higher schools celebrating its 100 anniversary in 2018, the monument burdened by human activity.

Keywords: intercultural dialogue, conservation, heritage, IoT, identity

1. Introduction

1.1. General information

Saint-Petersburg State University of Culture celebrates its 100 anniversary in 2018. It is the oldest higher cultural school in the Russian Federation. The story of the building of the main administrative premises on Palace embankment, 2, next to Summer Gardens in the historic center of the city is interesting and dates back to XVIII century.

1.2. Landmark

Ivan Betskoy House (Palace), also called Palace of Prince Peter Georgievich of Oldenburg. The life story of the building is connected with culture, diplomacy, education. It is the best place to bring up the youth in the spirit of respect to cultural heritage and intercultural dialogue, to demonstrate how the heritage can «live», deliver, perform its mission in the contemporary society.



Figure 1 - Betskoy House. Neva Embankment near Summer Garden. 1820. Russia, Saint-Petersburg, Cultural Heritage of the Russian Federation site N°7810575000P Project Designers – Yu.M. Felten, J-B. Vallin de la Motte; Architectural Style – Classicism, built in 1784-1787.

2. Case Study

2.1. Intercultural dialogue facts from early history

The life story of the building is connected with culture, diplomacy, education. It is the place where Swiss Italian architect D. Trezzini built a small house for Peter the Great, where Tsar received applications from different parts of the Russian Empire and the world. In 1750 Italian architect B. Rastrelli built a theatre turned by Italians into the Opera House the first one in the Russian Empire.

2.2. Betskoy's period

Betskoy (from the Trubetskoys) being personal Catherine the Great private assistant, secretary and one of the most outstanding people of those times (see Fig. 2, 3) built his two-story palace on the Neva -



Figure 2 - Monument to Catherine the II nd / Great with Betskoy I.I. to the left from her



Figure 3 – I.I. Betskoy (1704-1795), public figure, president of the Imperial Academy of Arts (1763-1794), Smolny Institute, founder of the Russian State Pedagogical University

luxurious dwelling with towers and a hanging garden similar to the one in the Hermitage, collections of paintings, perfect furniture. Here Betskoy met outstanding Russians and Europeans like philosopher for example, D. Diderot, arranged regular parties for the pupils of the schools he patronized.

2.3. The Oldenburgs' period

Prince P. Oldenburg was the next owner of the building. He also became famous for his outstanding educational and charity projects. The musical salon here was the place where composers presented their new works – the center of Saint-Petersburg social life. A. Oldenbug went on sparing much time and money on charity and education. Between 1828 and 1855 the building was rented by the Austrian embassy, from 1863 till 1918 - by the British Embassy. In 1917 the owner sold the house to the Provisional Government. The Palace became the premises of the Ministry of Education.

All collections of art went to the Hermitage.

2.4. 1918-2018

According to the decree of November 2018 the government founded the new cultural institution which has become the basis of the first higher school of culture and arts in the Russian Federation and celebrates its 100 anniversary in 2018. It has a bright 100 years history with all the specifics of any cultural heritage site and monument in the RF (Sokolov 2016). Today it takes part in many home and international events, plays an important role for the society and for the youth education in the traditions of intercultural dialogue and preserving cultural heritage (Devel and Lisitsyn 2017). SPbGIC today has become a staff centre in the major annual cultural event of the Russian Federation Government – the International Saint-Petersburg Cultural Forum (33 thousand participants in 2017) with Rector A.S. Turgayev being the Head of the Section on Intangible Heritage. One of the biggest sections is on the Cultural Heritage Preservation, with its Head O. Ryzhkov – Deputy Minister of the Ministry of Culture (St.Petersburg 2017), where in 2017 much time was paid to the research work in the cultural heritage studies, to horse heritage – in particular to the Imperial Stallion of Alexandria estate near Petrodvorets and Saint-Petersburg, where the restoration work is carried out under the coordination of the Head of the SPbGIC Department of Cultural Studies, Conservation and Restoration P.G. Lisitsyn. This Department has chemical, underwater archeology laboratories, does research work on cooperative basis with St.Petersburg, the RF centres, having on staff experts on history of art, culture, philosophy, technical sciences.

SPbGIC building changed in the XIX th century - two more stories were added (architect I.E. Starov). The hanging garden, the towers were removed. The identity of the architectural monument has been preserved through its history. It is in general in a good shape with its square layout, thick masonry; the interiors are adapted to the contemporary educational needs. The conservation of the identity of a number of interiors have been paid due attention to to the best of available budgets (see Fig. 4, 5, 6).



Figure 4 - SPbGIC White Hall



Figure 5 - The Culture Studies Department interior, SPbGIC World culture school



Figure 6- The contemporary look of the SPbGIC building

2.5. Cultural heritage and Internet of Things - IoT

Cultural Heritage represents a worldwide resource of inestimable value, attracting millions of visitors every year to monuments, museums, exhibitions and historical centres. The relationship between cultural heritage and new pervasive technologies and services has always been complex, dialectical and often inspired by the human desire to induce these spaces not created for that purpose, to pursue technological trends, eventually offering to the end-users devices and innovative technologies that could become a "dead weight" during their cultural experiences.

The IoT paradigm applied to the cultural heritage domain is a novel concept integrating technology - intelligent objects, sensors, services and applications within static cultural places saving their identity. The objective is to transform these spaces into smart cultural heritage environments. The Internet of cultural things is an emerging discipline which aims to design a novel fruition, tutelage and promotion models of the cultural heritage in the worldwide.

SPbGIC is just an example as here there is no exclusiveness. The works which under discussion were carried out by SPbGIC IT Division which knows all the features of the building very well. We find it is good to have the works made by the local people at least to a certain extent not purely by contractors. They used the following principals “to do no harm”:

- The mainline is constructed in the “unpreserved” territories of the institution, like corridors, roof, courtyard façade.
- The communication line scheme is to be agreed upon accordingly with the Committee for State Control over the monuments and sites use.
- They take into account the parts of the premises or the premises which are under their control. For example, the ceiling can be on the list of the preserved elements but the rest – are not. That is why there are gaps – where either on the surfaces or spaces inside the elements to work.
- In more difficult cases part of the construction scheme is not fixed (acoustics systems, theatre light, microphones, projectors, notebooks and so on), but just joined and switched on/off on demand.
- The mainline is the basis for wireless network, which makes it possible to provide Internet access and working conditions for the educational process under more difficult situations with the help of portable gadgets.

Wi-fi zones in the basement are shown in red circles. Figure 8 shows the cable route on the first floor. In both cases one can see the installations are made from the side of the courtyard façade.

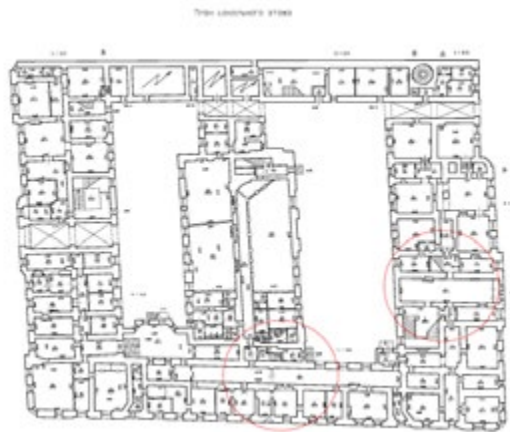


Figure 7 - Layout of the basement of the building with the indication of wi-fi zones in red circles

For example in 2011-2012 there were 2,5 km of fibre-optic lines. Since then the lines have become much longer. The library system is automated via RFID tags. It is not our purpose to describe the whole system of IoT in the given case. On the scheme in Figure 8 you can see room 214 – the Culture Studies Department, SPbGIC World culture school, the interior of which you can see in Figure 5. The purpose is to show an example how the identity is saved. Anyone can complaint and say there is much to be desired in terms of IoT. The march of progress. However the development of the Internet system can be obviously difficult for conservation reasons.

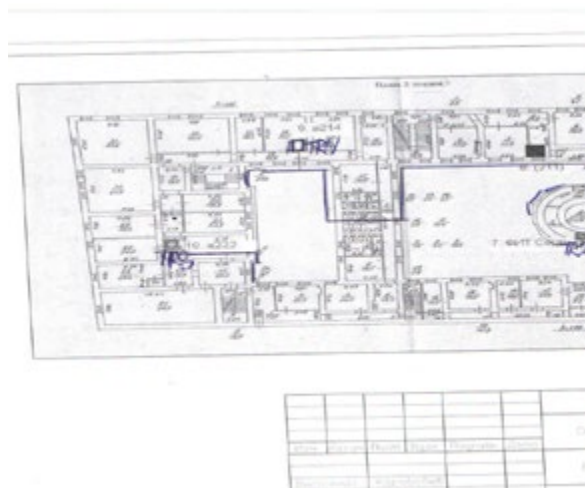


Figure 8 - The cable route (a fragment, see in black)

3. Conclusions

To propose and consider solutions, share experiences and exchange ideas on the information technology integration in the educational landmarks saving their identity - is quite important as one of the topical components of the cultural heritage studies matters (Paulo Del Bianco, 2011; De Guichen, 2013; Tampone, 2013; Perunov et al 2013). The role of scientific approach and significance of IT for our times is self-explanatory. Today we can certify the academic subject “cultural heritage studies” and Internet of things subject as a part of it. Specialisation of reviewing the situation is quite important too. The discussion about different ways of integration of various types of technology meeting contemporary requirements, the restoration, protection and maintenance of the architectural monuments of social significance can be very useful.

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References

Paulo Del Bianco (2011) *Cultural Heritage for Intercultural Dialogue with Life beyond Tourism®* in “The Image of Heritage. Changing Perception, Permanent Responsibilities”, Proceedings of the International Conference of the ICOMOS International Scientific Committee for the Theory and Philosophy of Conservation and Restoration (6-8 March 2009 Florence, Italy), ed. by Tomaszewsky, Polistampa, 2011, pp.37.

Tampone G. (2013) *Degrado de Materiali, Dissesto Delle Strutture. Opere Provisionali. Consolidamento* in “Dictionario Generale Del Restauro”/ id. E.Cura Fr. Gurrieri. Firenze: Mandragora, 2013, pp. 35.

Perunov A.S., Kunin Yu., Kotov V.I. (2013) *Restavrazia Pamyatnika Arkhitektury – zdaniya krugovogo parovoznogo depo [Restoration of the Round Locomotive Depot, A Moscow Landmark* in “Vestnik MGSU”, 2013, # 5, pp. 27. [Electronic resource]. URL:

<http://aupik.ru/restavraciya-po-italyanski-sekciya-soxranenie-kulturnogo-naslediya-provela-den-italii/> [18.02.2018]

Sokolov Y.V. (2016) *Sovremennoe ispolzovani pamiatnikov arkhitektury [Contemporary Use of Architectural Monuments] // Gumanitarnye nauchnye issledovania. 2016.# 7* [Electronic resource]. URL: <http://human.snauka.ru/2016/07/> [18.02.2018]

De Guichen G. (2013) *Scientists and the Preservation of Cultural Heritage* in “Science, Technology and European Cultural Heritage. Proceedings of the European Symposium” /ed. by Baer N.S., Sabbioni C., Sors A.I, Bologna, Italy, 13-16 June 1989. Oxford: Butterworth-Henemann, 2013. P.17.

Devel L.A., Lisitsyn P.G. (2017) *November, 2018 Florentine Mosaic Conference, Efficient Youth Intercultural Dialogue Workshop, Saint-Petersburg International Cultural Forum to the Benefit of the Planet We All Share* in Centro congressi al duomo Firenze Fondazione Romualdo Del Bianco. 2017. P. 86.

St.Petersburg International Cultural Forum 2017 [Electronic resource] URL: <http://www.visit-petersburg.ru/en/event/3136/> (18.02.2018)

DIGITAL TECHNOLOGIES IN PROVIDING ARCHEOLOGICAL SITES IDENTITY

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Abstract

Currently spatial references in an archaeological site indicate a variety of systems found in the theater thinking. This change is not related to the concept of place, as was seen by phenomenology, but to experience, innovation and unpredictable. The entire visible space should be sequenced depending on perceptive modalities, determined by processes of expansion, distortion or emphasis. New scenic forms follow the communication based on media technologies. Of these, hard technique refers to the building visible structural, meanwhile the soft one to electronic, immaterial systems. Numerous contextual examples reconfigure the importance of interaction between the two modalities. Integrated design represents how contemporary intervention in a cultural framework may offer a range of hierarchical media processes transforming static spaces of ruins, in interactive manifestations between the most diverse social groups.

Keywords: digital technologies, archaeological site, cultural identity

1. Archiving data

In archaeology, archiving the data represents one of the most important tool in researching a site. Most often, such a detection may prevent many problems caused by excavation. In this manner, the result of determining stratigraphic relations and site prospection maps, achieves the charts anomalies. One of the usual methods represents the site introspection, named also *periegesis*, which reveals land or vegetation surface diversity, for new archaeological sites discoveries. After the utilization of Earth first artificial satellite, from 1950 the photogrammetry became one of the basic instrument in the studies. These tools are recording information from the land surface through multispectral scanners (1, p.6)¹ and panchromatic photos. Based on the presence of various phosphates, carbonates or nitrates the soil indicates any dig-in, holes or channels that demand an excavation. The spectro-zonal aerial photogrammes reveal these chemical phenomena (1). Establishing the chromatic nature of a researched space may allow the identification of its archaeological potentiality. Mostly these non-destructive researches may offer a real detection of a possible archaeological site.

The study will propose a series of specific terms to different disciplines, aimed to understanding and correct interpretation of the theoretical content. To this purpose, it may examine: the introduction of scientific base, the evidence of the methodology and of the indicated disciplines and the report of various literature sources for a more complex acknowledgement. It can be considered only those archaeological sites which correspondes to the need to express a corporate identity in relation to the type of memory generated by it. In this regard, the monument is being associated to that type of representation that can keep alive a widely recognized signified. The archaeological museum represents a particular category, because of its location on site and its connection to it, presenting both as a outdoor trail and independent entity, formally defined. Transforming into a museum an historical space means transmitting to public a series of information about the site, putting it into value and preserving it. Beyond the principles of (post-)processuale archaeology, the stratigraphic method underlying the research will identify and systematize all the parameters of the context analysis.

Eduard C. Harris is the first archaeological researcher who found a method for the stratigraphic investigation. His surveys initiate from the entire area of the site Fig. 1. Previous researcher's theories (examples as Sir Mortimer Wheeler square analyses) decomposed the plan in various independent surfaces. It represents and functions as a unitary assembly, which uses the digital instruments as the basis of its prototype model. The end of this process concludes with a 3D computerized model. From the field data, he uses the horizontal and vertical sections of the whole complex. By this thinking, Harris eliminates the non-excavated zones, which result at the end of a traditional digging. Through the method he describes a diagram sequence of all relations presented in a layer, without including other research parameters as the geographical and the anthropological ones. By continuing, this approach represents the connection between the site, its limits and its mental possible reconstruction, in case of lost elements. A site analyses uses many geophysical data. Sometimes the prospection may encounter numerous problems due to excavation (3, p.6). The most known methods of analyzing of remains is that of radioactive carbon ¹⁴C, which establish the quantity of the chemical element in the composition of the deposit (4, pp. 443-446)², by comparing it with the one existing in the atmosphere of a certain historical period.

The close relations between humanities disciplines and the computerized ones, generate a new mechanism of analyses based not only on anthropological, historical and field research, but also on the introduction of digital theories, which seek “scientific” answers at issues related to the nature of dwelling. Generally, the tourist incurs difficulties while visiting well-known vestiges,

1 The multispectral images represents the source of color-composed photos, these type of instruments contain the digital recordings in realistic representations.

2 60 thousand years old represents the identified materials age until nowadays.

such as the Acropolis; in reconstruct mentally the antique representations. The present musealization process regard the reconstruction as a didactic modality by which the monument presents its original image, without destroying the existing remains. To create a good reproduction of art and architecture forms that otherwise would lose the communication strength represents the end of a research or of a site excavation. In these cases, the dialogue with the present, the re-configuration of the original form or the integration in a similar context as the historical one, is necessary. For historical building or statues reconstruction, it uses digital memory or convertors that present a hologram image around the object for a few seconds of time. The new formula, known as DAMP, the acronym from Digital/ Analogic Museum Project, produced by Modus Multimedia and applied initially to musical instruments museum where each object has its own sound. The Sistema Q442 produced by Laboratorio Museotecnico Goppion of Milan, during an exhibition from February 2011 represents a flexible, adaptable solution in the contemporary spaces for its industrial design. Interchangeable modules that may reach a number of 200.000 possibilities of recreating the object compose the system.

We experience a moment of denying the machinists, bionic and zoomorphic architectural interpretation variants, by examining a computing system whose parameters can actually generate colossal errors in the appropriation and the understanding of a civilization. Starting from the first interdisciplinary attempts of the New Archaeology movement to the Computational Archeology, it will present a series of quantitative methods for determining spatial coordinates and dissemination of cultural heritage. Geographic Information System- GIS is a primary computer system that provides aerial maps, which show the connection of the site to the surrounding areas and presents the detailed study of different evolutionary habitation phases. This procedure is widely spread and offers required database for mathematical function application. A special form of investigation is “archaeological informatics” (archaeoinformatics or computational archeology), which structures the site information as an algorithm.

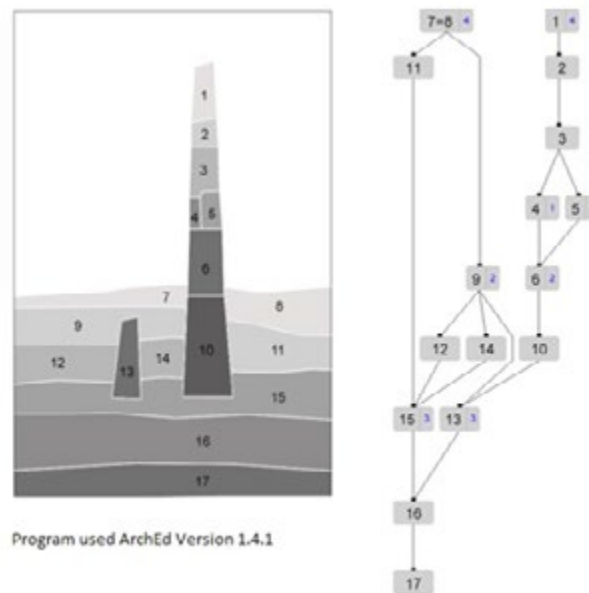


Figure 1 - The stratigraphic relations as presented by Edward Harris

The Method of Edward Harris, that determinates the so-called Harris Matrix, works for the first time with the tetra-dimensional space or Minkowski (5, pp. 45–86).³ Any point from this plan is termed „event”. A mono-dimension curve representing the „world line” underlines its history, defining by a succession of moments its evolution along time (*Ibidem* 4). In this manner, the stratigraphic sequence is regarded entirely, as a sum of chronological relations. These do not refer to the ground’s composition, but to the analyses of the contact surfaces between layers. Harris Matrix follows the four principles of stratigraphy, as the superimposed elements, the original horizontality, the initial continuity and the stratigraphic succession. It is always considered that the lower level is the oldest one. Due to the gravity, all layers are initially horizontal; therefore, each mutation of earth surface is identified by this positioning. Various graphics present the relation between units based on the site data. Thus, Harris Matrix relates levels, interfaces and chronologies.

“The conceptual maps” or the GIS are most of the times the appropriate graphic instruments to synthetize the numerous data archived and the site relations (as general control method). Therefore, from archaeological point of view a Corinthian capital represents a singular stratigraphic unit, meanwhile for the architect is important to analyze the relation between volutes and leafs

3 It represents a Euclidian space with the four dimension - the temporal dimension.

levels or between abacus and echinus. An optimum division of the element's structure shows its proper nature. The result of a research corresponds in this way to the fluid identity space, related to archaeology and that functions following the principles of the peer-to-peer network, regarding the equivalence of relations or studies⁴.

The lacunar and fragmented remains of the past periods become the research thesis on sites and on the human relations derived by its use. For this, there are used some regressive methods, which investigate the contemporary forms of the actual territory, returning successively at anterior representations to identify, through stratigraphy the traces that continue acting in the present. For having from the microscopically to a macroscopically view a well-determined database is used the GIS system. The method has the advantage not only of creating an information archive, but a thematic map with each one of the parameters that interests the stratigraphic unit. The Italian archaeologist Tiziano Mannoni who was saying that there is not any archaeology without the archigraphy, introduce a new coordinate in the studying process, which is data interpretation. The information archive represents an unrepeatable practice, reason for which the database should remain opened to other researches.

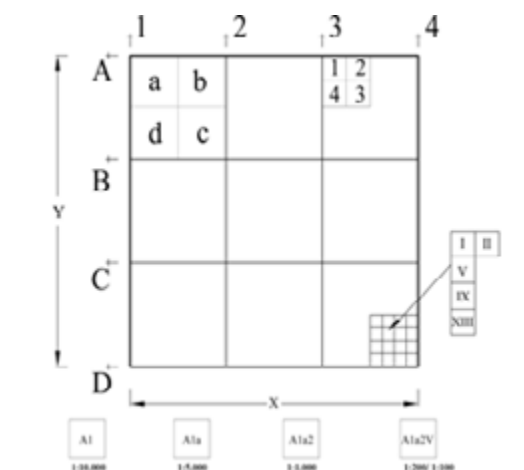


Figure 2 - The mapping of an archaeological site used for GIS database.

2. Changing paradigm

The character of the antique life and the importance of architecture in past periods, results from the trace studies, which determine a used path, followed regularly. During the Roman-Greek period, the streets were already conceived for “jus eundi”, which was the right of passing, a roman norm that regulated how a street was used from the passage to the roads. In that period the street was designed before other urban works for strategic land commercial reasons and presenting important esthetical plan values (especially for the Hellenic world). Space Syntax proposes a new methodology for the study of paths in an archaeological site. The observation identifies a new layer, established by a series of categories of space relations, that condition, depending on distribution, the way of passing of individuals and the category of utilization of place. Urban limits or its shapes usually configures the internal connections of the site. The first analyses on edifices and their signification for the city's life will establish the basic elements of the graph, as a schematic representation of existing roads. The Space Syntax British group has developed an informatics graphic system that investigates the urban space and the relationship between its morphological elements, by axial maps. The methodology found is that of representing all the convex spaces and the relation between similar. The segments that unite them will underline paths, starting with the statistics to demonstrate that the straight direction (the visual one) suggests the followed street. The axial space, the convex space and the “isovist” one are the three applied methods that explain the city street network, the distribution of the main buildings, their relations with the center etc. The study of movement in antique cities is fundamental because it reveals a series of new interpretations to the initial archaeological information compared to the current period, due to the polycentric category increase, to the residential area agglomeration or to the intensity of the used space. Fridell Anter and Weilguni detail in their study about Pompeii's paths (7, pp. 89-100) the method offering qualitative data and quantitative evaluations (through distances). The interior of each building defines a convex space, no matter the wall divisions. The uses by superposing of all known paths excavated or not, identified various types of roads: orthogonal streets, spontaneous circulations and crossing site streets, to connect the forum with the city's gates. The union of more convex spaces trough singular axis configures the initial design of a various environment, which interested visually the passenger (8, p. 100). The studies on integration and spatial segregation continue, relying by association the two moments of Pompeii: today and in the past, as visited and crossed.

⁴ Named peer-to-peer it represents an informatics network that presents a limited number of equivalent not-hierarchized nodes, which may either receive information, either send them to the other system elements.

3. Digital theories

Currently spatial references indicate a variety of systems found in the theater thinking. This change is not related to the concept of place, as was seen by phenomenology, but to experience, innovation and unpredictable. Attempts in achieving major scenography effects through an economy of means are made, by using abstract forms, emphasizing some trails, imagining the backgrounds, organizing collections, valuing vestiges and controlling the perspective. Those details may be found in ruin, to express the feelings induced to the visitor on gestaltiste psychology effect. The entire visible space should be sequenced depending on perceptive modalities, determined by processes of expansion, distortion or emphasis. Based on the concept of scenography enunciated by Vitruvius and the associated notions of public space by Aldo Aymonino, there was a series of compositional gestures, which aims relationship between integration and context: surface, vertical, enclosure, environment, figure, recoil. New scenic forms follow the communication based on media technologies. Of these, hard technique refers to the building visible structural, meanwhile the soft one to electronic, immaterial systems. Numerous contextual examples reconfigure the importance of interaction between the two modalities. Integrated design represents how contemporary intervention in a cultural framework, may offer a range of hierarchical media processes transforming static spaces of museum type, in interactive manifestations between the most diverse social groups. Besides the new design form is “the corporate identity”, which refers to the visual coherence of the project. This indicates the possibility of recognition, identification of museums through its brand. Corporate identity does not have a static function, but must be associated to the internal changes of a society. To motivate their accuracy relations between resulting conclusion from the digital theories application and humanities is required. In this manner, it concludes a realistic image through the general philosophical concept of dwelling by overlapping the anthropological profile over the archaeological site. The problem, related to narration, clarifies the significance of ruins through the implementation of Virtual Heritage programs. For the same purpose of protecting patrimony goods and referring to their virtual reconstruction, the UNESCO adopted the “Charter on the Preservation of Digital Heritage”, relying on the representation at territorial scale of a DEM (Digital Elevation Model), used as indicator of historical traces. One of the most representative projects is the virtual reconstruction of the ruins of Saint Mary of Tergu, a study conducted by prof. Letizia Ermini Pani⁵. DEM offered information about the achievable paths or indicated some historical traces. These operations gave the image of the stratigraphic layering and the correct identification of the ruins on the site. Having this information from 2003, the extensive excavation, the publishing of the research data and the musealization of the area opening it to the visitors, started. In this manner, it appears that the restoration from 1959 was done with concrete mortar, which degraded various structure, causing salt deposits. It was discovered also that there have been build ex-novo walls which didn't appear in the old complex and that the mechanized digging ruined some monastery parts. The advantages of such a working process are the immediate archiving of data, the conception of different evaluation models of all superimposed layers and the permanent identification of vestiges on a site. The end of the project consists in the integral musealization of the complex, starting with its history and continuing with aspects of quotidian life, totally neglected before. The communication manner is that of a 3D movie, which puts together the entire archaeological divided fragments. As procedure, initially is created the landscape through Technical Regional Maps, GIS, high-resolution image such as satellite photos, aerial perspectives or stereoscopies. Starting from the 2D information, raster, the CAD programs draw a detailed mesh of the area, the equivalent of a DEM. A rectified photo will give the real texture to indicate a realistic image of the virtual model. This program works as the laser scanning both at a territorial and a detailed scale, reproducing interior objects or other elements meant to illustrate the ambiance of a complex. Various sections present all data, from the geomorphic aspects of a zone to its vegetation, hydrology or paths.

From 1970, the idea of a diffused museum spreads all over the world. In this way, the archaeological museum may integrate new exhibition functions, through on-site antiquarium, during the excavations, but also when the digging process is finished. Corbusier talks about the necessity of the diffused building. Any edifice should present a flexible composition that allows its extension. The divided modules define the space, which respect the requirements and necessities of a public complex. Stratification method of taxonomy uses extensive surfaces. In this way, Turin becomes, from April 2011, the first model of “diffused museum” in Europe, functioning as a virtual city of museums, connected by technological platforms.

The stratigraphic superposition generated by its reconstruction, may potentiate the archaeological value of a site and communicate those aspects that led to the occurrence of marks and to the disappearing of some historical levels. For a long time the simplest and useful way to provide information to all users, in a comprehensive way, simulating the scientific ambiance of the numerous professionals involved was the virtual reconstruction. The archaeologists and other professionals from the field do not accept any more the idea of the restaurateur architect, who from a fragment succeed to recompose the entire building, giving a personal image to the operation and offering a deformed perspective over the past. Archaeologist-architects, like Italo Gismondi, created, through their reconstruction the image of the Antiquity that we have today. A continuous form of renovating concepts and critical thoughts define the notion of history. The importance of vestiges derives from its original relation with the context. Thus, “opened museum”, as the city spaces that hold commemorative works, here should be quoted the case of the Alba Carolina Citadel, Alba Iulia, Romania, induce a new integration system, by its permanent and unconditioned presence of all participants that generates its dynamics, determining contemporary urban environment interaction with the history. On the site there has been previously a roman fortress, but the monument is better known for its Vauban model. The

5 The professor of medieval archaeology Ermini Pani, from the „La Sapienza” University of Rome elaborated a new analyses method for archaeological sites of Sardinia, Tergu being the most important of them.

project managed to include the preexistences in an urban tour revealing their best characteristics. Unfortunately parts of the XVII century walls were lost and in the restoration process a graph theory was needed. This procedure becomes in this case one of the most used procedure to design or remodel an archaeological element by a virtual process. The method is necessary to identify hidden parts of original substance that was lost after the excavation (7). Some researchers of *The Hebrew University of Jerusalem*, implemented a computerized algorithm that generates all the meshes of an artifact, so that it can be used directly by scanning during the site excavation. The sequence determines all the unseen scars and ridges of the object. (8, p. 270).

We can talk in this case about the musealisation of historic monument, citing the contemporary value. This refers to an amount of ancient remains with a similar modern achievement, seeking to maintain unaltered, the physical conservation of a complex. The preserved remains give the interventions scale of conservation and establish the object-visitor relationship. Although considered and integrated as open exhibition space, archaeological areas supports a number of changes: restoration process, reinterpretation and reconstruction of the monument after the plans by designed by antiques or historians, the transformation of archaeological zones into a permanent source of excavation and research, the advantage to be found as a result of preexistences interference and understood as a permanently modifiable space, the idea of constructive destruction and modernization.

In case of ruins, the first direct exposure area is the city. The preexistences relationship with urban areas is often represented by a rupture in the tissue felt both in planning and in social thought. In its new premises for their re-functionalization, it is assumed that the site is based on stratigraphic composition, which has always highlighted the historical and the cultural “active” value and not just the importance of the monument. Starting from the principle of continuous use, the thesis will present new ways of managing urban development in an integrative vision, starting from society need to understand contemporary interference. Design subjects induce physical and functional transformations of the city space, the fundamental difference between the two of them being the scale. Archaeology, on the other operates by excavation, bringing thoughtful contribution to changes in territory. Daniele Manacorda explains that excavation is a stratigraphic “disassembly”, a destruction of previously generated order, by each intervention will be published, exhibited, exercising from the start a clear cultural position. Sites in peripheral and destructured areas can help to generate the congruence of space, characterized by a greater capacity for uptake of interventions. Otherwise, the ruins absorb and change the whole context, becoming, by a relationship of alienation, a conflict urban zone in which the structured city face the archaeological gap. At any time of museographic operation, there may be used reversible solutions, due to the need to restore the building to its previous condition, before the intervention, recognizing the work done on the monument, the possibility of further changes, dissociating the images of ruin from that of the inserts. The flexible museum means that space that can be configured by the type of hosted exhibitions, adapting to any new structure. The ability to camouflage to the environment is a concept derived from Plato, mimesis meaning simple imitation. Contemporary materials, facilities or ephemer scenographies lead architecture to autonomy and dialogue in dealing with its historical forms.

4. Conclusions- New perspective

One of the biggest problems of the accurate knowledge of the archaeological good is the evident difference between the research information and the antique possibility of use or in other words, the difference between the narrative forms of exposure of a survey and its authentic cultural values. The EngLald project, developed by Oxford University and the SEAD (The Strategic Environmental Archaeology Database Inter-linking Multiproxy Environmental)⁶⁷(10, p. 320) are one of the first programs that detect the continuity, the transformation and the identity of a landscape, starting with the human action. In this sense, the reconstruction may begin from the story and not from the effective reports. The introduction of a digitalized system eliminates an amount of inaccuracies, but it becomes accurately applicable only when linked to a subjective system, generated by human nature, regardless of the era to which we relate it. The scope of this program is to create a new possibility of reading archaeology, by linking the artifact with its original environment, from climate to geographical characteristics, from ethnography to faunal properties. The studied element cannot be removed from its location before having a complex understanding of the process that generated it. For an easier comprehension may be used the BugsCep Application⁸. (11, p. 326) This new manner of study led to the emergence of a new investigation field - Environmental Archaeology.

From the 2007 the European Parliament adopted a directive called INSPIRED (Infrastructure for Spatial Information in the European Community), which became an international database for all Protected Sites. The benefit of the network is the publishing of the research data and its online access, the implementation of similar study procedures in archaeology, the development and sharing of new research projects by connecting similar sites. The British and Scottish Parliament embraced the procedure from 2009, having ten years to accomplish the main processes. Unfortunately, in Romania the archaeologists

6 There are to be considered plenty of investigation methods among which models based on ethnographic literature (Dalla Bona & Larcombe, 1996), deductive modelling (Altamira Consulting, 2009), least-cost path modelling (Verhagen, 2010), optimal foraging theory and diet-breadth modelling (Whitley, 2010), geographically weighted regression (Löwenborg, 2010), fuzzy logic (Hatzinikolaou, 2006), intelligent network structures, based on neural networks (Ducke 2003), K-means cluster analysis and Dempster-Shafer theory (Veljanovski (Cuming, 2002.[10, p. 340]

7 The main requirements of a SEAD program are 1) data collation, storage and management; 2) integration, access and dissemination; 3) analysis and visualization and 4) networking and support.

8 The BugsCep represents a Microsoft Access Application used to create various databases and taxonomies. First, it hosted a quaternary fossil record but from the '80s when it appeared it developed a series of ecological, climate, bibliography information. The application uses the SEAD information and connects more archives in the same time. The result is a realistic image of an archaeological remain from a certain historical period.

represent an isolated community, where data is presented only in some enclosure environments and even if published, the studies are not shared to professionals. This attitude brings Romania to the limit of survival of heritage, a place where most of the monuments are at risk and where the digital theories are far away from their appliance. The thesis emphasize new perspectives offered on museum management, from the research "Managementul muzeal și aplicațiile sale" (Museum management and its applications), by professor John Opris. Following the law of museums and public collections, the legal system, the organizing and the functioning of these institutions in Romania, were regulated. In Italy, however, legislative proposals have been replaced by charts. There are three types of charts that have changed the relationship of archaeology with the city: the constraints charts, archaeological charts, charts of archaeological potential and risk. These represent a way of revealing the preexistences after classifications related to typology, dating, degree of conservation. They occur where there is a stratification of knowledge induced by the tutelage authority, as well as that of planning.

The linguistic rupture of professionals involved in heritage sector may induce numerous trauma to the buildings, many of them showing negative effects over time. The thesis is interposed as a form of reconciliation between archaeologists and planners, trying to restore discipline report to preexistences and the city. Stratigraphic research method applied both to the urban levels and to the new element insert, will function like a database where information can always be integrated. The musealisation is considered a flexible form of recovery, which induces interference on the monument, without affecting its essential parts.

References

Munteanu, I., Munteanu, Maria, Grigoraș, C., Marin, Gh.(1983).*Utilizarea teledeteției în evaluarea și supravegherea mediului înconjurător*, ICPA, nr. 2, București.

Coyers, Lawrence, Lucius Jeffrey (1996).*Velocity analysis in Archeological Ground-Penetrating Radar Studies*, University of Denver.

Jones, R. O. (1997). *Structure and Bonding in Carbon Clusters C14 to C24: Chains, Rings, Bowls, Plates, and Cages*, Volum 79, Nr. 3, Germany,

Walter, Scott (1999). Minkowski, Mathematicians, and the Mathematical Theory of Relativity. Apud Goenner, Hubert.

Fridell, Anter, Weilguni, Marina (2003).*Public Space in Roman Pompeii*. Nordisk Arkitekturforskning.

Hillier, B., Hanson, J.(1984).*The Social Logic of Space*, Cambridge University Press.

[https://en.wikipedia.org/wiki/Cut_\(graph_theory\)](https://en.wikipedia.org/wiki/Cut_(graph_theory)), (last accessed 20 August 2016).

Bagnoli, Paolo E. (2012). "Dating Historical Rock Art on Marble Surfaces by Means of a Mathematical Model for Natural Erosion Processes" in *Archaeology in the Digital Era*, Amsterdam University Press.

Palmisano, Alessio (2012). "Zooming Patterns Among the Scales: a Statistics Technique to Detect Spatial Patterns Among Settlements", in *Archaeology in the Digital Era*, Amsterdam University Press, apud. Lloyd, C. D. 2007. *Local Models for Spatial Analyses*, London: Taylor & Francis Group.

Buckland, Philip I. (2012). "SEAD - The Strategic Environmental Archaeology Database Inter-linking Multiproxy Environmental Data with Archaeological Investigations and Ecology" in *Archaeology in the Digital Era*, Amsterdam University Press.

Wilcox, William (2012). "Transparency, Testing and Standards for Archaeological Predictive Modelling" in *Archaeology in the Digital Era*, Amsterdam University Press.

CITY REGENERATION AND INTEGRATED CONSERVATION OF CULTURAL HERITAGE

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Abstract

The notion of 'creative city' has aroused growing interest among academics, specialists and politicians in recent years. Cities and regions all over the world are trying to develop, favour or promote the concentration of creative and innovative industries with intensive knowledge content in order to become more competitive. The main interest of stakeholders is to gain thorough understanding of creative cities and their contribution to the new creative economy. Such challenge requires a multidisciplinary approach, as creativity implies fusing different perspectives that take into account local identity and roots (*Spirit of Place*).

A new outlook not only supplies a city with new dynamism, but also has symbolic value showing how the cultural strength of such places constitutes the milestone for a new and open future. From this point of view the creative sector has become an important 'signpost' for urban planning and modern urban architecture.

The practice of conservation must nowadays relate with innovative technologies in order to face the stages of the entire conservation process considering the many risk factors involved, from climate change to globalisation, from safety to anthropic pressure.

Furthermore, new opportunities are emerging for the storage of great quantities of information, for the digitalisation of cultural heritage and for the use of social media for the control, planning, organisation, management, interpretation and monitoring of conservation actions, but also for the identification of new forms of enhancement and enjoyment.

If this is the reality we are immersed in, it is necessary, without further delay, for the theme of technology to acquire a new priority in our considerations. Meaning that we must ask ourselves not merely how and up to what point new technologies must no longer be confined only to routine application fields, but also in what way they may make a valuable addition to contribute to full equality, inclusiveness and sustainability of a growth strongly focussed on the centrality of cultural heritage.

Keywords: Culture of creativity, Spirit of Place, Integrated Conservation, Technological Innovation, Digital Heritage, Multidisciplinary Approach.

1. Creative Cities and Cultural Heritage

The notion of 'creative city' has aroused growing interest among academics, specialists and politicians in recent years. Cities and regions all over the world are trying to develop, favour or promote the concentration of creative and innovative industries with intensive knowledge content in order to become more competitive. The main interest of stakeholders is to gain thorough understanding of creative cities – in which cultural businesses and industries, carry out a crucial role in supporting urban creativity – and their contribution to the new creative economy. Such challenge requires a multidisciplinary approach, as creativity implies fusing different perspectives that take into account local identity and roots (*Spirit of Place*).

Cities reflect multiple aspects of the history of mankind and are at the same time contemporary expressions of the diversity of human responses to future challenges. Historic cities such as London, Liverpool, Amsterdam, Berlin, Barcelona, New York, San Francisco, Sydney or Hong Kong bear testimony to a profound transformation based on creative cultures. A new outlook not only supplies a city with further dynamism, but also has symbolic value showing how the cultural strength of such places constitutes the milestone for a new and open future. From this point of view the creative sector has become an important 'signpost' for urban planning and modern urban architecture.

The creative city is generally understood and utilised in four ways: (i) creative city as the focal point of heritage and cultural infrastructure; (ii) creative city as the place where creative economy occurs; (iii) creative city as synonymous for a strong creative class; and (iv) creative city as the place that promotes a culture of creativity.

Therefore, urban research requires a wider outlook onto the field of cultural dynamics, with a focus on: citizenship and identity, creative activities and innovation, intermediation, the impact of popular culture, the interface between the traditional viewpoints of society and open approaches toward modern cultures. In such a context cities have always been places where people of different cultures, knowledge and talent meet. The modern city is, thus, an open agora, where ideas from different cultures and nations meet; the main challenge it brings forth is to transform possible tensions into a multicultural agora imbued with positive synergic energy.

'Creativity' is defined in an inter-sectorial and multidisciplinary way, mixing elements (as suggested by UNCTAD, 'United Nations Conference on Trade And Development', in 2008) of 'artistic creativity', 'economic creativity' or 'economic innovation', 'scientific creativity', as well as 'technological creativity' or 'technological innovation'. (Table 1)

The relation between diversity and creativity – that shall be examined – has been thoroughly investigated by scholars of various

disciplines from cultural, socio-economic and psychological perspectives. The notion of ‘creative city’ was first developed in the late eighties by Charles Landry, whose creative philosophy is based on the collective imagination of the population. His study *The Creative City: A Toolkit for Urban Innovators* (2000) has become the main document of reference on the theme he described as the “place where people think, plan and act with imagination”. After Landry many other scholars have focussed on ‘creative cities’ and developed different definitions from different angles.

Therefore, it should be stressed that research in the field of creativity and sustainability contributes significantly to achieve a better comprehension of the creative process and is capable of developing relevant cultural policies for creative and innovative cities and regions.

Hadamard (1939)	Invention or discovery, be it in mathematics or anywhere else, takes place by combining ideas
Snow (1986)	Creativity is not a light bulb in the mind, as most cartoons depict it. It is an accomplishment born of intensive study, long reflection, persistence, and interest
Rothenberg (1990)	Creativity is the production of something that is both new and truly valuable
Sternberg (2000)	Ability to produce work that is novel (i.e. original, unexpected) high in quality, and appropriate (i.e. useful, meets task constraints)
Torrance (1989)	The process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficult, searching for solutions, making guesses, or formulating hypotheses and possibly modifying them and retesting them; and finally communicating the results
Simon (2001)	We judge thought to be creative when it produces something that is both novel and interesting and valuable
City of Ottawa (2003)	Creativity is about new ideas, and the discipline of developing, sharing and applying them
UNCTAD (2004)	Creativity is not a given resource but a resource that is deeply embedded in every country’s social, cultural and historical context. As such, it is a ubiquitous asset
Smith (2005)	Creativity should be defined by the novelty of its products, not by their usefulness, value, profit-ability, beauty, and so on
KEA (2006)	Creativity is a complex process of innovation mixing several dimensions such as technology, science, management, and culture
UNCTAD (2008)	Creativity refers to the formulation of new ideas and to the application of these ideas to produce original works of art and cultural products, functional creations, scientific inventions and technological innovations
Boston’s Creative Economy, BRA/ Research, USA (2009, cited in UNCTAD 2008)	Creativity can be defined as the process by which ideas are generated, connected and transformed into things that are valued
The Ride (2009, cited in Wikipedia 2009)	Creativity is the ability to illustrate what is outside the box from within the box
Wikipedia (2009)	Creativity is a mental and social process involving the generation of new ideas or concepts, or new associations of the creative mind between existing ideas or concepts

Table 1 - Different definitions of creativity

2.The ‘Network of Creative Cities’ of UNESCO and the emerging creative cities

The challenge of conservation and enhancement of our cultural heritage involves reclaiming our historic memory and at the same time gaining knowledge of the new technologies useful to face future challenges. Infrastructural innovation of cities should consequently, be at the service of sustainability, accessibility and transport. In this process, the role of medium size cities becomes one of importance for developing ‘Cultural Routes’ towards humane and local growth, creating virtuous synergies with neighbouring cities and collaborating with other cities in the same area by establishing relation strategies.

Created in 2004 to promote cooperation between cities that have identified creativity as the strategic element for sustainable urban development, the UNESCO 'Network of Creative Cities' is divided into seven areas, each corresponding to a cultural category (Music, Literature, Crafts and Folk Art, Design, Media Arts, Gastronomy, Film).

The 180 cities, in 72 countries, that are currently part of the network collaborate to achieve a common objective, to place creativity and the cultural industry at the core of their development plans at local level and to actively integrate at international level. All the creative cities involved are working to develop and exchange good and innovative practices, to strengthen participation to cultural life and to integrate culture into sustainable urban development policies. Furthermore, the 'Network' supports research partnerships and cultural exchanges among the cities that are part of it, as well as with the public and private sectors.

The Italian Creative Cities currently present in the UNESCO 'Network' are Bologna and Pesaro (Music), Fabriano and Carrara (Crafts and Folk Art), Rome (Film), Parma and Alba (Gastronomy), Turin (Design), Milan (Literature).

I would also like to highlight other examples of emerging creative cities (Figure 1),



Figure 1 - The map of emerging creative cities: 12 model cities throughout the world.

such as: Alice Springs (Australia), symbol of coexistence between aboriginal people and *whitefellas*; Antwerp (Belgium) for its ability to manage commercial trade flows and transport (Figure 2); Hyderabad (India) a cyber-city within the city; Florianopolis (Brasil), a new and much appreciated tourist destination; Kigali (Ruanda), high-tech reinvented by the women and the generation that survived the war; Kosice (Slovakia) industrial network, with investors and infrastructure (Figure 3); Kusatsu (Japan) for sustainability and its precious hot water springs; Marseille (France), an open air laboratory for the integration of cultures (Figure 4); Pittsburgh (United States), the city of reconversion (Figure 5); Izmir (Turkey), a bridge to Europe and in full urban expansion; Tianjin (China), the seat of prestigious Universities and the place of choice for many young people from all over the world; Vladivostok (Russian Federation), a multicultural city.



Figure 2 - Antwerp (Belgium), is a city that has been able to reorganise itself, especially for transport, becoming the most important port in Europe, surpassing Hamburg and Rotterdam. "Not just ships: the hometown of Rubens continues to inspire creativity".



Figure 3 - Kosice (Slovakia) is served by a great infrastructure network and is in a strategic position for foreign investors.



Figure 4 - Marseilles (France) hosts and fuses North-African, Arab and European Cultures in a multicultural melting pot, a real open-air integration lab.



Figure 5 - Pittsburgh (United States), former steelworks capital has imposed itself as the emblem of an America that is resilient in overcoming recession.

Finally, I would like to show you some pictures of the city I live in.

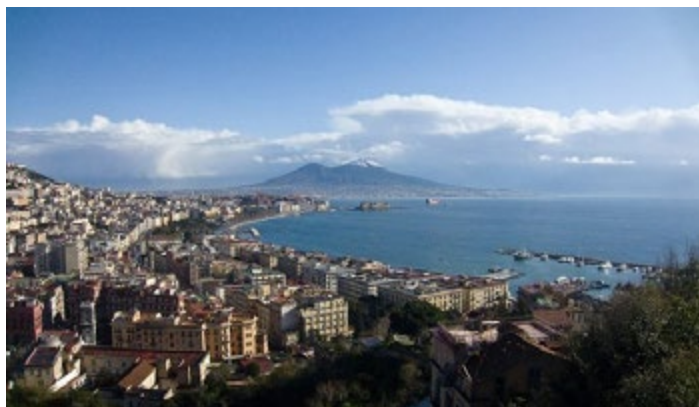


Figure 6 - Naples (Italy), a lively and creative city, it boasts a historic centre of outstanding and universal value, inscribed onto the UNESCO World Heritage List, which has exerted profound influence over most of Europe.



Figure 7 - Naples (Italy). An example of street art depicts Totò, famous comedian and artist, emblem of creativity, and of *napoletanità* (the culture of being truly Neapolitan).

3. Architectural heritage and innovative technologies for the conservation and restoration project

The practice of conservation must nowadays relate with innovative technologies in order to face the stages of the entire conservation process considering the many risk factors involved, from climate change to globalisation, from safety to anthropic pressure.

Furthermore, new opportunities are emerging for the storage of great quantities of information, for the digitalisation of cultural heritage and for the use of social media for the control, planning, organisation, management, interpretation and monitoring of conservation actions, but also for the identification of new forms of enhancement and enjoyment. (Figure 8)

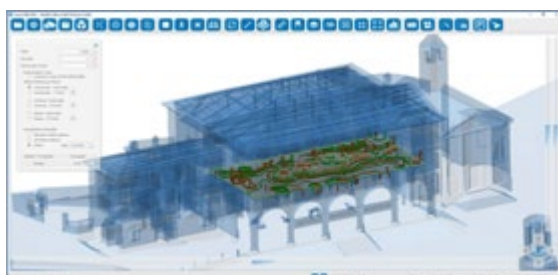


Figure 8 - LIM (*LiDAR Information Model*): faithfully reproduce reality that allow the implementation of metrological capabilities (off plumb elements, bulging, depressions, walls and floors thickness on their whole surface), and the possibility of monitoring the geometry over time.

Numerous initiatives are being supported by States worldwide, such as the EUROPEANA Project for the systemisation of *Digital Heritage*, or the Arches Project (an international collaboration between the Getty Conservation Institute and the World Monument Fund), besides Agencies for CH in different Countries, with the purpose of developing an *open source* geo-spatial information system that may constitute a digital archive for the on-line management of tangible cultural heritage.

To regulate this change, not merely technological but mainly cultural, the fundamental keys should be apt to guarantee respect for diversity, a systemic and holistic approach to conservation, the cyclic continuum of knowledge, diagnosis, project, respect of 'local knowledge' and traditions and, yet again, the use of the new emerging ability-enhancing technologies as a means and not a purpose in itself. (Figure 9)



Figure 9 - Domodossola (Italy), Castle Tower, an example of consolidation of the pavilion roof with struts and ties. (From L. Jurina, *Tecniche di consolidamento dei monumenti. Una panoramica attuale*, Pisa 2012)

Therefore, actions that bring back to the focus of debate a critical rethinking of the role of emerging technologies and ‘how’ they can really help ensure respect of diversity and spread awareness about the meaning of cultural heritage, should be promoted within the research community or the management of such heritage.

Technology positions itself between the world and what each individual experiences of the world.

Imaging techniques, for instance, widely used for diagnostics, or *laser scanning* for 3D modelling and also Historic Building Information Modelling (HBIM), which connects the survey with descriptive thematic databases (Figure 10), allow to open up and enrich the world of the user’s experience, modifying the horizon of meaning the experience belongs to.

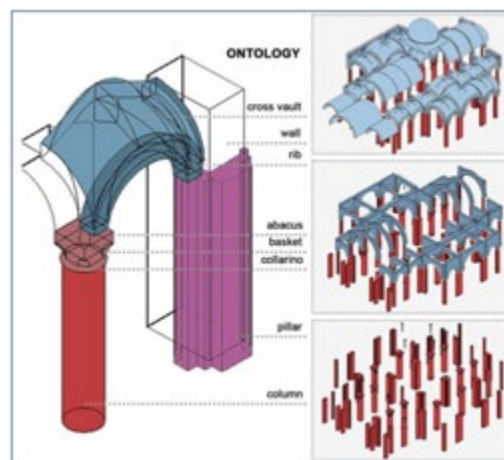


Figure 10 - HBIM (*Historic Building Information Modelling*) connects survey with descriptive thematic databases contributing significantly to knowledge of an artefact during the ‘anamnesis’ stage, the founding base for editing the restoration and archaeological project.

“Technology, social networks and, more generally, the digital revolution, while having determined a change of paradigm, creating the structural conditions for interdependency (and effectiveness) of systems and organisations and intensifying intangible flow between social actors, are not currently able to guarantee that the interaction nets created generate relations that are ultimately communicative, that is to say, based on symmetric relations and of real sharing. In other words, the Web creates a new communication ecosystem but, although it redefines the space of knowledge, it cannot guarantee in itself and for itself, horizontality or more symmetrical relations. The difference, once again, is in the people and how technology is used, beyond the many interests involved”. (Piero Dominici)

If this is the reality we are immersed in, it is necessary, without further delay, for the theme of technology to acquire a new priority in our considerations. Meaning that we must ask ourselves not merely how and up to what point new technologies must no longer be confined only to routine application fields, but also in what way they may make a valuable addition to contribute to full equality, inclusiveness and sustainability of a growth strongly focussed on the centrality of cultural heritage.

4. Evaluation of integration methodologies in the architectural restoration project

It must be considered that the technological act, when culturally aware, should be validated by a more general critical reflection and by the cultural approaches guiding the act of restoration.

The architectural and environmental restoration project is carried out starting firstly with a rigorous 'anamnesis' in order to obtain knowledge of the artefact with the necessary critical comprehension. This is followed by the 'diagnosis' phase, enabling the reading and recognition of the state of deterioration, together with the identification of the means available to ensure the conservation of all values, tangible and intangible. The third phase involves the drafting of the 'project', with the individuation of the intended use within the limits allowed by 'integrated conservation' and the definition of the consolidation interventions required.

Examining the techniques developed and perfected in recent years with the support of materials and notions, and with the prerequisite of a specific and non-invasive diagnostics, is necessary to face consolidation interventions in total awareness. Indeed, a correct diagnostics allows to converge towards the criterion of 'minimum intervention', besides leading, in most cases, to economic savings in the executive phase of the project.

It should be recalled that monitoring over time, also during the execution of works, must be part of planning a consolidation intervention. The criteria to be followed in the structural consolidation of historic built environment are those of 'necessity', followed by 'no harm' (*primum non nocere*), 'effectiveness', 'durability', 'compatibility', 'reversibility', contemporary respect of *historic and aesthetic concerns*.

The scientific community has developed a notable and growing interest, especially in the theme of masonry arches and vaults, since the second half of the 20th century.

The consolidation of vertical wall elements in masonry buildings, subjected to horizontal and vertical loads, constitutes one of the fundamental interventions for the achievement of adequate safety levels. The more traditional intervention techniques (operations of 'un-seaming and seaming' of masonry or of 'reinforced seaming' of lesions or consolidating injections) join other more innovative ones like 'reinforced plasters' with the application of innovative FRP fibres of different materials (from carbon to glass, to basalt) linked to masonry.

Indeed, an innovative technology for consolidation interventions is that of fibre-reinforced polymers, regulated in Italy by the CNR (DT 200-201/2004) for interventions on reinforced concrete, masonry and wood structures. By CNR (DT 202/2005) for interventions on steel structures. FRP in the structural field, are produced in strips and fabrics (uni, bi and multi-directional) in which fibres can be either just flanked or woven, resisting, consequently, to stress in one or more directions, and displaying a more or less accentuated isotropy according to the weave typology. They are also produced in sheets and bars for which fibres are disposed in just one direction. This technology, based on the application of fibre-reinforced polymers is apt for the consolidation of arches and vaults, outer walls and inner walls because it addresses, firstly, the structural and morphological requirements of buildings, and furthermore, it does not add any loads to the structure, it is rapidly applied, guarantees high durability and offers the artefact reduced chemical aggression.

The application of CFRP (*Carbon fibre reinforced polymer*) tapes in particular, can be very interesting for arches and vaults. Fibres are disposed vertically, horizontally and diagonally onto arches, in order to absorb lateral thrusts and stiffen the vaulted structure.

The consolidation of masonry walls also requires special attention because interventions must be differentiated according to the type of lesion. For masonry with localised interventions due to isolated lesions it is advisable to employ classical consolidation techniques with the 'seam and un-seam' know-how and injections of wet mortar, not pressure driven, to avoid greater deterioration of the existing mortar. For masonry affected by more extended lesions consolidation with the application of a reinforcement grid in GFRP (*Glass fibre reinforced polymer*) and fibre reinforced mortar may be more useful to give appropriate outer structural rigidity.

It is therefore possible, through the innovative technology of fibre-reinforced polymers (FRP), to hypothesise the consolidation of arches and vaults with the application of CFRP tapes (*Carbon fibre*), and of outer masonry with the application of a reinforcement grid in GFRP (*Glass fibre*). For inner walls the consolidation method can consider the CAM System (*Active seams for masonry*) which enhances static features.

For the survey of structural instability and the analysis of seismic vulnerability the employment of the Guidelines of the PLINIUS Centre (University of Naples 'Federico II') is useful. The Guidelines allow to observe global and local mechanisms and the damage assessment in vertical and horizontal structures, for ordinary masonry buildings, leading to the editing of two MEDEA sheets (Manual for Earthquake Damage Evaluation and safety Assessment) as a useful tool for identification and assessment of the influence of structural-typology vulnerability factors, responsible for the activation of the collapse mechanisms more frequently observed. The methodology is based on the analysis of the level of potential evolution of such collapses starting from the structural typology and the vulnerability factors found in buildings.

The innovative choices so far recalled are to be encouraged and applied in the awareness that the cultural property (architectural, archaeological, historic-artistic) undergoing intervention constitutes a *unicum* to be conserved in its authenticity and truth, also structural, to be achieved through a multidisciplinary approach coordinated between the architect restorer (who is its director), the structural engineer, the plant builder, the customer, the building company and the Authorities responsible.

The importance of multi and inter-disciplinary approaches is still undeniable and capable of guaranteeing the constant convergence of history, architecture, city and landscape, bringing the central focus on 'project culture' and its implementation. The use of traditional techniques and technologies (where possible) should, furthermore, always be privileged, whereas in the application of 'innovative' solutions the ones chosen should always be consistent and compatible with the historicity of pre-existing architecture and artefacts.

References

Giovanni Carbonara (2016), *Storia, tecniche e progetto*, In Genovese R.A. (edited by), "Patrimonio culturale: tecniche innovative per il progetto di conservazione // Cultural Heritage: innovative techniques for the conservation project", Giannini Editore, Naples 2016, pp. 39-52.

Roberto Di Stefano (1990), *Il consolidamento strutturale nel restauro architettonico*, Edizioni Scientifiche Italiane, Naples 1990.

Luigi Fusco Girard, Bruno Forte, Maria Cerreta, Pasquale De Toro, Francesco Forte (edited by) (2003), *L'uomo e la città. Verso uno sviluppo umano e sostenibile*, Franco Angeli, Milan 2003.

Luigi Fusco Girard, Bruno Forte, Maria Cerreta, Pasquale De Toro, Francesco Forte (edited by) (2003), *The Human Sustainable City. Challenges and Perspectives from the Habitat Agenda*, Aldershot: Ashgate, 2003

Luigi Fusco Girard, Peter Nijkamp (edited by) (2004), *Energia, bellezza, partecipazione: la sfida della sostenibilità. Valutazioni integrate tra conservazione e sviluppo*, FrancoAngeli, Milan 2004.

Luigi Fusco Girard, Tüzün Baycan and Peter Nijkamp (edited by) (2011), *Sustainable City and Creativity. Promoting Creative Urban Initiatives*, Aldershot: Ashgate, 2011

Rosa Anna Genovese (edited by) (2016), *Patrimonio culturale : tecniche innovative per il progetto di conservazione // Cultural Heritage: innovative techniques for the conservation project*, Giannini Editore, Naples 2016.

Lorenzo Jurina (1996), *Alcuni recenti sviluppi nella tecnica dei martinetti piatti*, Convegno Nazionale "La meccanica delle murature tra teoria e progetto", Messina 1996.

Lorenzo Jurina (2003), *La possibilità dell'approccio reversibile negli interventi di consolidamento strutturale*, Proceedings of the 19th Congress on Science and Cultural Heritage "La reversibilità nel restauro. Riflessioni, esperienze, percorsi di ricerca", (Bressanone, 1-4 luglio 2003), Edizioni Arcadia Ricerche, Marghera-Venice 2003.

L. Jurina, C. Giannico, A. Ferretti, S. Alberti, M. Ricci, A. Scotti (edited by), *Application of satellite radar interferometry for structural damage assessment and monitoring*. Proceeding of the Congress "IALCCE 2012- Third International Symposium on Life-Cycle Civic Engineering", Hofburg Palace, Vienna Austria, 2012.

Lorenzo Jurina (2012), *Tecniche di consolidamento dei monumenti. Una panoramica attuale*, In Augenti N., Sassu M. (edited by), Proceedings of "IF CRASC'12", Il Convegno di Ingegneria forense, and V Convegno su crolli, affidabilità strutturale, consolidamento, (Pisa-Italy, 15-17 November 2012), 2012.

Lorenzo Jurina (2012), *Intervento di Consolidamento antisismico del Duomo di Cremona con adozione di tecniche innovative*, In Augenti N., Sassu M. (edited by), Proceedings of "IF CRASC'12", Il convegno di Ingegneria Forense, and V Convegno su CRolli, Affidabilità Strutturale, Consolidamento, (Pisa-Italy, 15-17 November 2012) 2012.

USAGE OF LASER SCANNING TECHNOLOGIES IN RECONSTRUCTION OF OBJECTS OF HISTORICAL AND CULTURAL HERITAGE IN SARATOV

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Abstract

In modern practice of restoration of architectural memorials and objects of historical– cultural heritage 3D laser scanning is relevant and effective technology. Because of high automation, speed, exactness and specification of survey, this technology has recommended itself as the most effective method of getting geospatial information about different objects. Generally, appliance of laser scanning allows to get high-quality information comparing with traditionally used methods and technologies of measurement (phototheodolite, tacheometric survey). The final 3D model of a building according to the laser scanning information can be used on every step of working with engineering construction with the use of BIM- technologies. This article shows the experience of ground laser scanning and opportunities of using that technology in the field of restoration of objects of historical and cultural heritage. Objects of federal and local importance of architectural heritage of Saratov are given here as examples.

Keywords: laser scanning, 3D technology, historical environment, heritage.

1. Introduction

One of the most important areas of human development in the 21st century is the globalization of information platform. Discoveries in the IT sphere increases the chances of directing the country, helping the development of information exchange and provide various public services. The value of data rises every year, as information is a strategic resource. Modern information technologies, accelerated development and advancement acquires the character of a revolution in the sphere of information, having an increasingly greater impact on all spheres of the societal life. At the moment, there is a kind of information revolution, the outcome of which will be the transition of humanity to a new level of development.

Moving in step with development of modern information technologies, 3D modeling is rapidly developing in the field of architectural and construction design, possessing much more significant capabilities than just two-dimensional analogues. 3D modeling ensures improvement in the quality of design works, it includes the process of designing each object on a global information platform, and it also becomes one of the tools for marketing events, interactive trainings and presentations.

Continual improvement of computing devices and software has made 3D technologies easily available. Today, 3D models are widely used in the design and reconstruction of capital construction projects, in the preservation of cultural heritage objects. In the current design practice existing architectural objects, whether reconstruction or restoration, one of the most important tasks is to improve the accuracy of measurements.

When dealing with cultural heritage objects, measurement fixation - it is one of the main sources of graphic and geometric information needed to work with objects. The result of the measurements is an important material for analyzing patterns in composition formation and the construction of the architectural form.

Measurement fixation is carried out in order to:

- obtain exhaustive spatial graphic material that specifies the current state of the object and the results its research in kind;
- specification of spatial planning and constructive solution of the object;
- determination of the spatial position of the object and its parts;
- refinement of geometric forms of individual elements;
- preparation of initial graphic materials for carrying out of calculations and design works;
- use in the geoinformation systems (GIS) and databases of cultural heritage objects;
- determining the movement and deformation of structures in the construction history of the cultural heritage object;
- architectural monitoring of the object.

The requirements for carrying out measurement fixation, its saturation and accuracy are determined by the technical specification and the current regulatory requirements: Federal Law FZ-73 “On objects of cultural heritage (monuments of history and culture) of citizens of the Russian Federation”, State Standard GOST R 56905-2016 “Conducting measurement, engineering and geodetic works on cultural heritage objects. General requirements”.

In accordance with GOST R 56905-2016 (clause 5.9.1.1), during the measurement work, methods and equipment are used to complete the task with precision, detail and saturation, defined by the technical specification. One of the most effective and modern methods is laser trigonometric scanning.

Laser scanning is a high-tech method of fixating a cultural heritage object to obtain spatial data with high accuracy and speed. It is performed by using laser scanning equipments.

The effectiveness of this method is ensured by specifications of equipments. For example, a high-speed laser scanner Trimble® TX5. It is designed for detailed surveying and documenting of the territory. Thanks to laser technologies, the scanner makes it possible to obtain highly detailed 3D images of terrain and complex structures in just a few minutes.

The resulting image consists of millions of measurements in three-dimensional points

The main characteristics of the scanner:

- High accuracy.
- High resolution.
- High speed.
- Intuitive operation with touch screen.
- High mobility due to light/ compact design and built-in battery.
- Built-in memory.

The essence of the method lies in the study of the multitude of points belonging to the surface of the object under study, using a laser scanner. The result of scanning and preliminary processing of data is a cloud of points of the object under study, in the given coordinate system.

Individual “scans” - surveys are performed from different points, located at different distances from the scanned object and at different angles to it. Thus, each scan has its own coordinate system. Despite this, the data of each individual “scan” are stitched together into a common model, with the acquisition of a three-dimensional image that has no distortion due to the air perspective.

Before scanning, make sure that there are enough references in the scan area to ensure reliable “scans”. As reference points, spherical and flat paper marks are used, they can be used on the site simultaneously. The presence of markers during scanning ensures the most accurate stitching of scans.

After stitching individual scans into a single system, the overall model of the building is obtained. A finished 3D model based on laser scanning data can be used at any stage in the life cycle of an engineering structure using BIM-technologies. For three-dimensional model designers - an inexhaustible source of the usual two-dimensional drawings, floor plans, cross sections, profiles and other engineering data, as well as the materials required for the visualization and presentation of the object.

2. An example of performing measurement work using the method of laser trigonometric scanning.

In this article, for example the task is conducted using the method of ground - based laser trigonometric scanning, elaborated experience of measurement work at the cultural heritage site of regional significance “Yakhimovich apartment House”, 1911, arch. P.M. Zybin, Saratov, st. The Soviet, 5 (Fig.1).



Figure 1 - Photo fixation of the facade.

The owner of the house was Vyacheslav Avgustovich Yachimovich - engineer and inventor. The building under investigation is very valuable to the city as a monument of architectural and engineering thinking. At the moment the building does not function and is in a condition of emergency.

The building is a two-storey, brick structure. Built in the style of art nouveau. The main facade is oriented north. The composition is asymmetric. The plastic accent is the bay window, completed with a high figure attic. The bay window divides the facade into two unequal parts. The bay window pylons are decorated with four sculptures in the form of seated female figures symbolizing "Youth" at the upper belt and "Old Age" at the bottom. The main entrance is located along the bay window axis. The first floor is raised on a high smooth plinth. The building has a rich stucco ornament on the main facade. Decor and a sculptural composition was made by the sculptor Kononov in 1911.

The building is not only a valuable object for the architectural heritage of Saratov but it is unique for Russia as a whole. In this object V.A. Yakhimovich applied the latest technology, patented not only in Russia, but also in Germany and Great Britain (1907) - steam-concrete heating. The essence of the innovation was based on the ideas by Professor VM Chaplin, and consisted of the fact that, the heating elements - steel pipes with a coolant (steam, although water was used in a number of experiments) - passed through the walls and went out, where it will be covered with a layer of concrete, gypsum, wood or cement.

The invention of engineer Yakhimovich had a number of advantages. The coating made it possible not to allow too much heating of the surface of the instruments, which made the operation convenient and safe; Heat spread evenly throughout the room; Steam-concrete heaters were elements of interior design. With this type of heating, the heaters were floors, stair rails, steps, columns, pilasters, vases, statues. In addition, concrete and gypsum can keep heat for a long time, short-term interruptions of heat supply would be practically not noticeable. And, finally, steam-concrete heating was cheaper than water and steam only.

From 1907 to 1911, the heating devices of the Yakhimovich system were installed in more than 20 large hospital, school and public buildings, including in one of the premises of a mechanical and chemical technical school, in a reconstructed Saratov railway hospital, in a city gynecological clinic, in city schools in Saratov No. 2, 6 and 13, at the railway station of the Saltykovka railway station, etc. By 1918, more than 100 such installations operated in Russia.

Today in Russia there are only 2 buildings in which the technology of steam-concrete heating is used and the Yakhimovich house is one of them.

In accordance with the federal law on the preservation of cultural heritage, for works on restoration of monument, a set of scientific and project documentation must be completed, which is subject to the passage of historical, cultural and state examinations.

The measurement work was carried out with the aim of obtaining exhaustive spatial graphic material that fixates the state of the object at the current moment, within the framework of the architectural study of the object.

The main type of measurement fixation of the building is architectural measurement. Architectural measurement forms an idea of the composition of the structure, the nature of its decor, stylistic features. The degree of detail of the drawings determines the selected scale. The transfer of details is thorough.

Architectural measurement is used for the purpose of engineering and technical studies of the object, constructive calculations of various complexity, fixing defects in monitoring.

Measuring works include the following stages:

- preparatory work - reconnaissance, drawing up a program of work, deployment works;
- fieldwork - conducting measurements, collecting spatial data about the object, field control activities;
- desk work - data processing, creation of a report graphic material, preparation of a technical report for release;
- release of the report - registration of the report material, recording on electronic media, printing, duplication, binding work.

Work is carried out consistently - from preparatory work to the release of the reporting documentation.

To perform a laser trigonometric scan, you must select the appropriate weather conditions for the work:

- Absence of precipitation
- Presence of positive temperature.

Stage of field works (indoor and outdoor scanning building) carried out in complicated conditions:

- 40-50% of the building's interior is occupied by equipment, which complicates the movement inside the object and the selection of the scene for scanning.
- The object is in a location of active traffic and pedestrian flows, which interfere with the shooting. As a result, field work on scanning the facade was carried out early in the morning.

3. Report on work performed

The result of the work are:

- 2D drawings of the facades and interiors of the building (facades, sections, plans, details)
- Three-dimensional polygonal models of sculptural and decorative elements of the building.

The area of the scanned plane of the facade was 325.5 m², the ceiling area of the four scanned rooms was 96.0 m².

For balancing quality and scanning speed, and 2 sessions were used, for interior and exterior shooting . In the interior shooting time for one scan was 0:28:38 hours for the exterior 0:03:44 hours.

The density of surface points for one scan was 11.1 MPts and 44.4 MPts for interior and exterior shooting respectively.

The writing speed is 122 kpt/sec -120000 points per second.

For reliable registration, artificial sphere targets and labels were used - “spheres or checkerboard paper targets”.

On the facade of the building, 14 scenes of scanning were performed, with a clean time of 1:52:00 hours.

For the interiors of the building, 17 scenes of scanning with a clear time of 10:50:00 are performed.

The period of field work was two days.

Thanks to laser scanning technology we have received parametric information in the shortest time, much smaller than the traditional approach. The need to use expensive preparatory work, for example, the assembly of scaffolding or the acquisition of special equipment, was eliminated.

Automatic photographic images, combined with the process of measurements, it possible to obtain an objective picture of the object with instant Volumetric representation (Fig. 2)

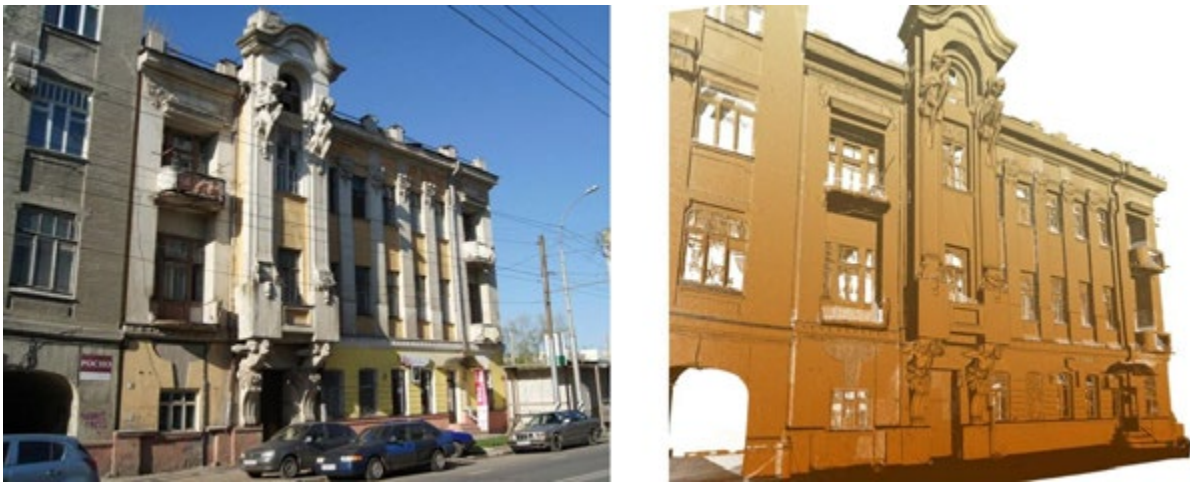


Figure 2 - Photo fixation of the facade and 3D model of the scanned building, consisting of point clouds.

The volume and quality of the measurements made it possible to obtain accurate and complete information about the geometric parameters of the building as a whole and all its individual elements, and transfer them to the dimensional drawings.

With the help of Geomagic software, fragments of point clouds with images of sculptures and architectural details were transformed into a polygonal object and prepared for 3D prototyping (Fig. 3).

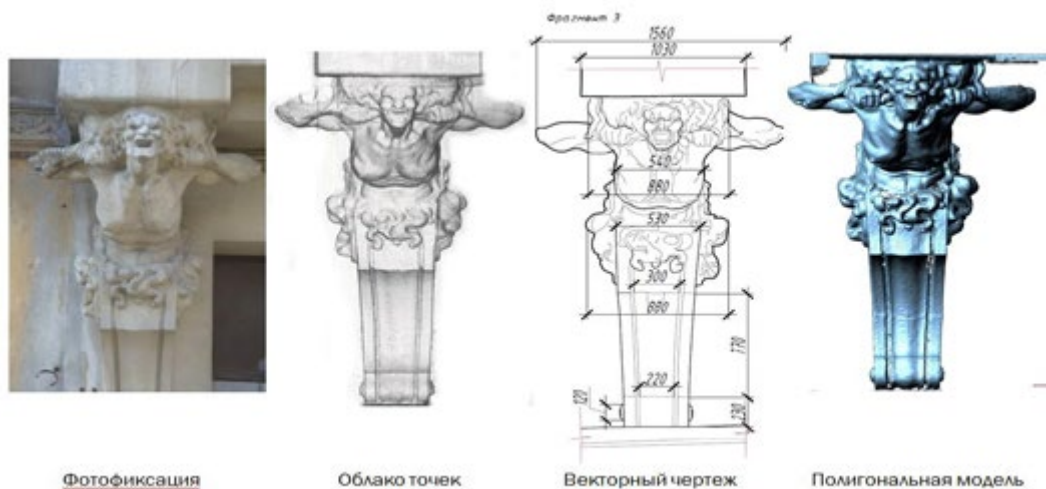


Figure 3 - Photo fixation, cloud of points, dimensional drawing and polygonal model of sculptural composition.

References

Federalnyj zakon ot 25.06.2002 N 73-FZ (red. ot 29.12.2017) "Ob objektah kulturnogo naslediya (pamyatnikah istorii i kultury) narodov Rossijskoj Federacii.

Gosudarstvennyj standart GOST R 56905-2016 "Provedenie obmernih i inzhenerno-geodezicheskikh rabot na objektah kulturnogo naslediya. Obshchie trebovaniya".

Obmernye raboty metodami stereofotogrammetrii i lazernogo skanirovaniya. Moskovskie regionalnye rekomendacii. Glava 3. Izschatelskie raboty. Sbornik 3/4.

Obmernye raboty metodami stereofotogrammetrii i lazernogo skanirovaniya. MRR-3. 4-16, 2016.

Orlovskaya L.A., Romanova N.A., Domracheva T.S., Globalizaciya informacionnyh tekhnologij. Globalnoe informacionnoe obshchestvo // Nauchnoe soobshchestvo studentov: mezhdisciplinarnye issledovaniya: sb. st. po mat. XI mezhdunar. stud. nauch. -prakt. konf. 8 (11) url: [https://sibac.info/archive/meghdis/8\(11\)](https://sibac.info/archive/meghdis/8(11)).

EMBRACING ADVANCED TECHNOLOGIES FOR WORLD HERITAGE

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Abstract

History has shown that technological advancements alter the way we produce, exchange, protect, consume and save all kinds of goods. Today's technological advancements offer new perspectives and opportunities that already started to affect all areas from archeology to medicine, from construction to heritage. More importantly, the Industry 4.0 signals the end of capitalism while a new economic paradigm is emerging that will transform our way of life. The aim of this study is to discuss the affects of these changes on theoretical and practical issues related to heritage, including digital technologies available and social and cultural implications of their use. The paper will argue that digital technologies advance possibilities for cultural dialogue that ensures fostering of peace in the World and for our planet Earth.

Keywords: architecture, heritage, cultural dialogue, digital technologies, industry 4.0

1. Introduction

Technological advancements alter the way we produce, exchange, protect, consume and save all kinds of goods. The First Industrial Revolution, for example, has been named as such since it indeed revolutionized everything related to daily living including art, architecture, culture, economy and politics. Today, economists, scientists and policy makers in developing countries are talking about the coming of the fourth industrial revolution, termed as Industry 4.0 in 2011 in the Science Fair in Hamburg, Germany, and the Second Machine Age, that not only will redefine the way humans live their daily life but also the very definition of human beings. Internet, the new renewable energies, and 3D-printing are the keys for the Third Industrial Revolution that was initiated after the 1970s which are increasing their effect on human lives.

History has also showed that most cultural actors are reluctant to embrace advanced technology at first as they might see it as taking away something at the core of humanity. Arts and Crafts movement for example, grew out of a concern for the effects of industrialization on design, on traditional skills and on the lives of ordinary people. However, their idea of art for the people could not be accomplished because their exquisitely made and decorated pieces could only be afforded by the very wealthy.

Today's technological advancements offer new perspectives and opportunities that already started to affect all areas from archeology to medicine, from construction to heritage. More importantly, the Industry 4.0 signals the end of capitalism as economist Jeremy Rifkin (2016) suggests, while a new economic paradigm is emerging called collaborative commons that will transform our way of life. The aim of this study is to discuss the effects of these changes on theoretical and practical issues related to heritage, including digital technologies available and social and cultural implications of their use. The paper will argue that digital technologies advance possibilities for cultural dialogue that ensures fostering of peace in the World and for our planet Earth.

2. Architecture, Culture, Heritage and Technology

Architecture is a profession that defines spaces to suit certain required functions. As available means are used to define spaces, architecture is directly affected by the materials and technologies available at the time. The development of materials and technologies available for construction always had affected architecture. Furthermore, these new developments cannot be thought apart from the changes in the socio cultural and economic structure of the societies. During the Roman period for example, it was both the availability of the pozzolana in Roman cement that lead to construction of imposing structures but also it was the Roman culture that created a need for the construction of these structures. Architecture and culture coupled with technology are key ingredients to Roman heritage.

The availability of new materials for architects took a new turn after the first industrial revolution that enabled mass production of iron, steel and glass. However, when the technological developments started to take place after the invention of James Watt's steam engine in 1765, architects were almost unaware of their implications for architecture. When social changes started to take place due to the revolution, architects were busy looking for appropriate 'style' for emerging functions such as banks, libraries, hotels, museums, opera houses, train stations etc. They were discussing which 'style' would fit into these new functions based on the ideals of their newly established nation states.

The architects' preoccupation with style and lack of interest with the technological developments are reflected most clearly in the story of the world's first temporary exhibition building. The world's first developed colonial power Britain wanted in 1850 to organize the world's first expo to showcase the latest technologies and innovations from around the world: The Great Exhibition

of the Works of Industry of all Nations. In January 1850 a competition was announced and a committee was formed to select the winning design. The structure had to be as economical as possible and be built before the exhibition was scheduled to open on May 1st, 1851. Within 3 weeks the committee received 245 entries, all of which were rejected. None of the designs would satisfy the requirements until a gardener Joseph Paxton, who happened to be in London and heard about the difficulties, visited Hyde Park where he quickly doodled his famous concept drawing of the Crystal Palace.

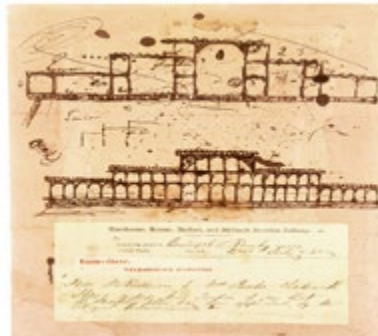


Figure 1 – First sketch for the Great Exhibition Building by Sir Joseph Paxton (1850)

Paxton was just a gardener who started to work in 1823 at Chiswick Gardens which was leased by the Horticultural Society from the Duke of Devonshire. Impressed with his abilities in 1826, the duke appointed Paxton head gardener at Chatsworth House, Devonshire family's large country house in Derbyshire. Here Paxton designed gardens, fountains, a model village and an arboretum. He also built a conservatory, known as the Great Conservatory, and a lily house, specially designed for a giant lily with a design based on the leaves of the plant.

Paxton's interest of building greenhouses led him to be interested with the new technological developments as well. It is known that he was friends with engineers of the period such as Robert Stephenson. Already a famous gardener of the time, Paxton experimented extensively with glasshouse construction. Using combinations of prefabricated cast iron, laminated wood and standard sized glass sheets, he created the 'ridge-and-furrow' roof designs. In 1836 this system was used for the first time in the 'Great-Store' the largest glass building at the time.

Paxton's experiments with glass and iron to build greenhouses were reflected in his concept drawing for the exhibition hall which included all the basic elements of the building. The design was a vastly magnified version of his lily house at Chatsworth. It was cheap, simple to erect and remove and could be ready quickly. Its novelty was its revolutionary, modular, prefabricated design and the extensive use of glass. Impressed by the low cost proposal, the committee accepted Paxton's innovative plan.

Despite widespread cynicism amongst press and public of the period, when the Great Exhibition opened in May 1851 it was an enormous success. The satirical magazine Punch named the building as 'Crystal Palace.' Crystal Palace resembles a giant greenhouse covering 77,268 sqm area. A total of 3350 cast-iron columns were used in the building, 1851 of which stood at the longer side representing its construction year. Its glass walls and roof cover an area of 83,700 sqm. Paxton's ingenious design created an unprecedented exhibition space. The construction, acting as a self-supporting shell, maximized interior space, and the glass cover enabled daylight. The method of construction was a breakthrough in technology and design, and paved the way for more sophisticated pre-fabricated design.



Figure 2 – The Crystal Palace in Hyde Park for Grand International Exhibition of 1851

Between May and October 1851 millions from across both the UK and the world flocked to wonder at the Victorian marvel, firmly planting the building in the public psyche. In October, Paxton was knighted by Queen Victoria when he got his Sir title as well as architect. By the time exhibition closed its doors, much of the British public had grown exceptionally fond of their 'People's Palace' and there was great concern that the temporary structure was about to be lost forever. Luckily, it was re-erected in

Sydenham in south London in June 1854, where it remained until it burned down in 1936.

After the First Industrial Revolution, it took some time for the architects of the time to accept and use the new technologies and materials available as representatives of the new age. It required not only the availability of these new materials and technologies but also acceptance of them by architects first and also by the society leading the way to consider technology as the “cultural manifestation of modern man.”

One of the earliest examples of steel columns is in a public library in Paris, Bibliothèque Sainte-Geneviève (1843-1850). Designed by Henri Labrouste, the building is a representative of how inexperienced and noncreative architects’ of the period were. They were hesitant and non-imaginative to use the new materials such as these slender cast-iron columns shaped as sort of Corinthian columns having set on stone pedestals. From the outside the library just looked like traditional stone and brick buildings without ever indicating the use of iron columns and beams inside.



Figure 3 – Bibliothèque Sainte-Geneviève (1843-1850)

The marriage of architectural ideas with new materials made available by the new technologies had to wait until the pioneers of modern architecture put them into use. Gropius’s glass skyscraper and Le Corbusier’s idea of undivided screens were among the first steps. The time gap between the demise of modern architecture and the technological innovations of first industrial revolution-mass production of glass and steel-is about sixty years.

3. Culture and Technology Today

Today we face a similar challenge as the development of new materials and technologies are at an unprecedented speed. Though there are some architects playing with the possibilities of emerging third industrial revolution there is not enough focus within architectural discourse on the possible effects and interplays between architecture and the emerging new era with its new economic social and political agenda.

Today however, economists, scientists and policy makers in developing countries are talking about the coming of the fourth industrial revolution, termed as Industry 4.0 in 2011 in the Science Fair in Hamburg, Germany, and the Second Machine Age that not only will redefine the way humans live their daily life but also the very definition of human beings. Internet and the new renewable energies were the keys for the Third Industrial Revolution (TIR) that was initiated after the 1970s. Another major development in TIR is the 3D-printing. This new technology changed the manufacturing process from ‘subtractive manufacturing’ into ‘additive’ one that will cut down the materials used to produce goods as well as energy used during the process.

New avant-garde projects are already experimenting with the application of the 3D printing technology. One of such as project is Amsterdam’s 3D-printed steel pedestrian bridge that spans one of the city’s old canals. The innovative Dutch construction company Heijman’s Innovation Manager Jurre van der Ven suggests that we need to start looking at design in a completely different manner since in 3D printing design and construction operate hand-in-hand. Multi-axis industrial robots will construct the pedestrian bridge using cost effective and scalable technologies creating an automatic construction site.



Figure 4 –Amsterdam’s new 3D-printed steel bridge

A new Ukrainian homebuilding startup company called PassivDom uses 3D printing robot that prints 20cm-thick walls, roof and floor of 380 square foot house in about 8 hours. The materials used include carbon fibres, polyurethane, resins, basalt fibers and fiberglass. The windows, doors, plumbing and electrical systems are for now added later on by a human worker. PassivDom's houses are now available for preorder online in Ukraine and US. Their designer Maria Sorokina adds that the homes also offer the possibility of living off-the-grid providing an opportunity to live in nature away from civilization but having the traditional house's comfortable conditions.

One of the world's largest architectural firms, Foster and Partners and a UK based 3D printing company called Monolite have teamed up with the European Space Agency to explore the possibility of using 3D printing to construct a permanent base on the moon. The buildings would be printed using lunar soil as the feedstock. The goal is to construct lunar habitats with locally sustainable materials found on the moon in order to avoid the logistic cost of shipping in materials from Earth.

The developments of Industry 4.0 are way on its way and it will alter many professions and similarly the way we live including the way we produce goods and the way we use them. Digital technologies available are also increasingly getting faster and more developed each day: Limits of image resizing and processing are increasing, new ways for image storage and retrieval lead to new image databases and faster access to images, many documents are digitized for public access including rare books and manuscripts, digital access to many photographic collections are made available each day.

4. Discussion and Conclusions

As discussed above, we have already entered what has been called 'The Second Machine Age.' The Industry 4.0 signals the end of capitalism as economist Rifkin (2016) suggests, while a new economic paradigm is emerging which he calls collaborative commons that will transform our way of life. Today we have more powerful computers, cheaper mass storage, higher bandwidth for internal and global networks, and more importantly softwares and file formats are becoming standardized thus enabling sharing.

With these developments comes the question are digital technologies saving identity of feeding globalization. A case might be helpful to consider this question. Istanbul, for example, is a well known city as it has a long history. But it is not just one city, it houses within many fallen civilizations as well. Its strategic position increased the number of empires the city hosted: Byzantium, New Rome, Constantinopol, and İstanbul. One can do down and down to find remnants of fallen empires. In its long history from a 7th century BC small fishing city of Byzantium turned into Roman Constantinople in 338, and then on 11th century become the capital of Eastern Roman Empire and then at 1453 Ottoman capital Istanbul, and since 1923 the biggest city but not the capital of Turkish Republic. During its long history of 27 centuries, it has been destroyed and built over numerous times, thus history is stacked like bricks each layer buried deeper then the rest. Basilica Cistern known as Sunken Palace (Yerebatan Sarayı) is the biggest underground cistern in the world with its 459ft x 229ft diameter and 336 columns located 7.5m beneath the city. The different historical layers of the city could be made available as cultural restitutions through digital surrogates. VU City project developed by Gordon Ingram and James Hotown Associates might be a good example for understanding these surrogates. They already digitally scanned and produced the city of London as a case for smart city data, i.e. large data readily available for live use. It is a case where city modelling is at a new level; you can see timeline of buildings in London as you desire for example.

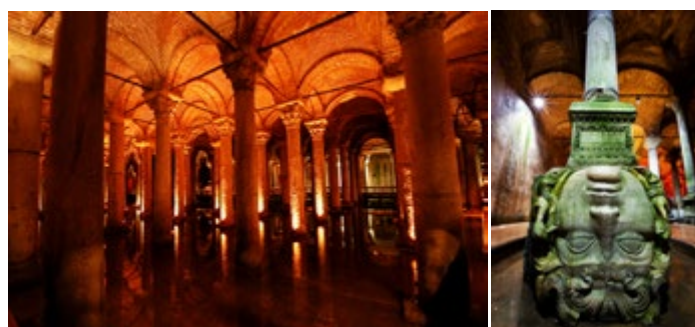


Figure 5 – Basilica Cistern – Sunken Palace (Yerebatan Sarayı) İstanbul

We need to evaluate theoretical and practical implications for many disciplines including art, architecture and heritage as well as education in all disciplines. Today, digital technologies such as the 3D printing and 3D laser scanning might be in still developing, but their properties as well as usage will grow exponentially in the coming two decades as they becomes increasingly efficient and cheaper. Low cost techniques on 3D representation and 3D printing have already started to effect heritage preservation. Many European research projects are already completed such as VITRA (Veridical Imaging for Transmissive and Reflective Artefacts), VASARI, International Dunhuang Project, VU City and Collect Britain. British Library pronounced that the aim is to help

people advance knowledge to enrich lives by aiding scientific advances, adding commercial value for businesses and contributing UK's 'knowledge economy' via innovatively exploiting its collections as a resource for the nation and the world. Some of the

To conclude, digital technologies are new tools that are providing new means for us in our work on cultural heritage as well as via internet platforms getting faster and better we have new ways to share our work with the rest of the world, and we may also have new educational tools soon using 3D virtual reality-VR, augmented reality-AR and mixed reality-MR technologies. We already started to have virtual collections available online. All together they can aid us in creating new ways of communicating to increase much needed intercultural dialogue that fosters understanding and peace among different cultures.

References

İnce Güney, Y. (2017) *Advanced Technology and Architecture: A Critical Analysis* In Proceedings of IATS 17, 8th International Advanced Technologies Symposium (19-22 October, 2017, Fırat University, Elazığ, Turkey)

İnce Güney, Y., Lerner, I. (2012) *Technology and Architectural Education: A Conceptual Framework*. In Proceedings of ICONARCH – I Architecture and Technology International Congress, (15-17 November, Konya, Turkey) p.169-178.

Gelernter, M. (1995) *Sources of Architectural Form*. Manchester, Manchester University Press.

Kostof, S. (ed.) (1977) *The Architect: Chapters in the History of Profession*. Oxford, Oxford University Press.

Kruft, H. W. (1994) *A History of Architectural Theory From Vitruvius to the Present*. New York, Princeton Architectural Press.

McDonald, L. (ed) (2006) *Digital Heritage: Applying Digital Imaging to Cultural Heritage*, Elsevier, Oxford, UK.

Trachtenberg, M., Hyman, I. (1986) *Architecture From Prehistory to Post Modernism*. New Jersey, Prentice Hall Inc.

Rifkin, J. (2014) *The Zero Marginal Cost Society: The Internet of Things, The Collaborative Commons and the Eclipse of Capitalism*. New York, St. Martin's.

Rifkin, J. (2008) *The Third Industrial Revolution*. New York, St. Martin's.

Brynjolfsson, E., McAfee, A. (2013) *The Second Machine Age: Work Progress and Prosperity in a Time of Brilliant Technologies*. New York, W.W. Norton and Company.

The Inhabitat website, (2017), (online), Available: <http://inhabitat.com/amsterdams-new-bridge-will-be-made-of-3d-printed-steel/>

The PassivDom website, (2017), (online), Available: <http://passivdom.com/en/>

MODERN FACADE SOLUTIONS AND THEIR ROLE IN THE CREATIVE CITY STRATEGY FOR URBAN CENTERS

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Abstract

Concentrated on the agglomeration of Poznan, Poland, the paper resumes the outcome of selected academic projects of creative industry enterprises with a special regard to the design methods that were used by the authors to define the building envelopes. Individual to each work, the approach adopted towards facade design will be analyzed three categories. Firstly, in accordance with one of the creative industry architecture's fundamental commitments, that is to broadcast the company's identity, some projects use their innovative facade designs to tell the story about what is happening inside. Another important method departs from a context-sensitive approach. The resulting forms can be described as sculpted solids, characterized by polygonal shapes and unusual rooflines. The third important aspect of creative facade design relies on materials selection. Based on selection of exemplary projects, the paper investigates different applications of contemporary facade designs as well as their prospective influence on the quality of public space. The strategy of locating creative industries serves the purpose of urban renewal, while introducing innovative facades into the historical context is a means of adapting the city to the preferences of the present generation and can constitute a significant addition to the recent evolution of the smart city vision.

Keywords: creative city, innovative facades, building materials.

1. The Concept

The idea of creative industries within the creative city can be seen as a potential strategy of urban renewal. Being one of multiple different ways to respond to the falling attractiveness of the urban centres as well as to the resulting outflow of population towards suburban areas, the idea of the creative city is about adopting such a policy of urban management that would result in attracting creative and innovative individuals, interested in engaging themselves in the cultural industry or in undertaking activity within one of various branches of creative industries, which involve the production of both ideas and material goods. In line with such a policy, location of creative industry plants within urban centres is supposed to lead to the economic revival of their most neglected neighbourhoods and, consequently, to their effective revitalisation. Complementing the defective urban tissue with new creative plants, which improves an existing public space or defines a new one, does also promote creating new job opportunities, enriching the local offer of products and services. It is worth pointing out that the wide diversity of creative industry branches, giving as a result their varied forms and scales, provides them with unique ability to be situated within highly urbanised areas, besides their obvious potential to obtain profits from the growing market. These characteristic spatial features related to creative industry plants decide on their real potential to be used as a means of urban revitalisation through densification.

2. Task for Architects

based on the concept of the creative city, the policy of locating creative industry plants within already concentrated, however neglected urban areas requires providing necessary infrastructure, which must include buildings so as to contain appropriate workplaces. Included in the training program for architecture students at Poznań University of Technology, the task to design a creative industry plant within an urban context responds to the intentional strategy of urban densification and revitalisation of historical neighbourhoods. One of its primary goals is to identify an area concerned by a need to improve its urban landscape. Then, by introducing heterogeneity of both architecture and functionality, the students' projects aim to create new public spaces or to revitalise the existing ones. In order to achieve the effect that would be aesthetically appealing to the present society, an inspiring and innovative architectural design is needed, with facade being its most expressive interface to communicate with the public. Individual to each work, the approach adopted towards facade design tends to determine the most important principles regarding its composition, assemblage technology as well as selection of finishing materials and their colors. These characteristic features of the facade do not only define the perception of the new building itself, but they can moreover influence the users' opinion regarding the quality of the public space that precedes its entrance, hence the importance of its design.

3. Creative facades

facade solutions that are selected, or even especially invented for a particular project, are an important means to express the creative profile of the enterprise to be installed within a building being designed. Firstly, in accordance with one of the creative

industry architecture's fundamental commitments, that is to broadcast the company's identity, some projects are based on the industry's final product's characteristic features as their formal inspiration. In the result of adopting such approach, the design for a creative industry plant is about providing a convenient space for the technology contained within the building and to subsequently wrap it with an innovative envelope. In its turn, the facade tells the story about what is happening inside the building by means of its structure, materials selection and detailing. Innovative facade design, which animates the street frontage and so contributes to the landscape improvement, calls for the use of modern building techniques, suitable to achieve the desired novelty effect. Another important facade-orientated design method for urban creative industry buildings departs from a context-sensitive approach, aiming at the urban landscape's improvement in the first place. Besides the basic principle of volume and height adjustment, this attitude is characterised by a thorough research of such finishing materials that will make the building's facade most sympathetic to the environment. This goal is usually achieved by adjusting the nature, the colour and the tonality of finishing materials to the existing context. At the same time, however, the materials selection responds to the need of representing the building's creative function as well as allows the use of modern technological solutions, which are necessary to communicate with the present generation. The application of varied design principles related to the facade can be exemplified through selected projects elaborated by students at Poznań University of Technology within the recent years. Their works can be systematised into three following categories according to the architect's main focus on one of the various aspects that refer to the facade design.

3.1. Innovative envelopes

The first design approach, that turns out to be frequently used and to produce successful facade designs results from the architect's interest in expressing the creative profile of the enterprise to be housed within the building. Invented especially for one single project and most often inspired by the characteristic features of the selected industry's final product as well as by its manufacturing process, an innovative facade system animates the street frontage and contributes to improving the quality of public space. Moreover, by expressing the building's creative function, innovative facade systems inspire the users of the adjacent public space with the idea of creativity.

A proper example of such design attitude is represented by the project of a creative firm devoted to designing and manufacturing different types of glass decorative elements that contain green moss in their interior, which was elaborated by Edyta Cieślak. The architectural form of the building is based on an orthogonal layout that corresponds to the glazing net and, more significantly, to the modular facade panels. Invented by the author for this particular project, special facade panels are characterised by a metal mesh surface on which green moss is grown for the purpose of supplying the creative industry company housed inside with one of the required raw materials. In order to be fully operational, the facade system was equipped with pivot joints that allow each panel to rotate inside out for the collection of moss planted on the outside. In order to ensure ease and safety of use, the void provided between the glazing and the building's outer envelope contains an ergonomically sized footbridge for the staff charged with both the maintenance and the collection of plants. Besides its importance for the building's principal user, the vertical plantation of moss stretched over the facade, does also play an important role in revitalising the adjacent public space. Located in one of the city's rather neglected neighbourhoods, the plot that was selected for the project is small in scale, yet particularly important for the local area, as it ends a city block and faces a triangular public space situated at the Y-shaped intersection of two streets. This particular location provides the building's main facade with good exposition to the sunlight, which is necessary for the growth of plants. Moreover, by acting as a vertical garden orientated towards the public space, the innovative green facade conceptualised in relation with the concerned project can also be seen as a means of improving purity of air within a city centre location.

Another illustrative example of an innovative approach towards the facade design can be identified in the project of a fashion house, designed by Kaia Korpa. Having selected a narrow and elongated plot located in a downtown, the student has focused on elaborating such facade finishing system that would be suitable to express the aesthetic philosophy of the fashion company installed within the building, despite its tiny width. Referring to the fashion design's innovative ways of working with textiles, the student decided to shield the facade with pleated fabrics from the first floor to the building's top edge. Covering the building's front nearly entirely, the fabric was selected with a careful regard to its technical characteristics, which need to make it suitable for outdoor use, weatherproof and safe for pedestrians walking below. Forming uniform pleats, the shield can be unveiled at an angle like a curtain so as to regulate the amount of sunlight falling inside. Moreover, even while stretched to a maximum coverage mode, the shield works as a sun filtering screen, giving lots of natural light without the glaring effect. Thanks to the spontaneous and variable way of veiling the shield, the building facade stands out from its surroundings, although being only a narrow slit within the street frontage. It is particularly expressive after dark, when and the people working inside the building's illuminated spaces diffuse delicately into shadows. By daylight or by night, the everyday functioning of the fashion brand housed within the building runs ordinarily beyond its facade. The workspaces required by the programme are sorted depending on the production stage and distributed over successive floors. In consequence, the creation of individual fashion designs as well as the manufacturing process runs from one floor to another, with the top level reserved for recreation and socialising among the employees.

The design principles aimed at making the building's facade broadcast information about the creative activity housed inside is also represented by the project of a stained glass studio, elaborated by Wiktoria Przedpejska. The titanium zinc framing, which divides the building's elevations into vertical stripes, was actually inspired by the net of lead elements forming the stained glass'

structure. Moreover, the light diffusing effect of stained glass has inspired the idea of openwork panels mounted over a portion of facade's surface. Finally, massive wooden frames installed within the facade make reference to the concept of framing a work of art. While the building's facade is intended to express the activity housed inside, its volume is unreservedly adjusted to the area's spatial norms. Situated in a neighborhood which has been until now considered as a rather evil quarter, this project contributes to the district's most recent revival as a Bohemian centre, attracting artists and artisans. Searching for an equilibrium with the area's modest yet historical character, this project also aims at improving the quality of urban landscape. Preceded by a mindful analysis of neighboring architecture, including its functional profile, accessibility, average building height and other factors, the choice of site and function is intended to ensure the new development's right scale adjustment in relation to the existing context. Consequently, the proposed new architecture respects the height of the neighboring buildings' cornice lines. When it comes to the selected function, a stained glass manufacture that the building houses was modeled on an existing family-run artisan atelier, offering professionally executed products despite the very limited spatial conditions. Covering all production stages, the new building designed by the student can also be visited as a living museum, playing a culture-making role within its neighborhood. Welcoming visitors, the building also contains a shop, a gallery and a cafeteria. Multifunctional despite its small scale, the building serves as a cultural centre in its neighborhood and supports its social and economical activation.

3.2. *Sculpted-in solids*

The project of a stained glass studio in Poznań, cited above with regard to its facade, which was inspired by traditional stained glass manufacturing and aimed at communicating the building's utility to the public, did at the same time introduce another important factor that expresses itself through the building's volume as well as through facade divisions. This factor can be resumed as fitting the contextual frame. One of its most significant tools that influence facade design corresponds to a sculptural approach to the architectural form. Creating a solid that is sculpted by an architect in order to harmoniously blend into the context requires using modern facade solutions, which allow to give real dimension to irregularly shaped conceptual forms.

The use of contemporary envelope techniques in implementation of architectural forms resulting from the architect's sculptural approach towards the building's solid can be exemplified by several academic projects, like for example the design of a music recording studio elaborated by Andrzej Woźniak. Situated on a city block corner in a downtown location, the selected site is characterized by different roof levels on its both sides. Finding a form which would smoothly connect them became the student's first concern. This has been resolved by an irregularly sloping roof, which animates the composition and, at the same time, enhances the existing landscape. In consequence of the roof's irregular form, the window openings are not all lined up. A few of them are roof windows and some others are shaped as boxy, shallow bay windows. Somewhat contradictory to the building's bold form is the choice to cover its entire exterior with only white-colored materials, mainly with white Corian panels. According to the author, this decision was made in order to slightly tone the building's impact and to reduce the role it plays within its historical surrounding to the background architecture. When it comes to the building's functional profile, the choice of the music branch resulted from realization that Poznań does not offer many places of this kind at the moment. Intentionally multifunctional in order to benefit from a potential synergy effect, the project contains a variety of spaces. First of all, there are several listening, rehearsal and recording rooms, which can be flexibly reshaped due to the usage of sliding acoustic panels and which are all equipped with necessary facilities. There also is an auditorium, which can be adapted to accommodate chamber concerts and, moreover, a two-storey restaurant provided with a stage so as to contain special events. In addition, the building's ground floor contains a luthier's workshop and a music retail store, both provided with direct access from the outside. A major, worth mentioning complication that the student has encountered during the design process was to eliminate vibrations and noises from the nearby street and a tramway line. The proposed conceptual design of the soundproofing system is based on the idea of mobile, perforated acoustic sandwich panels which can be used to reshape rooms as well as to temporarily cover the windows or other elements causing reverberation. Along with this solution, the permanent walls and ceilings would be overlaid with soundproofing pyramidal panels.

Another interesting project that uses modern envelope technology in order to cover irregularly sculpted building's solid is the design of a furniture factory made by Natalia Okraska. Inspired by the city's heterogenous character and its innate functional diversity, this project aims at resolving two major problems identified within the project's location area. First one is a social need for diversified job opportunities within the district. In order to respond to it, the student has proposed a variety of functions within the building, the principal of which covers all stages of producing furniture, starting from the design and ending at retailing. Beside that, the project houses many additional functions including a restaurant, rentable office space and flats, as well as a gallery and a summer cinema. The last two functions are intended to enrich the neighborhood's cultural offer, while its main, production profile aims at strengthening local economy. The second identified problem is related to the question of the landscape quality. The site selection was made with the student's special intention to improve the district's appearance and, at the same time, its reputation. Yet, the building is sympathetic to the local architecture by closing the city block's corner and connecting the two adjacent frontages. Besides trying to find the right roofline so as to join the two different building heights, the project also aims at revitalizing an existing outbuilding at the site's rear. Providing comfortable access as well as optimum quality and quantity of natural light into this building has imposed the project's first and principal guidelines, like gradual height reduction in front of the concerned building or keeping a considerable distance from its windows. Moreover, having identified the need to provide pedestrian access throughout the site, the student decided to arrange a green, landscaped courtyard within the block's

interior, referring to the traditional city block design. Consequently, all production spaces are located in the basement, which has seriously complicated the design. The polygonal skylights that allow natural light to enter production spaces situated below the courtyard do also enhance the design of the public space provided on the ground level. The sculpted form of the building, which results from a three-dimensional analysis of all conditions and constraints related to the site, needed such a facade technology that would easily adjust to polygonal, often irregularly shaped planes. The student has selected corian panels in two basic colors, common in the area, that are used over the building's elevations, bending over its roof slopes as well. In order to make the joint between the walls and the roof purely graphic, the roof is equipped with a hidden drainage system.

3.3. *Modernity's favorite materials*

The third important approach to define building's facade in a way that highlights and transmits its creative functionality is based on the use of the most popular among the contemporary materials, that are metal and glass, but in a new take, less usual and often innovative.

Among various contemporary building envelopes using metal sheets, which differ by their texture and color, some recent implementations as well as some student's projects found interest in blending corten into a historical brick background. This was for example done by Zuzanna Piłkuła in her design of a bakery, situated in one of the oldest neighborhoods in Poznań. The project was from the beginning marked by the student's prudent attitude towards the existing context, understood as the district's built heritage as well as its immaterial character. Having analyzed the neighborhood's existing architecture, the student has identified a multitude of brick tenement buildings, which she decided to refer to in her project. Following the principle of opposition, she decided however to resign from using brick. Instead, she proposed to cover the building's elevations with corten sheets in which rectangular, brick-sized shapes have been perforated so as to make reference to the traditional brick wall. At the same time, the new development respects the height of neighboring buildings' cornice line. Particularly focused on complementing and on improving the street frontage, the presented project undertakes a successful dialogue between new and old. Besides her concern about the quality of urban space, the project's author has also rethought the production profile to be installed within the building. Having thoroughly researched among various branches of creative industries, with an objective to identify one that would be most empathetic with the district's character, the student selected to realize a multifunctional building that houses a bakery, a confectionery, producer's boutique and a restaurant. Divided over five floors, the functional layout of the enterprise permits a customer to observe the whole production process on the way up to the restaurant, which is situated on the top level. Entirely unlike the industrial, large-scale bakeries, this one is conceived as a place of artistic creation and interaction, covering all production stages from a concept to packing, including packaging design as well as marketing department.

The combination of a contemporary architectural form covered with corten sheets with the historical brick neighborhood was also tested by Joanna Załuska in the project of a model workshop. One of the first decisions that the student took during the design's conceptual stage was the choice of an opaque, solid form with a single cut out which continues from the ground floor to the building's top. This decision was intended to make a reference to the process of maquette building, which traditionally consists of cutting the cardboard for elevations and subsequently applying the details. Having defined the building's architectural form, the student commenced a search for its most adequate skin. Taking into consideration the need to provide natural lighting of workplaces and, at the same time, the determination to maintain the concept of a solid form, an idea to cover the elevations entirely with finely perforated panels was developed. The design's next stage involved many graphical tests which aimed at identifying a finishing material that would assure the panels' best fit to the neighboring brick dwellings. Having tested by means of visualization the relationship between the brick and a few different materials, the final choice fell on corten as the most sympathetic one.

The use of perforated metal panels on the building's facade has proven to be very versatile when it comes to signaling various creative activities contained inside. Various academic projects have tested individually designed perforations, diversified when it comes to their shape and size, which are supposed to refer to the particular activity. This is for example the case of a fashion atelier designed by Miłosz Korczak. Covered with black, perforated panels with a houndstooth pattern, the elegant and simple elevation is meant to express the enterprise's identity and also its complex functionality, combining haute couture and prêt-à-porter type of fashion design and sewing. Apart from the usual activities taking place in such an enterprise, like designing, modeling outfits, tailoring and sewing, the building is also prepared to house various events. Owing to a multifunctional, polyvalent space provided on the ground floor, it can house fashion shows, conferences and many other types of cultural events. The building also ensures proper spaces for catering preparation as well as a number of offices to contain administration and marketing departments. Finally, it also contains a retail store and a showroom. Such multitude of functions is supposed to make it a lively place, not only an expensive boutique, but also a local cultural centre. The selected corner location has imposed various problems which at the same time became tangible guidelines for the form composition. Particularly, the two different cornice levels on the site's opposite sides gave as a result the building's height graduation. Then, a need to naturally complete the city block was an impulse to propose the building division into three volumes, the proportions of which correspond to those of older buildings in the neighborhood. Finally, the student found inspiration in the shape of local typology related to the courtyards and has skillfully transformed them into the building's layout. The context-sensitive composition of the building's form might feel contradicted by its modern facade. Reconciling the investor's natural desire to stand out with the architect's aim to improve the

urban landscape, this project is a proper example of how plastic the creative industries are when it comes to combining social, economic and aesthetic goals within one project.

Among the design principles focused on contemporary building materials it is worth to mention also a purely ideological approach to their nature and source. This attitude is represented by the project of a recycled furniture workshop elaborated by Alicja Kubicka. Following the selection of a creative industry branch based on recycled materials, a series of consequent choices was made by the author. First of all, the selection of a site, which is situated within a former slaughterhouse complex, more recently transformed into a flea market and furniture renovation base, is an important statement in terms of urban revitalization. Besides its functional adjustment to the site's established character and opening new perspective for the local labor, the new development also aims at introducing novelty design, suitable and attractive for the modern information society. Moreover, inspired by the typology of the site's existing architecture, the student decided to reinterpret the typical, historically grounded form of industrial nave. A very important point of this modern reinterpretation is the nature of used finishing materials. The careful combination of brick, corroded metal sheets and aged wood makes reference to the recycling as a concept and as a lifestyle, diffusing its philosophic principles. In order to manifest the creative way of working with recycled materials that takes place inside, the entrance area of the building is enclosed within a truncated cone form with its skin layer of corroded metal sheets cut into polygonal shapes and mounted over metal framing.

Another material that holds a significant position in contemporary architecture is glass. Its principal merit, when used for facade glazing, is its transparency which allows to see the building's interior from the outside. In consequence, the creative activity taking place inside is displayed to the sight of a passerby. Such intention has accompanied the choice of glazed curtain wall for the project of the Design Courtyard in Poznań, elaborated by Filip Zieliński. In this case, the proposed building form found its beginnings in an in-depth analysis of the existing urban typology as well as in the relevant conditions and constraints. Small width of the street as well as the resulting problem of the insolation of its opposite frontage have inspired the student to develop the concept of reversed city quarter. Accordingly to this idea, its court has been opened to the street, creating new semi-public space, which remains integrated with the proposed new building. Predominantly glazed, the facades of the courtyard invite to observe the daily functioning of different design industry branches hosted within the building. On the opposite side, the site's back perimeter has been entirely closed by the building's body that stretches along the existing windowless walls of neighboring dwellings. Moreover, the building's front wing, which is advanced towards the street, is characterized by a limited height in order to avoid excessive shading of its interior as well as to minimize the narrowing effect.

Finally, a particularly interesting approach to the notion of transparent facades is represented by the project of a shoe design atelier elaborated by Maria Wójcik. By the decision to use glass bricks, which is blending smoothly with traditional terracotta upwards in the direction of the building's roofline, the student intended to catch the eye of the company's potential clients. At the same time, the translucency of the ground level is supposed to make the adjacent public space more lively and to reinforce the visibility of the firm's final product for sale. Looking up in the direction of the roof, the transparency is reduced by the increasing quantity of traditional terracotta bricks. At the building's top, the sloped roof covered with metal sheets adjusts itself to the solids of adjacent dwellings.

4. Contemporary facade solutions and creativity in urban context

These and more examples of academic architectural projects aimed at blending new creative firms into the established urban context prove how creativity can be manifested to the outside, improving the quality of public spaces and inspiring their users with new ideas regarding creative work opportunities nowadays. In the hands of the architect, the building's envelope turns out to be a significant tool used for blending new architecture into its contextual frame and, at the same time, for highlighting the investor's creative profile. Individualized and intriguing architecture of creative firms is not only meant to improve the attractiveness of the urban landscape, but it is also seen as a means of creating a company's recognizable image. It is likewise supposed to build the company's prestige and therefore bring advantages in the market competition.

While most contemporary and innovative facade solutions can be used on various types of buildings without any special relationship to their function or scale, the creative industries can potentially inspire its architectural design from a conceptual stage, supplying the designer with ideas corresponding to the principle functional characteristics of creative industries. Commercializing ideas and unique products, creative industries remain nonetheless focused on conceiving, transmitting and materializing symbols and they usually refer to an individualized, personified client. The characteristics of selected creative industry branch can be interpreted by an architect in order to produce an individual, customized building envelope and, moreover, they have a potential to be transformed into spatial relations between different architectural objects and the adjacent public space, conveying the concept of creativity onto the urban level. This, in turn, supports realization of the policies related to the concept of the creative city. The network of connected public spaces with creative industries carved into it, is also a potential, significant component to the idea of the smart city, responding to the problematics of urban densification and revitalization of historical neighborhoods at the same time. The concept of the smart city, which is sometimes simplified to the efficiency alone, is also about improving the quality of urban life. This, in its turn, requires better public spaces, situated also in neglected, although often historical, districts. Amelioration of urban life does moreover depend on attracting innovative enterprises as well as creative individuals. In this sight, the idea of creative industries within the creative city is convergent with strategies related to the idea of the smart city.

References

- Bonenberg W., *Przemysł w Mieście. Ekologiczna metoda modernizacji zakładów przemysłowych zlokalizowanych na obszarach intensywnie zurbanizowanych*, Zeszyty Naukowe Politechniki Śląskiej, Gliwice 1985.
- Carta M., *Creative City. Dynamics, Innovations, Actions*, List, Barcelona 2008.
- Cherbo J., Wyszomirski M. (eds), *The Public Life of the Arts in America*, Rutgers University Press, New Brunswick, NJ 2000.
- Drury J., *Factories. Planning, Design and Modernisation*, The Architectural Press, London 1981.
- Flew Th., *The Creative Industries. Culture and Policy*, SAGE Publications, London 2012.
- Fusco Girard L., Baycan T., Nijkamp P., *Sustainable City and Creativity: Promoting Creative Urban Initiatives*, Ashgate Publishing, Farnham UK 2011.
- Gehl J., *Life between buildings. Using Public Space*, trans. Koch J., Island Press, London 2011.
- Landry Ch., Bianchini F., *The Creative City, Demos*, London 1995.
- Landry Ch., *The Creative City: A toolkit for urban innovators*, Earthscan, London 2000.
- Smoleń M., *Przemysły kultury. Wpływ na rozwój miast*, Wydawnictwo Uniwersytetu Jagiellońskiego, Kraków, 2003.
- Steward W., Kuska Sh., *Developing and Sustaining Creative Cities: A Sustainability Tool for Designers, Planners and Public Administrators*, [in:] *Sustainable City and Creativity: Promoting Creative Urban Initiatives*, Naples, 24-26 September 2008.
- Venturi R., Scott Brown D. and Izenour S., "Learning from Las Vegas: The forgotten symbolism of architectural form", Revised edition, The MIT Press, Cambridge MA 1977.
- Webber M.J., *Location of Manufacturing Activity in Cities*, [in:] *Urban Geography*, Volume 3, Issue 3, 1982.
- Yencken D., *The Creative City* [online:] *Meanjin*, Vol. 47, No. 4, Summer 1988, pp.597-608.

MODERN DIGITAL TECHNOLOGIES IN THE ARCHAEOLOGICAL DOCUMENTATION ON THE EXAMPLE OF URBAN FORTIFICATIONS AND RESIDENTIAL BUILDINGS

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Abstract

The objective of the paper is to present the results of research and documentation methods established by using modern digital technologies (including photogrammetry and 3D documentation). An example will be a comparison of research results from two archaeological sites in Poland with different cultural context – modern residential buildings in Warsaw (Masovian Province) and the castle of the Teutonic Order in Pasłęk (Warmian-Masurian Province). We would like to draw attention to the need and necessity of using such documentation methods in archaeological research for proper protection of cultural heritage.

Keywords: 3D documentation, archaeology, urban architecture

1. Introduction

The archaeological heritage is undoubtedly one of the most important elements of the culture of humanity. Due to its values, it is an extremely valuable testament passed down from one generation to another. However, as a non-renewable source it is exposed to irreversible loss of the content it transmits. Improper and excessive use of this resource, also for scientific purposes, leads to its depletion. Threat to archaeological monuments include, among others, detectorists who illegally dig out artefacts, at the same time destroying immovable monument objects together with their context. The excessive and uncontrolled tourism is also a devastating factor. In addition, the archaeological heritage is exposed to being destroyed by uncontrolled investments.¹ Therefore, it is worth asking yourself how we can get information and scientific values out of the archaeological heritage. At the same time we must remember to document it properly and leave it for next generations of humanity.²

One of the possibilities is usage of digital documentation during the excavations. When the preservation of archaeological objects is not possible, new documentation methods allow to save the valuable information. Former documentation methods – drawings and basic photographs do not always reflect these elements with proper accuracy. The development of these techniques leads to the preservation of the archaeological heritage. One of this methods is recently commonly used photogrammetry, presented in the paper on the example of archaeological research at Pasłęk and at the Wola district in Warsaw.

2. Archaeological excavations at Wolska Street in Warsaw

Archaeological research in the area bounded by Wolska, Okopowa and Solidarności streets was conducted at the turn of July and August 2016.³ Archaeological excavations were associated with pre-investment activities preceding the construction of the new apartment building. The Warsaw Monument Conservator decided to commission archaeological research of this area, due to rich history of Warsaw's Wola district, connected not only with the history of the Second World War.

Excavations covered the area where the history of permanent urban development dates back to the second half of the 18th century. Already in 1838 wooden houses were replaced with brick ones. The new frontage of tenement houses has rapidly changed the urban landscape. The modernization of the district was not limited to residential buildings. In the same time, the farm buildings located at the back of the parcels, were also rebuilt.

In the mid-19th century, the frontage of Wolska Street was fully developed. At that time, in the north-eastern part of the parcel, a hospital was built and it is visible on pre-war maps. Just before the Second World War outbreak, in the years 1937-38, further changes were made in the management of this area. On parcel No. 6, a modernist-style tenement house was erected. The building No. 10 was demolished in order to erect further residential buildings in its place, but construction work was interrupted by the outbreak of the war. Most of the buildings at Wolska Street were destroyed due to war activities and the area was not rebuilt after 1945. The post-war reconstruction of the Wola district changed the spatial layout, while the street network were modernized. For this very reason, the so-called "Serek wolski" has been subjected to excavations within visible limits.

Archaeological research⁴ allowed to reveal the western part of foundations of the two-pronged front house at Wolska 10. Only the foundations of the northern and southern facades have been preserved. In addition, the walls of four cellar rooms, located in the eastern part of the trench, have also been preserved. At the back of the parcel, the basements of the western

1 "Land use must therefore be controlled and developed in order to minimise the destruction of the archaeological heritage", see: ICAHM 1990: Article 2.

2 Kobyliński 2009: 111.

3 The archaeological excavations were conducted by Wawrzyniec Orliński and Andrzej Jankowski.

4 Description of archaeological research comes from the as-built report prepared by W. Orliński, see: Orliński 2016. Information about excavation research at Wolska Street, see also: www.archeologiawolska.pl.

one-story annexe were uncovered. Preserved outbuilding basements consisted of nine rooms with a staircase. During the works, well-preserved foundations of the front building from Wolska 12 Street were uncovered. It was the two-bay building with a gate in the axis of the house. In the northern part of the trenches, the remains of the Aleksander Feist's brush factory were discovered. It was also a two-bay building with two larger rooms in the western part, a series of smaller ones in the eastern part and with a separate corridor in the north. In the basement of the building a large part of the concrete floors have been preserved. During the research, various types of documentation were carried out in order to accurately capture the information about history of this place. First of all, a classical documentation was made. Exposed buildings, as well as other objects located in the courtyards, such as wooden wells have been drawn. In addition, discovered basements, as well as artefacts (e.g. sewing machines) have been photographed. However, it was decided to prepare a more precise digital documentation. Due to the chronological diversity of the discovered buildings, it was planned to prepare the area for the orthophotography (Fig. 1). The documentation allows not only to follow the development of the Wolska Street, but also the diversity of architectural styles. Therefore, the faces of the walls have been documented (Fig. 2) and the results have been used for further architectural analysis. On the basis of the processed orthophotography results a plan of the examined area was created, which greatly facilitated the preparation of further analysis of building structures. The numbering of rooms was applied to the plan and used during the excavation works.



Figure 1 – Plan of tenement houses foundations, outbuildings and factory discovered at Wolska Street in Warsaw (done by S. Rzeźnik and J. Zakrzewski).



Figure 2 – The face of one of the walls at Wolska Street in Warsaw (done by S. Rzeźnik and J. Zakrzewski).

The above-described form of documentation allowed to reliably document the uncovered cultural layers, which provenance was confirmed by historical sources. Architectural stratification creates new opportunities for the historians of Warsaw city and for architects to conduct further analysis of urban layouts of areas almost completely devastated during the Second World War. Such documentation also makes it possible to visualize the scientific and informational values of the archaeological heritage. In addition, it is a contribution to the creation of conservation recommendations for further activities aimed at protecting, but also popularizing knowledge about the history of the city. At the same time, it is also an important element of future guidelines for conservation services. They, based on new knowledge, may require from investors to organize an archaeological excavation, instead of only supervising the area during the construction works.

3. Archaeological excavations at Pasłęk

Pasłęk is located on the northern edge of the Iława Lake District, in the Masurian-Warmian Province. From July to August 2017, excavations were carried out in the area next to the castle located in the middle of the town. The area of the former moat is a subject of legends told by the inhabitants about the old tunnel leading from the castle to the church of St. Bartholomew. However, the main purpose of the excavations was to verify the results of non-destructive geophysical research conducted a year earlier.

The pre-location settlements of this area were connected with Old Prussians (former names: *Paslok* or *Paczlog*).⁵ At the end of the 13th century the town Pasłęk was founded based on German law. The first parish church also comes from the same period. Mentions about the Teutonic Castle can be found in historical sources dated back to 1267.⁶ Most likely it was a stronghold with a wood-earth structure and surrounded by a moat. Already in the mid-fourteenth century it was rebuilt. At that time, a stone and brick construction was erected. The city walls were then modernized, and the main building material became brick, which replaced previous constructions.⁷ The next rebuilt took place in the seventeenth century. The body of the castle was then a closed square with a courtyard in its interior. The cubature of the building has been growing continuously until the 19th century. Unfortunately, the castle was almost completely destroyed during the Second World War.⁸

For such a historically rich area a two-stage archaeological research was planned. The first stage was related to the non-destructive geophysical methods. Research using electro-resistance and geomagnetic methods revealed remnants of architectural structures. The second stage of the archaeological prospection involved excavations in the area. The purpose of the excavations was to verify the observed anomalies, as well as to recognize the cultural accumulation of the area directly adjacent to the Teutonic castle.⁹

During excavation works, moat layers were found. The defense moat was leveled in the middle of the 19th century, when the town was cleaned up after a fire. Moreover, during the excavations, the construction of a brick cistern, dated to the 19th century was discovered. to the 19th century was discovered.

Archaeological research led to the unveiling of a that separated the castle from the moat. In addition, in a trench between the castle and the uncovered wall, remains of cultural layers associated with the first phase of the castle (13th century) and even older settlements were unearthed.

Objects found during the excavations were documented as accurately as possible. Also in the case of that research, classical methods of documentation in the form of photographs and drawings were carried out. Besides, photogrammetry of exposed plans as well as earth and wall profiles were also made (Fig. 3). Laser scanning was used to obtain a three-dimensional terrain model of the site.¹⁰ Thus, discovered architectural remnants, including a wall, were documented (Fig. 4). It is worth to mention that three-dimensional models of movable monuments were also made.¹¹



Figure 3 – Results of photogrammetry of the face of the wall at Pasłęk (done by R. Solecki).

5 Długokęcki 1997a: 255-265.

6 Długokęcki 1997b: 267; Salm 1997: 238.

7 Długokęcki 1997b: 262; Salm 1997: 238-239, 244.

8 Wójcik 2000.

9 Wysocki and Solecki 2017: 2.

10 Model was made by Regional Digitization Laboratory in Elbląg, see: <http://www.cyfrowewm.pl/>

11 FARO Focus 3D X330 HDR equipment was used to make three-dimensional plans, Artec Spider was used for artefacts.



Figure 4 – 3D model of the excavation area at Pasłek (done by Regional Digitization Laboratory in Elbląg, after: <http://www.cyfrowewm.pl/obiekt/522/stanowisko-archeologiczne-w-pasleku#tab2>)

4. Conclusions

Modern methods of documentation are of great importance, especially in the case of artefacts discovered during excavations. The possibilities presented above, according to the authors of this article, should constitute elements of all archaeological and architectural research.

The classic methods of documentation, although undoubtedly valuable, are not always accurate enough. They are also time-consuming, at least in the case of drawing documentation. Therefore, it is worth to exploit other possibilities which often allow for the maximum acquisition of information about the studied area.

The photograms allow for the reconstruction of shapes, sizes and locations of objects in the field. These photos are combined with accurate data obtained due to measurements made with the Total Station. Due to such processed photos, photographic documentation is embedded in geodetic coordinates. This allows for an extremely accurate location of discovered archaeological structures. On such prepared plans, there is no problem to recognize latitude and longitude, and in the profile picture it is possible to quickly read the altitude of any unit (Fig. 3).

It is equally important to prepare three-dimensional models of unveiled architectural objects. This allows to present the monuments after the completion of research works, as well as it is a perfect carrier of information, practically unpolluted interpretation of researchers. It can also be an interesting element in popularizing the results of archaeological work, because it is not directly related to the place of discovery. Transferred results of excavations can be presented, for example in schools. In addition, it is an interesting element that can become a part of the museum exhibition.

It should also be noted that in the case of the two above-described examples of archaeological research, one of the overriding objectives was to verify historical applications (Fig. 5). Therefore, the usage of documentation advanced in terms of technology is important. It allows for an accurate comparison of historical sources with research results, which often reveal damaged architectural remains. Such documentation has become the carrier of newly acquired data, which is extremely important itself. The value of artefacts as well as archaeological sites is incomparable when it is possible to fully acquire, preserve and transfer this scientific and historical information.



Figure 5 – Plan from the excavations at Wolska Street in Warsaw imposed on an aerial photograph taken during the Second World War (done by K. Zdeb).

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References

- Długokęcki, Wiesław (1997a) *Dzieje miasta Paśtęka w latach 1297-1454*, in „Paśtek Z dziejów miasta i okolic”, ed. by Józef Włodarski, Paśtek: Urząd Miasta i Gminy w Paśtęku, 1997, pp. 255-266;
- Długokęcki, Wiesław (1997b) *Paśtek jako ośrodek administracyjny i gospodarczy zakonu krzyżackiego*, in „Paśtek. Z dziejów miasta i okolic”, ed. by J. Włodarski, Paśtek, 1997, pp. 267-272;
- International Committee for the Management of Archaeological Heritage (ICAHM) (1990) *Charter for the Protection and Management of the Archaeological Heritage*, Lausanne;
- Kobyliński, Zbigniew (2009) *Własność dziedzictwa kulturowego. Idee – problemy – kontrowersje*, Warszawa: Instytut Archeologii i Etnologii PAN;
- Mieszkowski, Radosław and Jacek Wysocki (2016) *Kompleksowe rozpoznanie geo-archeologiczne obszaru wokół zamku w Paśtęku*, report commissioned by Paśtek Municipality, Piastów;
- Orliński, Wawrzyniec (2016) *Sprawozdanie powykonawcze z badań archeologicznych przeprowadzonych na terenie działki nr 2/6, obr. 60403 z terenu dzielnicy Wola w Warszawie, październik 2016 r.*, Warsaw Monument Conservator;
- Salm, Jan (1997) *Z problematyki rozwoju przestrzennego Paśtęka*, in „Paśtek. Z dziejów miasta i okolic”, ed. by Józef Włodarski, Paśtek: Urząd Miasta i Gminy w Paśtęku, 1997, pp. 225-253;
- Wójcik, Ryszard (2000) *Lochy Paśtęka. Kulisy poszukiwań skarbów w Polsce*. Warszawa: Cinderella Books;
- Wysocki, Jacek and Rafał Solecki (2017) *Sprawozdanie z archeologicznych badań wykopaliskowych przeprowadzonych w 2017 roku na obszarze przylegającym od zachodu do zamku krzyżackiego w Paśtęku*. Provincial Office of Monument Preservation in Olsztyn, Elbląg Branch.

Internet sources:

Badania archeologiczne „serka wolskiego”, www.archeologiawolska.pl (accessed 20.02.2018).

THE ANCIENT KNOWLEDGE OF SOUND. ARCHAEOACOUSTIC ANALYSIS OF THE PYRAMID OF BOMARZO AND THE SURROUNDING AREAS IN LAZIO, ITALY

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Abstract

The term "archaeoacoustics" does not simply mean the study of sound in archaeological contexts, but also the study of all physical phenomena in these sites. Using an archaeoacoustic approach it is possible to measure the frequencies of natural sounds and magnetic fields of archaeological sites and to interpret their possible sacred function. In previous research our research group (SBRG - Super Brain Research Group), a interdisciplinary team of researchers from various European countries, has demonstrated in some ancient temples the existence of a relationship between mechanical vibrations or magnetic fields induced by natural phenomena and brain activity. For the pyramid of Bomarzo, an ancient archaeological site in Lazio (Italy), we applied the same standard of research that we have used for several years. It is without doubt that the Bomarzo pyramid area owns typical characteristics of similar sacred sites we have previously examined in other locations. The presence of 14Hz almost everywhere at different volumes in the Bomarzo pyramid area is a feature we have often met with at other sacred sites such as Sogmatar and in Göbekli Tepe in South Anatolia where it was also possible to localize a similar powerful magnetic field as in the Bomarzo pyramid.

Keywords: sound, archaeoacoustics, Bomarzo, pyramid

1. Introduction

During the nine months of gestation a fetus perceives the beating of the maternal heart. This sound is the first thing that human beings perceive even before seeing light. So a constant rhythmic sound will always be part of a human's genetic heritage. It is the beating that marks the presence of life. For the first hominids living on Earth this heritage helped ensure their survival. Everything they smelled, saw and in particular the sounds they heard were certainly perceived and assimilated in the same way as the animals with which they shared the external space. Living in symbiosis with nature, free from any form of pollution, they instinctively perceived inaudible vibrations very clearly. Listening to the silence they learned to refine their senses and realized there was a relationship between vibrations coming from a particular location and their effects on the human body. In the same way, but using an empirical approach, they recognized strong natural magnetic fields able to heavily influence brain activity. Considering these two observations the choice of their sacred places would not have been by chance. The term "archaeoacoustics" does not simply mean the study of sound in archaeological contexts, but also the study of all physical phenomena in these sites. Using an archaeoacoustic approach it is possible to measure the frequencies of natural sounds and magnetic fields of archaeological sites and to interpret their possible sacred function. Archaeoacoustics can also help explain why some ancient structures were built or carved in certain locations. Firstly because natural sound phenomena have been used to create suggestive rituals in many civilizations, and secondly it is also known that some ancient structures have been specially modeled to directly affect the mind producing an altered state of conscience [1,21]. In previous research our research group (SBRG - Super Brain Research Group), an interdisciplinary team of researchers from various European countries, has demonstrated in some ancient temples the existence of a relationship between mechanical vibrations or magnetic fields induced by natural phenomena and brain activity [2 - 20, 23]. Using modern technology, able to recognize vibrations and magnetic fields, and after studying about forty ancient sites from 2010 to 2017 in Europe and Asia Minor, we can say there are natural phenomena in some archaeological sites, considered sacred for thousands of years, which make these sites more mystical than others. So for the Pyramid of Bomarzo, an ancient archaeological site in Lazio region (Italy), we applied the same standard of research that we have used for several years [2 - 20, 23]. It is without doubt that the Bomarzo Pyramid area owns typical characteristics of similar sacred sites we have previously examined in other locations. The presence of 14Hz almost everywhere at different volumes in the Bomarzo pyramid area is a feature we have often met with at other sacred sites. Thanks to new technologies we were also able to draw the shape of a powerful magnetic field which is present in and over the pyramid. Only in the sacred sites of Sogmatar [14] and in Göbekli Tepe [20] in South Anatolia was it also possible to localize similar powerful magnetic fields just as in the Bomarzo pyramid.



Figure 1 – A drawing of the Bomarzo Pyramid by N. Tarabella, which shows its unique structure carved from a singular block of stone.

2. The Bomarzo Pyramid

The Tacchiolo valley (Viterbo, Italy) is full of ancient stone artifacts and structures including the so-called Pyramid of Bomarzo (Fig.1), a carefully sculpted large natural magmatic rock. This enigmatic structure obtained from a single block of rock of volcanic origin and about 16 meters high, whose origin probably dates back to the Rinaldonian period, owes its name to the lateral pyramidal shape. In fact, the Rinaldonian Civilization, preceding Etruscan Civilization, had great skills in working with stone and built their homes and tombs in the rock and always placed them near water sources. Frontally the structure looks like a large altar, with a series of steps that climb up to the top, and spaces carved into the stone. On the left side of the pyramid, a long and narrow staircase is carved that reaches the first altar. On the right side, there is a second altar flanked by a ladder that goes up to the top. Between the two areas, a series of larger steps have been excavated leading to the “high place” of the structure. We can hypothesize that that the location had a religious purpose connected to the use of water. This is supported by the presence of a quadrangular stone basin, overlooking the pyramid, used for sacred ablutions. Also on the pyramid a long narrow channel was dug, which was probably used for the drainage of liquids used during the rites. The sacrificial nature of these rites is not ascertained, but the fact that the sun disappears behind the pyramid at noon, leaving it completely in the shade, is certainly not accidental. Over the centuries, this mystical structure has survived the passage of religious syncretism, as witnessed by the Christian crosses engraved on the pyramid but has always preserved its original sacred function and, still today, is surrounded by an aura of mystery. We also examined from an archaeoacoustic point of view the rock anthropic structure in the neighborhood as the so called “Finestraccia (bad windows)”, a rock temple or a house which has on the upper external level a large thick circle carved in the rock also aligned to the equinox (Fig. 2, left). Inside this rock temple we found an interesting resonance frequency (fig. 2, right) by using our voice and a sciamanic (or Irish) drum.



Figure 2 – On the left: the large circle carved in the rock aligned to the equinoxes placed in the upper level of the Finestraccia. On the right: the test for researching the resonance phenomenon inside the rock temple using a sciamanic or Irish drum.

3. Materials and methods

The audio recording was performed following the SBRG Standard for Archaeoacoustics (SBSA) we used for a long time (2-20). In this case the equipment consisted of a high range dynamic recorder, extended in the ultrasound and infrasound field with a sampling frequency rate of 192 kHz (Tascam DR-680 by Japanese TEAC Corporation), and two professional condenser microphones with a wide dynamic range and flat response at different frequencies (Sennheiser MKH 3020, frequency response between 10Hz and 50,000Hz) with shielded cables (XLR Mogami Gold Edition) and gold plated connectors. We placed the microphones at the base, in contact with the soil, and on the top of the pyramid. Sometimes, for avoiding magnetic interference we noticed after the first recordings, we inserted the microphones directly in the body of the recorder.



Figure 3 – The digital recorder Tascam DR-680 placed inside the structure carved in the rock behind the pyramid with the microphones inserted in the body of the device.

Praat program version 4.2.1 from the University of Toronto and Audacity open-source program version 2.1.2 for Windows and Linux were used to analyse the audio recordings.

Before recording a spectrum analyzer, Spectran NF-3010 from the German factory Aaronia AG), was used to detect the presence of any electromagnetic phenomena which could influence the results.

To make the shape of the magnetic field visible, UV photography and a vector program for PC (PIV – Particle Image Velocimetry) was used. This consisted of a modified Canon EOS 1100D digital camera [14,15,16,17,19], with its anti-aliasing filter removed. The camera used was modified in Canon's Italian factory¹. In the ultraviolet band (UV) the absorption of lenses of normal optics (not with calcium fluoride and quartz lenses for forensic use) is very strong, usually a normal optic is unable to allow electromagnetic waves below 320-350nm to pass through, but it is sufficient for analysing the UVA band (400-315nm) where it is possible to perceive the movement and the behaviour of dust suspended in the air and the flow of gas as steam which orientates itself as a dipole in the magnetic field. Particle Image Velocimetry (PIV) by Dantec Dynamics from Denmark was the software used to analyze this movement in the UV video and photographs taken (Fig. 4). PIV is used in industry as an intuitive measurement technique to measure two or three components of velocity in a variety of flows. The application of PIV in research and industry is widespread, due to it being easy to use and its accurate data representation. As easy and intuitive as PIV is, it involves many cross-disciplinary challenges, from classical optics and imaging to the use of dedicated state-of-the-art digital electronics and lasers. The principle of PIV working is very simple: two consecutive shots illuminate a slice or volume of a flow field with particles suspended in the flow. The scattered light from the particles is recorded in two consecutive images on one or several digital cameras. The images are sub-divided into smaller areas for calculating the mean particle displacement between two corresponding sub-areas. The particle displacement is calculated using cross-correlation or Least Squares Matching techniques. Since the time between the shots is known, the particle velocity can be determined. Taking into account the magnification of the optical setup, the absolute velocity field can be derived. The velocities calculated from an image pair are an instantaneous snapshot of the flow viewed by the cameras. PIV results are an accurate representation of the flow presented to the user and viewers in an easy to understand and visual manner. The presentation is aided by advanced soft-ware post-processing. Dantec Dynamics is the leading provider of laser optical measurement systems and sensors for fluid flow characterization and material testing.

¹ Any new camera can be modified in this way, however Nikon, Sony and Olympus cameras can only be modified by a private technician automatically invalidating the warranty of the firm and the camera can loose characteristics for scientific use.

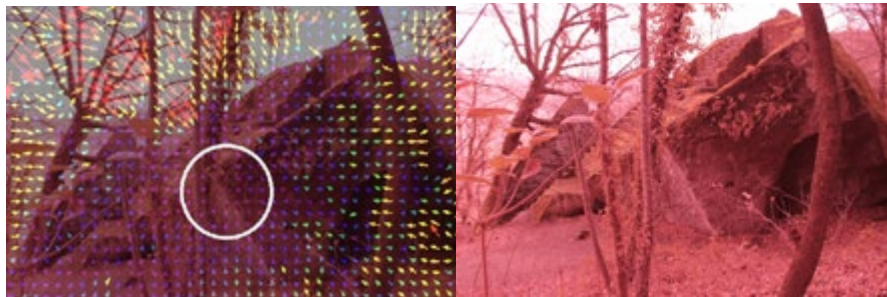


Figure 4 – On the left: image in UV band and visible as in person. On the right: the same frame of the video treated with the PIV program which shows a spiral magnetic field directed towards the center of the Bomarzo pyramid.

For our local radioactivity measurements we also used a Geiger counter GAMMA-SCOUT model w / ALERT of German construction, with the detector tube type Goigor-Mullor, steel coating filled with halogen gas and possibility to dose the alpha, beta and gamma rays by rotating-ray discriminator.

4. Results

4.1 Bomarzo Piramyd

The graphs below, which represent the sound analysis of the recordings taken on the ‘Pyramid of Bomarzo’, show infrasounds at the base of the pyramid whose main dominant is represented by 14Hz at medium volume (Fig. 5). This sound probably derived from the movement of groundwater, also at the level of the cups carved in the rock and placed above the Finestraccia (Fig. 6). At the top of the pyramid the sound changes and extends itself with a wider peak, from 7-8Hz to 14Hz already detected at the base (Fig. 7). It is probable that this difference is due to the interference of the ‘pyramid’. The pyramid looks to change the character of the sound thanks to its shape which modifies the transmission of the sounds coming from the subsoil. But if you listen to the sound transposed in an audible band, in order to make audible infrasounds normally not perceivable by the human ear, it seems to be manipulating more than just the sound due to the magnetic field, which is confirmed by the existence of the UV band imaging technique with the use of the PIV software.

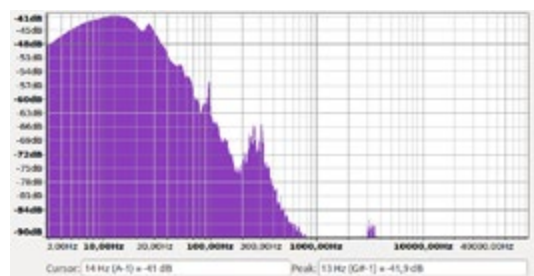


Figure 5 – Graph of infrasounds at the base of the pyramid with microphones placed in the air. There is a peak with apex around 14Hz at -45db.

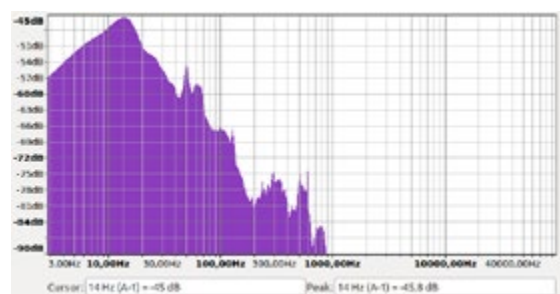


Figure 6 – Graph of the infrasounds found at the level of the cups carved above the Finestraccia. There is a large peak with an apex at 14Hz and a higher volume (-41db) compared to the base of the pyramid.

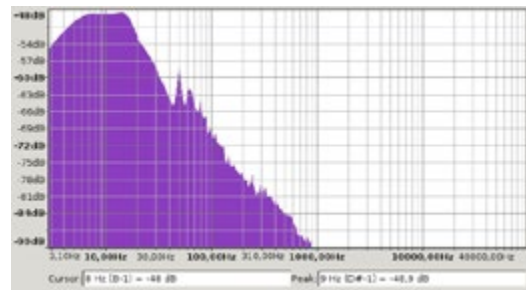


Figure 7 – Graph of infrasounds found at the apex of the Pyramid of Bomarzo: the sound changes character extending the peak with a wider plateau starting from 7-8Hz up to 14Hz already detected at the base of the pyramid.

Using ultraviolet band imaging techniques and vectorial software, capable of unveiling possible magnetic fields, we have highlighted the presence of a spiraling magnetic field, which seems to attract particles towards the depth (Figure 8, left). That is, the magnetic field detected appears to be directed towards the subsoil and not upwards, as often happens. It is therefore possible that the pyramid acts with its morphology, like a vector pointing towards the subsoil. This magnetic field, due to its power and amplitude, has a certain effect on the human body and is also present at the apex of the pyramid itself (Figure 8, right).

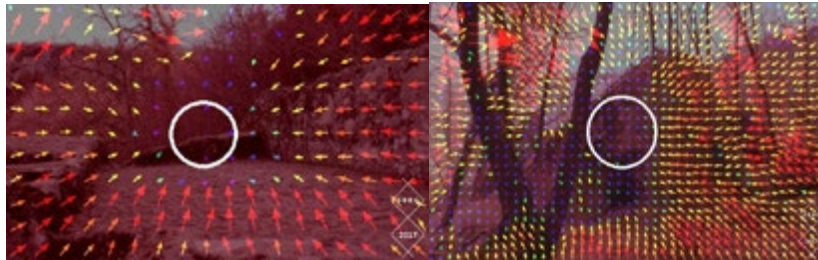


Figure 8 – On the left: from the direction of the vectors it is possible to identify a very powerful magnetic field that is centered on the pyramid. On the right: the magnetic field appears also at the center of the apex of the pyramid.

4.2 Finestraccia

In addition to the previous comparative archaeoacoustic analysis of the cups placed above the so-called 'Finestraccia', we also wanted to examine the rock structure in itself. We therefore tried to detect the presence of infrasounds, but we also realized that we could stimulate the resonance present in the room, both with a male voice and with a shamanic drum. This structure, whose entrance is oriented perfectly to the east, apparently presents two levels, even if the attic that divided it into two rooms is now no longer present. However we cannot know whether the construction of such a floor, and therefore the separation into a superior and a lower room, was only the result of a residential renovation of what we suppose to be a temple. Upon entering there is a sort of sepulcher carved into the rock, to the right of the entrance, similarly though you cannot know whether it is contemporary or subsequent to the excavation of the structure.

The shamanic drum stimulates the resonance at about 97-98Hz, as can be seen from the graph below (Fig. 9). In it the highest peak is not the base frequency of the drum, already known and measured in the laboratory and located around 58Hz, but the response of the room. In fact, this responds by releasing sound energy thanks to a superior harmonic of the drum. This sound energy is added to the upper harmonic of the drum, thus generating a higher peak. Usually, the harmonics above the base sound all have a lower volume than the dominant note of the drum, so it is easy to recognize the resonance frequency of the room.

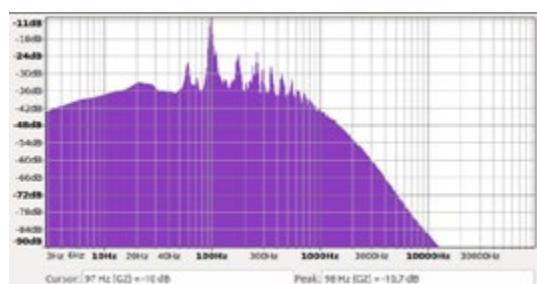


Figure 9 – The resonance peak response determined by the shamanic drum around 97-98Hz is clearly evident.

This data is also confirmed by the use of the male voice, which can stimulate the room in the same way and produces a frequency very close to the previous one, focused around 95-96Hz, as can be seen in the graph in Fig. 10.

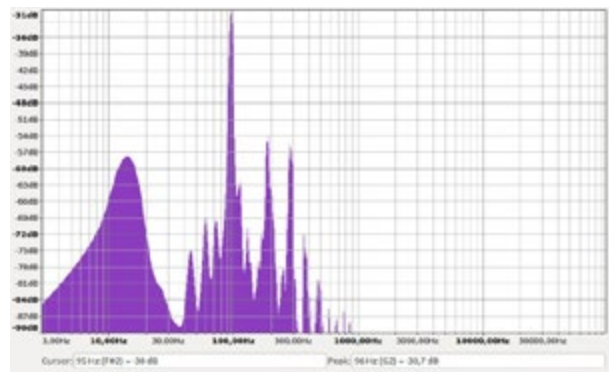


Figure 10 – The chamber resonance stimulated by male voice. The big peak around 95-96Hz is really evident.

The slight difference that exists between the resonance peaks is due precisely to the different characteristics of the instruments used which have different superior harmonics, but which also stimulate the resonance of the room around the same frequency. So it is possible to say that by drum and voice stimulation the resonance frequency of the room is between 95 and 98 Hz, that is a very narrow band of frequency, so absolutely not random. These results suggest that the separation in two rooms, upper and lower, is therefore the result of a renovation, because a wooden floor interposed between the two rooms would have made a resonance response of this type impossible. It is easier to assume that the original structure was composed of a single chamber. It is also interesting to verify in the graphs the presence of a more rounded peak before the vocal frequencies, due to the natural vibration already identified in the whole area of the Pyramid of Bomarzo, always located at 14 Hz. The room also has a second, less intense resonance frequency, set at 109Hz. This phenomenon is not uncommon for the hypogean structures already studied by us in Malta [9] and in Cividale del Friuli [7]. Both resonance frequencies have greater effect if you place yourself in the west corner of the room. The last graph (Fig. 11) represents the infrasonic vibration already highlighted above, but at 0db of sound recording, that is the same recorded volume in open air kept at the Bomarzo Pyramid and in the area above the Finestraccia.

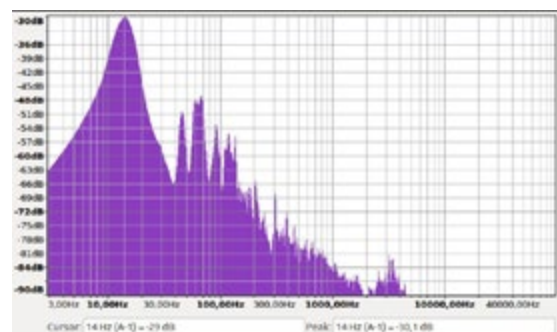


Figure 11 – The graph of the sounds taken in total silence inside the rock structure. We found this peak of infrasound at 14Hz in the whole area, but here at a much higher volume (-30db).

The Fig. 11 represents the graph taken in the silence of the room. In it the infrasonic frequency already highlighted and placed at 14Hz has, however, a volume of -30db, which is to be considered very high. This rock structure is likely to act as a sound box for the frequencies coming from the subsoil.

A greater problem, however, is represented by the radioactivity of this place, which is around 0.46 $\mu\text{Sv/h}$ peak, probably due to the poor air exchange present in the rock structure, unlike the places in the open air previously examined. So it appears that, staying in this place for a long time is not advisable, but a short stay inside this structure does not create health problems. Sievert is the unit of measurement of the “equivalent radiation dose” in the International System. It is a measure of the effects and damage caused by radiation to an organism. The Sievert replaced the old traditional unit, the rem (1 Sv = 100 rem). In Heidelberg (Baden-Württemberg, Germany), where the used equipment was built, the natural background radiation is within a range of 0.10 and 0.20 $\mu\text{Sv/h}$ (microSievert/hour). In Finland, the natural background varies from 0.04 to 0.30 $\mu\text{Sv/h}$ and the alarm threshold is set at 0.4 $\mu\text{Sv/h}$. Values above 0.60 $\mu\text{Sv/h}$ reveal the presence of a radioactive source. Recall that a simple chest X-ray exposes us to 1,000 μSv (microSievert) in a single dose, a TAC of 3-4,000 μSv .

The surrounding areas, both the access road and the nearby road, equally examined, do not have these characteristics. So we have to consider them as peculiar to this area.

5. Discussion

There is no doubt that the district of the 'Pyramid of Bomarzo' possesses characteristics typical of the sacred sites we also examined before in various European and Asia Minor locations. The presence of 14Hz almost everywhere, even if at different volumes, is a characteristic we have often encountered, for example in the sacred site of Sogmatar in Turkey, in the so-called Temple of the Seven Planets [14] and in Enclosure D at Göbekli Tepe in South Anatolia [20] where it was also possible to find a magnetic field equally powerful to that in the Pyramid of Bomarzo. In the silence it was very easy to record this strong natural frequency coming from the subsoil of about 14Hz, which was also outside the rock structure, but which has the maximum power within it, for the ability to transmit sound of the rock, which acts as a natural transducer. It is important to remember that this frequency is present in other holy places in Europe, which has a strong effect on brain waves, capable of inducing a state of relaxation [10,12,13,18]. It will be very interesting to come back to the site in the future, to examine the effect using more sophisticated devices, as previously done in other sacred sites, for example in Italy or in Slovenia [16]. At the end of each research, many questions arise spontaneously. How these phenomena were known millennia ago? How is it that millennia ago the Rinaldonians, the Etruscans and the ancient Romans managed to find the sacred places without using the measuring devices we have today? We know from historical sources that the Roman architects had a deep knowledge of the vibrations coming from the subsoil and possessed a particular category of priests called "Augurs" that had the ability to detect such vibrations using various methods of divination. These techniques were used to find the optimal position for a military camp, a public building or a spa, taking care to avoid any potential negative impact on health [16] and the Romans had a deep respect for them. It is believed that the knowledge of the use of thermal waters was originally held by the Etruscans, as a lot of knowledge and techniques generally attributed to the Romans. The Etruscan 'Discipline' was a compendium of knowledge, probably derived from very remote times, which included the 'Knowledge of Heaven and Earth', held in high esteem in Rome. The books of the Etruscans did not reach us, but were kept in the temple of Jupiter in Rome for many years and then destroyed by the Romans before and after the arrival of Catholicism. The Roman nobles sent their offspring to Etruria to be educated by that cultivated and refined people, to whom we owe so much of our history, even if their wisdom is usually attributed to the Romans, according to a *damnatio memoriae* that lasts to this day. The Augurs were a class of priests; Tito Livio wrote in his book "Storia di Roma", Book VI, that no decision on war or peace was taken in ancient Rome before consulting their council [24]. Tito Livio also wrote in Book I that this college was made up of fifteen members initially chosen by the dictator Silla, whose decisions did not concern the future, but the approval of the Gods [25]. These decisions could be considered as a preliminary feasibility study for any activity to be undertaken. Augurs have always been considered as a special group of priests within a larger group called the "Aruspici". Their task at the time of Etruscan culture was to interpret and understand the general will of the Gods. Some historians like Squadrilli [26] place this tradition since the time of Romulus, who would have used it for the foundation of Rome. Augurs are associated with the interpretation of the flight of birds. They carried a characteristic stick with the tip bent like the handle of an umbrella, called "lituum", whose function was to limit the number of birds seen in the sky, so that their behavior could be observed with care. This was considered as a mere superstition, but it ignores how much birds are noticeably sensitive to environmental factors. Few people remember that this particular object was also used as a 'diviner's rod' and many Etruscan tomb paintings show priests carrying the lituum during specific ceremonies, attesting that the auspicious art was already known and widely used by this people, before Rome made it his own. In medical science it is well known that in humans the palms of the hands, feet and in the thorax there are vibratory receptors, the so-called Meissner sensors, capable of detecting inaudible vibrations [16]. It is evident that personal experience and training were important so that the ancient wishes could effectively determine where the best conditions existed for positioning a temple. In modern times these studies are rediscovered in the field of bio-architecture, which takes into account the geo-physical characteristics, the position and the surrounding environment before each construction, in order to avoid the onset of geopathic stress. The powerful magnetic field present on the Pyramid of Bomarzo is, however, a topic still to explore further. It is a field that attracts, but to determine what the direct effect on brain activity will be would require further studies with the use of volunteers undergoing the examination of a portable EEG (electroencephalograph). In the future, our research will continue in this direction. The hypothesis is that it is the shape of the pyramidal structure that acts as an amplifier of a pre-existing natural phenomenon. It is certainly not random that we found resonance inside the structure carved in the rock placed next to the pyramid. It has to be considered as a temple and not only a rock shelter. The frequency of resonance can be stimulated by a voice and by the drum, that together with the flute are the most ancient musical instruments, fall within the range of 80-140Hz; this frequency is able to provoke a modification of the state of conscience. We have demonstrated this effect several times in the laboratory [5,15,23]. This type of frequency modifies the nervous activity, causing in some brain centers a doubling of the frequency, a phenomenon that allows the subject subjected to these frequencies able to experience a lucid dream if properly trained. In fact, the ancient sacred places were not for everyone, but only for people who had practiced special meditation or prayer techniques. In people who are not trained in meditation, these frequencies provoked only a strong emotionality or a marked state of relaxation. This phenomenon made the rituals inside the structure more suggestive for sure.

6. Conclusions

It is very important to understand the relationship between these ancient sites and the people who built them. So archaeoacoustics should not only analyze the acoustic properties of the site, but also all the physical phenomena associated and not perceived by the human ear, which could have influenced the archaic populations in considering a particular place as sacred. The archaeoacoustic analysis of the Pyramid of Bomarzo provides various evidence to support the hypothesis that the decision to choose that site as "sacred", by reshaping the huge block of magmatic rock, was not accidental. The discovery of the magnetic field centered on the 'Pyramid' that could be the desired or unconscious result of this modification, but which has accentuated the natural phenomenon able to alter the state of conscience. A very important discovery is the resonance phenomenon inside the rock structure called 'Finestraccia', which should therefore be considered as a temple and not as a simple residential structure. It must be remembered the carving in rock is not the most primitive system with respect to the construction of a structure on soil. On the contrary, an error in the development of the hypogeal structure cannot be remedied, so that the exact pitch of the chamber in the 80-140Hz range presupposes a profound knowledge, even if empirical, of the shape necessary to obtain this phenomenon and assumes a very advanced culture. This type of phenomenon refers to the hypogeum of Hal Saflieni in Malta, built around 4000 BC. and remained almost unaltered even to present day [9]. It is therefore conceivable that this technology based on the knowledge of the relationship between mind and sound, was the common heritage of various civilizations that inhabited the Mediterranean basin at that time. Consequently, it is conceivable, without fear of speculative impulses, that there were cultural exchanges between those populations. These results must be considered as preliminary, the research must therefore be extended and deepened in the years to come.

References

1. I.A. Cook, S. K. Pajot, A. F. Leuchter. 2008. "Ancient Architectural Acoustic Resonance Patterns and Regional Brain Activity", *Time and Mind* 1(1), pp. 95-104.
2. P. Debertolis, H.A. Savolainen: "The phenomenon of resonance in the Labyrinth of Ravne (Bosnia-Herzegovina). Results of testing", *Proceedings of ARSA Conference (Advanced Research in Scientific Areas)*, Bratislava (Slovakia), December, 3-7, 2012, pp. 1133-1136.
3. P. Debertolis, N. Bisconti: "Archaeoacoustics in ancient sites" *Proceedings of the "1st International Virtual Conference on Advanced Scientific Results" (SCIECONF 2013)*, Žilina (Slovakia) June, 10-14, 2013, pp. 306-310.
4. P. Debertolis, N. Bisconti: "Archaeoacoustics analysis and ceremonial customs in an ancient hypogeum", *Sociology Study*, Vol.3 no.10, October 2013, pp. 803-814.
5. P. Debertolis, G. Tirelli, F. Monti: "Systems of acoustic resonance in ancient sites and related brain activity". *Proceedings of Conference "Archaeoacoustics: The Archaeology of Sound"*, Malta, February 19-22, 2014, pp. 59-65.
6. P. Debertolis, D. Gullà, F. Richeldi: "Archaeoacoustic analysis of an ancient hypogeum using new TRV camera (Variable Resonance Camera) technology", *Proceedings of the "2nd International Virtual Conference on Advanced Scientific Results" (SCIECONF 2014)*, Žilina (Slovakia) June, 9 - 13, 2014, pp. 323-329.
7. P. Debertolis, N. Bisconti: "Archaeoacoustics analysis of an ancient hypogeum in Italy", *Proceedings of the Conference "Archaeoacoustics: The Archaeology of Sound"*, Malta, February 19-22, 2014, pp. 131-139.
8. P. Debertolis, A. Tentov, D. Nolic, G. Marianovic, H. Savolainen, N. Earl: "Archaeoacoustic analysis of the ancient site of Kanda (Macedonia)", *Proceedings of the 3rd Conference ARSA (Advanced Research in Scientific Areas)*, Žilina (Slovakia), December, 1-5, 2014, pp. 237-251.
9. P. Debertolis, F. Coimbra, L. Eneix: "Archaeoacoustic Analysis of the HalSaflieni Hypogeum in Malta", *Journal of Anthropology and Archaeology*, Vol. 3 (1), 2015, pp. 59-79.
10. P. Debertolis, D. Gullà: "Archaeoacoustic analysis of the ancient town of Alatri in Italy", *British Journal of Interdisciplinary Science*, September, Vol. 2, (3), 2015, pp. 1-29.
11. P. Debertolis, M. Zivic: "Archaeoacoustic analysis of Cybele's temple, Roman Imperial Palace of Felix Romuliana, Serbia", *Journal of Anthropology and Archaeology*, Vol. 3 (2), 2015, pp. 1-19.
12. P. Debertolis, D. Nicolčić, G. Marianović, H. Savolainen, N. Earl, N. Ristevski: "Archaeoacoustic analysis of Kanda Hill in Macedonia. Study of the peculiar EM phenomena and audio frequency vibrations", *Proceedings of the 4th Conference ARSA (Advanced Research in Scientific Areas)*, Žilina (Slovakia), November 9-13, 2015, pp.169-177.

13. P. Debertolis, N. Earl, M. Zivic: "Archaeoacoustic Analysis of Tarxien Temples in Malta", *Journal of Anthropology and Archaeology*, Vol. 4 (1), June 2016, pp. 7-27.
14. P. Debertolis, D. Gullà: "Preliminary Archaeoacoustic Analysis of a Temple in the Ancient Site of Sogmatar in South-East Turkey. Proceedings of Conference 'Archaeoacoustics II: The Archaeology of Sound', Istanbul (Turkey), Oct 30-31 Nov 1, 2016, pp. 137-148.
15. P. Debertolis, D. Gullà: "New Technologies of Analysis in Archaeoacoustics", *Proceedings of Conference 'Archaeoacoustics II: The Archaeology of Sound', Istanbul (Turkey), Oct 30-31 Nov 1, 2015, pp. 33-50.*
16. P. Debertolis, D. Gullà: "Healing aspects identified by archaeoacoustic techniques in Slovenia", *Proceedings of the '3rd International Virtual Conference on Advanced Scientific Results' (SCIECONF 2016), Žilina (Slovakia), June 6-10, 2016, pp. 147-155.*
17. P. Debertolis, D. Gullà, F. Piovesana: "Archaeoacoustic research in the ancient castle of Gropparello in Italy", *Proceedings in the Congress "The 5th Virtual International Conference on Advanced Research in Scientific Areas" (ARSA-2016) Slovakia, November 9 - 11, 2016: pp. 98-104.*
18. P. Debertolis, N. Earl, N. Tarabella: "Archaeoacoustic analysis of Xaghra Hypogeum, Gozo, Malta", *Journal of Anthropology and Archaeology*, vol.1 no. 5, June 30, 2017. In press.
19. P. Debertolis, D. Gullà: "Archaeoacoustic Exploration of Montebello Castle (Rimini, Italy)", *Art Human Open Acc J 1(1): 00003, DOI: 10.15406/ahoaj.2017.01.00003.*
20. P. Debertolis, D. Gullà, H. Savolainen: "Archaeoacoustic Analysis in Enclosure D at Göbekli Tepe in South Anatolia, Turkey, Proceedings in Scientific Conference "5th HASSACC 2017 - Human And Social Sciences at the Common Conference", Slovakia, Žilina, September 25-29, 2017: in press.
21. R.G. Jahn, P. Devereux, M. Ibison: "Acoustical Resonances of Assorted Ancient Structures", *J. Acoust. Am Soc Vol.99 No.2, February 1996 pp.649-658.*
22. V. Tandy, T. Lawrence, "The ghost in the machine", *Journal of the Society for Psychical Research*, April 1998, 62 (851): 360-364.
23. N. Tarabella, P. Debertolis: "Archaeoacoustics in Archaeology", *Proceedings in 19th International Conference and Assembly of the Experts of the Fondazione Romualdo Del Bianco "HERITAGE FOR PLANET EARTH 2017 - Smart Travel, Smart Architecture and Heritage Conservation and its Enjoyment for Dialogue", Florence, Italy, 11-12 March 2017. In press.*
24. Titus Livius: "auspiciis hanc urbem conditam them auspiciis beautiful ac peace domi militiaeque omnia geri, quis est qui ignoret?", In "History of Rome", Book VI, 41.
25. Titus Livius: "History of Rome", Book I, 35,3.
26. T. Squadrilli: "Vicissitudes and monuments of Rome", Staderini Editore, Rome, 1961, p. 25.

ENGAGING THE CROWD IN THE RESTORATION ATELIER: SURVEYING THE POTENTIALS AND CHALLENGES IN DEVELOPING THE SOCIAL NETWORKS IN CONSERVATION OF THE IRANIAN CULTURAL HERITAGE

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Abstract

The usefulness of technological breakthroughs is commonly seen hesitantly in the field of cultural heritage conservation. The emergence of social networks in cyberspace has also been involved with various allegations of distorting the concept of truth and making false identities. Nevertheless, the review of Iranian experiences over the past two decades in the field of the interpreting the difficulties of conserving the cultural heritage in cyberspace has revealed the opening of new horizons for discussion between the audience and professionals of cultural heritage practice, as well as opening up the critical space and accountability of the system against the users. To conduct the survey, the performance of the Iranian social networks in the cyberspace of the Telegram application on smartphones between January 2016 and February 2018 was reviewed.

Keywords: conservation, technology, social networks, identity

1. Introduction

Although the history of emerging digital social networks began by the establishment of the Internet, the advent of smartphone technology has recently led to a large number of active forums and information channels on the topic of Iranian Heritage and Cultural Identity. This is part of the widespread networks in almost all areas of the public and specialized issues providing digital contents in different levels of access. Currently, many national and international conservation institutions active in the country have been developing social networks. Updating the digital content in these media are somehow the most important external aspect of their lives and activities. Ongoing updates has made it impossible to justify or hide the problems, and thus, users are able to face the current trends in a more realistic manner. Although some of the classic institutions may attempt to keep themselves away from this field, the reality is that they will gradually losing their positions to more active players. Analyzing the content of these approaches, it is easy to obtain precise information about the potentials and limitations in the field of conservation and restoration. This article attempts to follow the patterns that are visible in the contents produced and presented in digital social media by the most active institutions including Iran-ICOMOS, ICOM-Iran, and non-organizational virtual groups, i.e. Scientific Society of Conservators (Sushiant), the Conservation Society, Iranian Architectural Education, Iranian Architectural Conservation Association, and Cultural Heritage Watch. The content of these media was monitored over a two-year period and analyzed structurally and functionally in order to assess their ability in stabilizing the cultural identity, in particular through the promotion of public and specialized knowledge and, finally the adverse effects of this phenomenon is discussed. From the structural point of view, each network, depending on the type of communication with the formal conservation environment, has chosen variety of levels of trust on users in cooperation and cooperation. This implies the degree of attention to the democratic discourse in each institution. In this regard, it should be noted how far a network has brought the issue of heritage conservation and interpretation from the specialists' circles to the wider social spaces. It should be noted that in this research, in order to provide the most documentary, the citation to the addresses of the social groups and channels inside the Telegram application space is provided according to the following system to coordinate with the format of submission of references in the conference: Name of administrator(s) (year of establishment). Name of the social group or channel which is usually a translation from originally Persian descriptions. Link to the address in the Telegram application.

2. History of Cultural Heritage Issues in Cyberspace

Despite the adoption of the Cultural Heritage Act in 1931, the issue of cultural heritage in Iran was long regarded as an academic subject, and news and information on this subject were limitedly published in specialized journals or otherwise recorded in the form of unpublished official reports or academic dissertations. A look at old periodicals shows that the restoration records of monuments were published only in a very minor way in the form of articles that were usually published on the occasion of the commemoration or obituaries of conservators (Varjavand, 1974).

In this way, for the general public, the subject of conservation and cultural heritage was more or less an unknown subcategory of archeology and history. With the destruction of historical monuments and ancient urban textures, under the excuse of new construction, gradually the concerns of intellectuals were published at national and local levels in public journals, and as a matter of urgency, they became common concerns among citizens of the ancient Iranian cities. This, however, did not find a way to the open discussion until the late 1990's. The Sentronics technology allows for broader dialogue among citizens. Meanwhile,

the expansion of activities has also made heritage professionals themselves more interested to share their findings, and younger generations of experts are pushing for publication of their findings as common cultural and national concerns.

The first experiences of contacting the audience to the heritage practice was started with the online presentation of the Chogha Zanbil site in 2004 launched on the official website. At the same time, news agencies devoted special pages to the issue of cultural heritage, while the conservation was still a technical and artistic consideration, and the problem of cultural identity through preserving tangible heritage had not become a public concern. The formation of the social networks in the form of Internet sites was the first opportunity to articulate cultural heritage issues on a wider level. Nevertheless, these types of social networks were very virtual in nature, so that mostly younger users entered in such spaces without their true identity. This indicated that these platforms would not be proper for following concerns on preservation of cultural identity. This was the case with social networks in Iran until the entrance of Facebook into this market which has largely changed everything.

Since then, the International institutions for conservation and world famous museums also established public spaces for information and discussion. People at different levels of knowledge attended in the network. The names and facsimiles were real, with the possibility of dedicated pages for a variety of topics, including conservation campaigns. Experts and critics could share new contents on a daily basis. In this way, mechanisms such as echoing and the number of audience for discussions and pages were raised, and in this form, first concepts for quantitative evaluation of ideas arose that later came up with new topics such as polls (Manzi et al. 2018, Vasalou et al. 2010).

The arrival of smartphones into the market was the next milestone toward more social participation by the audience of historical monuments. Now, the audience came out of obscurity of passive readers of newspapers or magazines. They could simply share their views on the topics of the day. One item could be sent repeatedly and so it was simply not possible to restrict it. Many apps were tested by Iranian users, but finally the Telegram was accepted by most types of social networks. In the short term, not only experts and people in the academy, but also private sector, research institutions, and ultimately government offices also entered the Telegram network.

3. The study of the diversity of the mechanisms of identity issues in current social networks

The Telegram offered a variety of possibilities that would bring the satisfaction of all type of audience in the field of cultural events. Characters, such as the former chairman of the Cultural Heritage Organization, now chairing one of the key research institutions, tries to provide a wider audience in the context of his updated views and actions by choosing to create a channel. He also uses audiovisual material in his channel (Bahaeshti 2016). A channel is still a one-way transmission of information; however, this form of communication is considered more successful than conventional media as well as older internet media. A large number of governmental institutions as well as non-governmental organizations, such as Iran-ICOMUS, also use the channel structure (IRAN ICOMOS 2016).

On the other hand, the head of the ICOM-Iran Conservation Committee, Rasool Vatandoust, who has a history of representing Iran in global affairs such as ICROM and the World Heritage committee, has tried to create a group along with the establishment of an official channel for ICOM CC, which give the possibility to its members to send feedback on the various topics of this institution activities. Membership in this group has a particular trend. The content of the shared articles is controlled by a group of administrators and the non-relevant items related to the activities of this specialized committee will be removed (Vatandoust 2017, Vatandoust et al. 2017).

In the meantime, several unofficial institutions have been virtually created in the telegram network, which have attracted a large number of audiences. At present, several telegram groups are working as the Restoration Associations or Restorers' Societies. Some of these associations are specialized in the conservation of monuments (Zareii et al. 2017), objects (Sayyad Shahri et al. 2017) and traditional arts (Sarvdalir 2016). The number of members in these groups is significant. The quality of administrators' intervention varies from one group to another. Nevertheless, in the last few months, the dynamism of the groups became more and more depended on the activity of their administrator(s) in sharing new issues and topics. The quantity of shared documents and contents has been gradually declined from around two years ago to today.

Another important form of activity in the telegram space was the formation of committees and campaigns to follow specific demands, including the pursuit of the protection of historic houses in Tehran (THHC 2016). These types of committees often lack the formal identity and statute. Part of this is due to the difficulty of officially registering such campaigns or committees in the real environment that have led to their virtual equivalents, albeit without a clear organizational identity in cyberspace. One of the most important activities of these committees is the prompt notification of the threats and damages to historical monuments, which in a few cases led to the gathering of people at the sites of destruction and to prevent the spread of damage until the proper consideration of the Cultural Heritage Organization were guaranteed. These activities rarely follow any economic intension and are very similar to the achievements of anonymous or fake identity artists who have undoubtedly had an influence on the general trends and main stream arts by their critical approach against the concept of market oriented identity.

Another function of these committees is to conduct a survey on the effectiveness of local cultural heritage managers, which in many cases were skeptical about the accuracy of the quality of their efficiency due to remoteness from the capital or provincial centers. The Cultural Heritage Watch is one of those Telegram structures that challenged the polls on the performance of

the head of the Cultural Heritage Organization in the capital and provincial offices in the last months (Iran Cultural Heritage Watch 2016). These types of committees are the most important structures in connecting the wide audience to the issue of cultural heritage because they have more explicitly addressed the immediate demands for protection and cooperation. However, other groups and channels-whether formal or informal - are more likely to be created and followed by somehow academic or professional background in one of the cultural heritage areas and are somewhat more specialized.

4. Approaches to virtual identity networks

In this regard, three main trends in the content of these social networks can be identified in relation to the issue of cultural identity:

The ancient historicism, dating back to more than one hundred and fifty years ago, that recognizes the purpose of heritage studies and conservation as identification and rehabilitation of the ancient Iran values and life style as a genuine model for a better life against the effects of the modern life patterns, thus attempts to provide the public with the achievements of the ancient Iranians.

The approach toward the rehabilitation of urban spaces that is not necessarily dependent on archeological studies, but considers the historical built space in urban centers as a cultural capital for sustainable development. (Beheshti 2016, THHC 2016, IRAN ICOMOS 2016).

The approach toward the recognition of traditional arts through the conservation study of historical buildings and museum objects that seek to provide data to create more appropriate forms of art and architecture with the concept of Iranian identity. (Sarvdalir 2016).

5. Conclusion: Assessing Opportunities and Threats

The social networks which were created inside the virtual context of smartphone apps should be examined in two areas concerning the cultural heritage issues: Channels, and official groups of institutions which mostly operate as one-way paths of information. They have gaining the dominance inside the virtual space in the last year and routinely update their content. On the other hand, there are informal associations that merely form within the space of the Telegram community of sole middle class experts and students that are gradually weakening. This phenomenon is to some extent disappointing since these associations at first were a hope for voluntary team working of all people in conservation as the slogan of good old thinkers such as Ruskin and Morris. However, it should be noted that it was a great opportunity for experiencing what seems totally impossible thus even they lose the game to the more prepared formal space at this instance, it would not be the end of the game.

It should be also noted that the short span of the active life of each group will end by the emergence of more updated groups of new applicants just the same as the device itself. Perhaps it has also led to several generations of users entering the space and gradually abandoning the course and giving way to a newer generation soon. It seems that we are dealing with a new phenomenon which is the instant formation of identities and vanishing of them on the cost of reborn identities from their ashes. The same feature is surprisingly occurring in the real market.

However, the gradual decrease in the volume of virtual group contents seems to be due in part to the depletion of the treasures of members' data. In this way, the material that is now being shared is far more recent and first-handed than the start of the groups' activities.

There are also concerns about losing achievements in preservation of vernacular approaches toward the cultural identity that have come about over many years of complex works with the stakeholders, artisans, and heritage holders who hesitate to engage in any kind of social connection, due to negligence that seems to be inherent in each technology associated with the globalization.

The question that can always be asked is whether the activity in these spaces is a professional threat for the network members? So far, there has not been any sign of trouble for Telegram users in the field of cultural heritage. It can be said that a significant part of the critical activity in this space is being promoted by students and young people reproducing such materials. They cannot simply be pinned by official organizations related to cultural heritage, but instead they can attract the attention of the public by repeatedly releasing critical information, which, like a snowball targeting the men in the offices. At no period of time the heritage directors had so far found themselves vulnerable to public critics. This suggests a future promise of more responsible behavior in institutions related to cultural identity and, on the other hand, the arrival of experienced experts and formal institutions in the form of updating the scientific content of their channels also enlarges the audience's knowledge on the dimensions of their cultural identity and their role in conserving it.

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References

- Seyed Mohammad Beheshti (2016) *Official channel of dialogues and essays by Seyed Mohammad Beheshti*, <https://t.me/SEYED-MOHAMMAD BEHESHTI>
- Hani Zareii, Atousa Mehr, Amin Mahmudzadeh, Neda Navabi, Mohsen Ghaseminezhad Rayeni, Hassan Ghaseminezhad Rayeni (2017) *Conservators of Iranian Art and Architecture*, <https://t.me/joinchat/AAAAAD7PBIEF359cq95yBQ>
- IRAN ICOMOS (2016). *Official Channel*, “<https://t.me/iranicosorg>”
- Iran Cultural Heritage Watch (2016) *Iran Cultural Heritage Watch*, <https://t.me/reesjomhoormiras>
- C. Manzi, S. Coen, C. Regalia, C. Giuliani, V.L. Vignoles (2018) *Being in the Social: A cross-cultural and cross-generational study on identity processes related to Facebook use*, in “Computers in Human Behavior”, Volume 80, 2018, pp. 81-87
- Alireza Sarvdalir (2016) *Training Iranian Architecture*, in “facebook.com/PersianMogarnasDesign” (Telegram Group: without direct public link of accessibility in Telegram)
- Hamed Sayyad Shahri, Reza Vahidzadeh, Negar Eftekhari, Mohammad Mortazavi, Maryam Ahmadi (2017) *Sushiant Society Restoration of historic works of art*, in “<https://society.sushiant.com/>”
- THHC (2016) *The Committee for Conservation of Historical Houses of Tehran*, “<https://t.me/tehranhistorichouse>” (www.thhc.ir)
- Parviz Varjavand (1974) *How the Shah mosque survived: obituary for maestro Hossein Maarefi*, in “Art and People”, Vol. 164, pp. 2-9
- A. Vasalou, A.N. Joinson, D. Courvoisier (2010) *Cultural differences, experience with social networks and the nature of “true commitment” in Facebook*, in “International Journal of Human Computer Studies”, 68 (10), pp. 719-728.
- Rasool Vatandoust (2017) *ICOM CC- IRAN Official Channel*, <https://t.me/ICOMCCIRAN>
- Rasool Vatandoust, Sudabe Daryan, Niloufar Karanizadeh (2017) *ICOM CC- IRAN Telegram Group*. (Telegram Group: without direct public link of accessibility in Telegram)

EVOLVEMENT OF THE DIGITAL TECHNOLOGIES IN HERITAGE AND LOCAL COMMUNITIES

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The process of the rapid expansion of the digital technologies during the first decades of the XXI century created numerous, in its character, challenges regarding the protection of the Cultural Heritage. These are, unfortunately, not only the positive ones. The ongoing benefits in this sector at the same time creates the range of the secondary, sometimes unpleasant, effects. One among them is stratification and isolation of the society and especially the smallest members of the system- communities and neighborhoods, especially those who resides far away from the larger societal centers and urban agglomerates and therefore lacks the proper connection with the sources of information at the relevant level to their understanding and use. The fully professional materials, especially if digitized in an advanced level, does not reaching the real users of the assets of the Heritage, therefore the no basis is to be found for the safeguarding processes.

The actual need for a fruitful dialogue as the basis for adequate safeguarding of the Cultural Heritage values is more than desirable. As well as the number of means of the assurance of the success of the such process while transferring them to the future generations must be altered with the aim to foster the development of the achievements in the digitized world towards full use of the actualized and meaningful information straight to the centers of the interested neighborhoods and communities. These achievements have to be employed for the benefit of society members aiming to formulate a range of means, which would give the best results for the understanding or recalling the specifics: universality and particularity of existing values of the both- build and natural environments, tangible and intangible Heritage and their interrelation with local, regional and even continental contexts.

The most sensitive and therefore very vulnerable are the closest sectors of Heritage- the actual composition of the soil and its physical forms, waters and climate, greenery and alive nature along with intangible elements- spoken Heritage and live traditions, accompanied with the built structures by the humans. That is crucial that the achievements in a digital sector would serve us in a best way, providing relevant and actual information on our environments and their values and therefore it would encourage us to debate the decision makers, developers and protect our Heritage from the unwise and unreturnable changes. Actual networks with the science institutions and local governance, with the aim to compile and distribute material on the physical environment of the communal territory and its Genius Loci to the actual inhabitants in a most effective way, would lay the basis for the direct and proper dialog among the generations, which is the guaranty for the safeguarding of our Heritage.

Introduction

Depending on the particular country or even larger region, its economic well- being and consciousness of the local residents one point is usually very sensitive everywhere- that is the market value of real estate assets under the private ownership- dwellings. In majority of the cases, at least in the east European countries (especially transitional ones), that is the only real/true valuable assets left for the local residents. Therefore, is extremely important not only monitor and research them, but also provide sets of simple and efficient tools and knowledge for the recovering features of the specific character of each area, especially if there are noticeable presence of the objects of the immovable, tangible cultural heritage, which with no doubts makes important part of the living environment for the locals. It can be called as traditional, very characteristic for the particular location and therefore- diverse and at the same time exceptional.

That can be foreseen as the important part of the cultural- economic capital- on among the range of fundamentals for the safeguarding the tangible, intangible, natural heritage sectors as live, settled and therefore vital.



Figure 1 – locations of the projects

Character of social composition of the local society in target areas

The recent impression from the number of visits to country sites during the summer of 2017 has showed the tendency in the composition of the social segment of the smaller towns and village sites (this draft conclusion is partially based on the data from the national system of the statistics, but also more can be treated as revelation of the personal impressions) and obvious emerging problems with the real estate sector. From the first side it has demonstrated dramatic decrease of the population in its size and stratification on its content, from the other side- because of the numerous examples of the poorly maintained or abandoned properties- it demonstrates the attitude and short seeing approach to it. The other outcomes are more than obvious: decrease in number of consumers, collapsed businesses, shortage of the work possibilities, dramatic drop of the land price... all that directly influences the sensitive part of the cultural heritage- rural areas of the countries, where the remains of the authentic atmosphere still reside in abundance. But it so fragile...



Figure 2 – Remains of the authentic dwellings in Zeimelis

The positive part of the message about such situation (which, I believe, is in one or another way is so common for many regions of the other countries) is also can be seen as two folded: those residents who are still staying (and will stay) in the above mentioned characteristic areas currently has much more *i) interest in rebuilding, recovering and maintaining the values of the local specifics and thus includes the ii) demand to understand deeper and revalue the features of the physical living environment, as a basis for the balanced, sustainable development.*

By emigration process during last decades, the smaller neighborhoods had been „cleaned and purified”. Additionally, the obvious increase of the streams of the wealthy, well-educated, professionally trained and often- expert level- senior age people from the larger cities, moving to the human scale towns and village areas is more than noticeable. Idea of spending last decades of their life in the peaceful surroundings, human scale environments usually equipped with the most necessary services (medical care, catering facilities and grocery shops and small cultural places, good internet connections too) along to the possibilities to work on their own plots of land and enjoy natural surroundings, creates the number of opportunities to upkeep as much as they can afford their real estate assets. They participate in small events of cultural life in the territories they entering in, monitor and participating actively in the decisions making processes by the neighborhood and often interfere the unwise actions by local governments administrations.

All that is currently builds the foundation to step into their milieu with the aim to advocate as much as possible regarding safeguarding and sustaining their living environment, while providing easy obtainable, relevant to their environment, easy readable knowledge on how to reassess and understand the local values, including the Cultural Heritage ones. As the one among the many means to achieve that is the persuasive use of the solutions by simplest scope of Digital Technologies.

Number of attempts has been ongoing in this sector during the decade in its variety of goals and ways of implementation, however in a total majority of cases those efforts were either very fragmented or complicated for the end-users, not wisely planned and therefore reached only a short time prospects, hadn't long life character and sense of sustainability.



Figure 3 – Local museum and community center in Zeimelis

Thus has many reasons...former technical assistance projects in a field of the cultural heritage had limits for the time and budgetary means for the external and local experts involved, and along with the mostly chosen central or local governments as end clients, are not demonstrating the lasting effect.

Presumably, nearly none of those positive streams of different projects (which had in their essence of formulated aims to give the substantial push the outcomes to the actual, real clients- people who uses assets of the Cultural Heritage in and for their daily life) demonstrated real successes and therefore the actual results usually are under disposition of the different departments of the various levels of state or private governance only.



Figure 4 - Zeimelis town. Right under the corner

If fact, many results are in use as the target of the first (as a new, unexplored market) rank by the manufacturers and salesman of the irrelevant building elements and trim materials, who can afford the advertise them heavily and by this persuade to use them as the simplest solution instead of the traditional materials and techniques.

Character of the cultural heritage assets

In the target areas of the actual planned works with the groups of students of Architecture of Vilnius Gediminas Technical University for the late spring of 2018 there are two basic types of the build Cultural Heritage assets chosen to work on.



Figure 5 - structure of the towns under the projects targets

That is small towns and villages with wooden and brick build dwellings. The first area is the three former small town centers in Northern Lithuania, Pakruojis region, which consists of rather traditional structure of small town square, a church and usually other worship house for the another confession (Lutherans or Jews).



Figure 6 - Jewish cemetery of Zeimelis

Here are two types of residential dwellings: single family occupation wooden log houses (sometime mixed use) and red brick type of single or two floors structures. All areas contain impressive cemeteries of different confessional belonging and quite noticeable landscape forms, waters and active local residents.



Figure 7- Community member`s initiative



Figure 8- Dwellings of the Zeimelis Town

Those assets of build cultural heritage still keep a high level of authenticity in material and in application of traditional, but unfortunately, forgotten technologies. Even more interesting is the fact that the majority of the building elements remains as they were initially installed and level of dilapidation leads to the solution of the repair, but not of the replacement.

Thus, along to the fact, that the selected areas are ranging from the point of their history prior to the XIX th century, actual value of the vital evolution of the sites are more than obvious.

The character of the local resident`s organizations, who actually expressed some request for the assistance are NGO`s, based on the statuses of Local Community or Local Association of the residents. According to their by- law, aside of other important points, „they are willing to promote and maintain local and traditional arts, crafts and features of the values of local and national Cultural Heritage. All of them got some assistance from the various sources of funding to be equipped with the basic digital equipment units and premises for their common meetings and other venues.

Aiming to gain sustainable double benefit

There are two major target groups for the planned actions: groups of local residents, will state as end users of the material, knowledge and skills provided and students of the BA (last generations of the Bologna system in higher education) level, involved in the accomplishment their diploma works in architecture and urbanistic. The planned results of the quick survey is to lay a base for the continuous collaboration of the institutions of the higher education and actual owners of the cultural heritage assets in the smaller towns and country village sites.

Thus will allow to establish a basis for the long term, informal cooperation based on the redevelopment and revival of the peculiarities of local character, including the features of the cultural heritage. Additionally, the networks of the local communities in the country could contribute, while spreading message about such bilateral initiatives to other members of national association.

The outgoing product will look as the small, uncomplicated database of the present data of the most valuable building and their groups, short outline of the development history of an area, revealed features of the landscape and its underground peculiarities as well as the instructions sets on the possibilities to understand basic principles and technical ways of executing or supervising the minor construction and repair works.

All this may rise a question: - what is for the digital age and it`s possibilities in that? The answer should sound like that:

By providing the local community with the data on their dwellings for the particular date and other valuables of the area they live in, there is a chance to obligate them have that data as a re- starting point to move forward properly and eliminate major mistakes at the same time assuring ourselves, that the knowledge and skills necessary are here, along to the possibilities to advice to the smaller neighborhoods for the major emerging daily questions and problems to be solved.

With additional funding paper copies could reach each owner with the aim to strengthen their obligations towards the community owned physical values of the living environment.

This data will be stored in a digital file for the disposition of the local community and association of the country's local communities and neighborhoods. The copy of this will be available from the university for the science and applied researches.

It is planned that the digital map on the values of the dwellings and built structures is going to be produced and it will contain also prints of the technical status of the units and structures presented.

The availability of such a data, after the specific agreements among the owners of this and e.g. the local governments can also be partially used for the macro planning and for the legislative needs (e.g. can serve as supplementary material while granting permits for the new construction and planning procedures.

ETHICAL ISSUES OF ARTIFICIAL INTELLIGENCE IN HUMAN LIFE

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Abstract

For the first time in the world, human beings will face the birth of a new class. This new class is the technology that human beings have created, the last point reached by science. Technology has now reached the level where human beings can stand out in every part of their lives. Artificial intelligence, which has become the most advanced point of technology, will lead to another debate. This new-generation class, formed by artificial intelligence, will probably reveal that human beings are being re-glanced at all stages of life, starting from the taxonomy. For the first time in this new class, which is different from other living classes, its place and limits in life can be determined. Today, there are many issues that have begun to be found and answers are sought. The answers that are tried to be found against these issues are influenced by human beings own native culture. As native cultural behaviours are used to solve these issues, artificial intelligence technology shows an increasingly similar native cultural attitude. As a result, human beings convey the value of its own local culture to this new class. So, a similar life is being reconstructed using technology this time, perhaps this time as more risky.

Keywords: artificial intelligence, ethical issues

1. Introduction

Today, the influence of technological products on human life is increasing day by day in modern life. These emerging technological products can be found in many standards and types. With ever more digitalization of daily life, intelligent software can turn into robots with superior electronic circuits. Some of these robots do basic tasks with simple software, while others can do difficult tasks with complex feelings that can produce creative ideas.

Robots are used in many areas of our daily life. In future, the use of robots will increase even more. Robots will be increasingly used in medicine, in the military field, in industry, in the home, in sick, elderly and child care. The use of robots will undoubtedly be accompanied by a resurgence of labor, time and masculine, along with legal problems. In particular, there will be problems in terms of liability from the consequences of the actions of the robots, protection of privacy and safety, intellectual property rights and ethical concerns regarding robots (Armağan Ebru Bozkurt Yüksel, 2017).

Today, with the development of artificial intelligence, all branches of Science must be ready for new problems and they must have solutions. For this new problem of human beings, sociologists, lawyers, engineers and many more different disciplines have to work together more. Although many studies have been done on this area, they are not at a sufficient level. These studies are limited to problems with local culture or to solve problems with only one thematic field. The desired point is that basic rules are needed to solve the fundamental problems of all human beings. At the beginning, there is a need to establish stronger policies for the world on a platform with international participation, where many themes will come together and discuss this issue thoroughly. After this stage, private policies can be determined at local levels.

In this study, the issues of artificial intelligence and the solutions for these problems are examined.

2. Common Principles on Basic Issues

A few local laws have yet to be published on issues arising from the development of artificial intelligence systems. In 2017, the first serious report was published in the scope of "Asilomar Artificial Intelligence Principles", which was organized by experts in economics, law, philosophy, ethics and social sciences and technical/engineer participants on artificial intelligence. There are also names like Stephen Hawking, Elon Musk, Sam Altman, Sam Harris and Jeff Dean. According to the principles of Asilomar, human beings should follow the following principles in all treatment of artificial intelligence systems (Future of Life Institute, 2018):

- **Safety:** Artificial intelligence systems should be safe and secure in their working condition and should be confirmed to the extent applicable.
- **Failure Transparency:** If artificial intelligence causes damage, it should be able to determine precisely why this damage has been caused.
- **Judicial Transparency:** If there is any involvement in the judicial reasoning processes of any autonomous system, the justification for the content of this inclusion must be satisfactory and the result of this effect can be made by a competent and competent human should be auditable.

- **Responsibility:** The designers and developers of advanced artificial intelligence systems are responsible for all kinds of material and moral responsibility arising from the use, misuse and behaviour of these systems. This responsibility is also a result of the authority to shape the effects that will arise.
- **Value Alignment:** Artificial intelligence systems with a high degree of autonomy should be designed so that their goals and behaviours are in harmony with human values, valid for all times they are in operation.
- **Human Values:** Artificial intelligence systems should be designed and operated in such a way as to be compatible with ideals such as human dignity, rights, freedoms and cultural diversity.
- **Personal Privacy:** Person should have the right to access, manage and control all the data that artificial intelligence system produced.
- **Liberty and Privacy:** Applications of artificial intelligence on personal data should not be unreasonably limiting on the real or perceived freedom of people.
- **Shared Benefit:** Artificial intelligence systems should benefit and empower the maximum number of people possible.
- **Shared Prosperity:** The economic prosperity produced by artificial intelligence systems should be shared on a large scale to benefit all humanity.
- **Human Control:** It is also necessary for people to determine how the decision-making authority is to be made when artificial intelligence systems are used to determine the aims and functions of people.
- **Non-subversion:** The power acquired through the control of advanced artificial intelligence systems must be respectful to the social structure of the society. These should be in developer style. These processes should avoid disruptive and destructive.
- **AI Arms Race:** An arms race should be avoided for deadly autonomous weapons.

3. Ethical Issues of Artificial Intelligence

3.1. Primacy of Personal Information

With the Internet of things technology, personal data is transported online and stored on the web. Thanks to cloud technology, robots can communicate with each other and transmit information over the internet. The security of this network will be important for humanity.

The robotic systems can detect, process and record the situation with sensors that they can go to places where humans can't get in, and they can do things humans can't do (George A. Bekey, 2012). Nowadays, home automation, vehicle control, digital technologies is used in many devices and areas. In the near future, hackers can access the code of humanoid robots with artificial intelligence that could think, causing much greater disasters in the world. Therefore, the codes of the prepared program need to be written with security-oriented planning. The slightest carelessness in programming will cause data not to be secure, to be used for bad purposes, and to cause huge problems. Otherwise, all intelligent systems could collapse at a time or cause damage to human beings.

3.2 Robot Rights Issue

It is unclear whether a person has the right to have a robot that he or she can act on the robot as desired. How are other human affected by the bad behaviour of a robot? It has been pointed out that if a robotic application is followed by the implementation of a human maltreatment, this is the same effect as in humans, and the same level of stress is seen (YouTube, 2018). In Figure 1, the people watching this video often felt bad about themselves.



Figure 1 – When testing the Atlas of the humanoid robot developed by Boston Dynamics, it was knocked down (YouTube, 2018).

(Kate Darling, 2012) prepared an article explores the human tendency to anthropomorphize social robots. Human beings are also felt to have human emotion to humanoid robots, and therefore a law is needed.

Robots will soon be able to produce robots, such as themselves, and repair themselves (Science L., 2018). It is a very important issue to be able to control robots that repair or manufacture them, not to the detriment of human beings. Therefore, in production and repair, it is necessary to prepare and protect the algorithms considering this basic principle.

For the first time, a software was successful in the Turing test in 2014 which distinguishes artificial intelligence robots from humans. The software, called Eugene Goostman, that acts like a 13-year-old student developed by two programmers, convinced the jury that it was a human (Future of Life Institute, 2018).

When artificial intelligence is programmed, there should be no prejudices like people. No distinctions should be made, such as race, ethnicity, gender. Unfortunately, this is a big influence of using the resources obtained from human ideas samples as data. There's no law in the relationship of robots that will live with people. In the future, it is unclear whether there will be a marriage relationship with a humanoid robot with artificial intelligence. In these types of cases, humanoid robots with artificial intelligence cannot be properly evaluated because the existing laws do not exist.

First of all, it is necessary to classify the new species with tests and to make laws for them according to these results. It should not matter if the artificial intelligence to be considered at this stage has a physical body. The important thing is that artificial intelligence is able to communicate.

3.3. Responsibility Issues of Robots

For robots with artificial intelligence, they may also become harmful to humans by misinterpreting the programmed targets. Artificial intelligence robots can offer radical solutions to reduce consumption in order to solve the world resource problem.

What will humans do if many jobs are made on the responsibility of robots? Can excessive use of robots in working life cause laziness or various health problems in humans? Could economic instabilities and income inequality occur in the world? These are very difficult questions for the near future, but we will see how humans will find solutions to them over time.

Undoubtedly robotic technology is easy to use and possible to commit crimes. Depending on the crime, programmers, producers, robot users or robots may have their own responsibilities. Besides, a robot can accidentally commit a crime, even though it's not designed like that.

(Armağan Ebru Bozkurt Yüksel, 2017) If a robot harms another person's robot, or if a robot harms a human, then the owner of the robot can be a strict liability offence. However, it should be possible for the owner of the robot to be able to bring evidence of salvation. The owner of the robot can avoid liability if he / she proves that he / she is taking care not to cause damage. For example, regular technical and physical maintenance of a robot, updating of virus programs, the inability of harmful software to be installed on the robot if the robot is used depending on the internet, the information that the robot saves should be proved that the necessary precautions are taken to avoid theft. So the robot owner has to take the necessary care. The standards can be exploited to determine how a person receives any necessary precautions. In this way, it is possible to provide convenience to the courts in order to establish standards to be complied with in the production of robots and to support the standards in legal regulations, and to raise the awareness of consumers, whether the measures taken are sufficient and the amount of compensation.

Objective liability; it may be in the design, manufacture and use of all robotic applications that may be dangerous. The rules of objective liability can be used in the field of war law. According to this, if the robots work differently than the parameters given to them, the producers will be responsible for it. In the event that robots use disproportionate force in the war, the commanders or political authorities who manage the robots will be responsible for this in accordance with the law of war (Ugo Pagallo, 2013).

Many programmers can work and contribute to the software used in robots. It is possible that robots have errors in their software and that unpredictable results will emerge. It is difficult to detect errors in software that many programmers have developed together. It is also possible for artificial intelligence programs to learn how to change their code, so it is even harder to determine who is responsible (Jack B. Balkin, 2015).

3.4. Issues about Intellectual Property Law

So far, the courts have not examined the robots that created the database using copyrighted works. Now the courts will have to make a decision about the situation of the new produced by the robots. In addition, multiple robots and humans can work together. These works produced in artistic sense are also part of a digital culture, which indicates that an inheritance law is needed. The situation of these issues needs to be clarified immediately. Therefore, Figure 2 shows that there may be problems with determining who will be the rightful owner.



Figure 2 – A sample of Google Artificial Intelligent, artistic work using with Van Gogh style (artnet News, 2018).

Six paintings of Google artificial intelligence were purchased at an auction in San Francisco for \$ 8,000. These works were prepared by applying four different techniques, considering Google engineers, computers, independent artists and old art works (artnet News, 2018). Figure 3 shows that new artificial intelligence works. In addition, A robot may be able to make an invention, design it, make the existing product more useful, or produce software.



Figure 3 – A sample of Google Artificial Intelligent, artistic work (artnet News, 2018).

Here are a variety of opinions. (Armağan Ebru Bozkurt Yüksel, 2017) The creator of the software on the robot can be considered to be the rightful owner here. The person or organization that makes financial investment in the software may also be considered to be an owner of the works. Robots must have a personality in the legal system in order to qualify. It can also be argued that the recognition of the rights to robots is appropriate or whether it is reasonable or not. It is necessary for the robot to discuss the necessity of sui generis recognition on databases (Madeleine de Cock Buning, 2016). Similarly, solutions and laws are needed to insured products and generating robots when they are working.

4. Conclusions

In this era of human history is experiencing a moment from analog to digital. Here is too important for the next generations. Maybe this is the last chance of solving these problems and bring them to certain standards. Otherwise, it can become a serious problem for human life in the future. Today's technological products will form a sub-structure of tomorrow's complex built-up humanoid robots. Tomorrow's humanoid robots will determine how the future will be made of digital life. Therefore, every decision to be taken on these issues and every standard to be determined and applied is of great importance. These products are produced by many different standards and therefore can face many problems with them.

As the law begins before the birth of human beings, there is a need for a border where robots law begins. The correct classification of the software capacities of artificial intelligence and the law must be determined according to each class. In addition, it is necessary to determine the law between classes and the law of the relationship between artificial intelligence and humans. In many countries, robots are produced in many different standards. Even if new laws are set at the local level, a global standard must be set.

The problems related to robots "criminal law" compensation law, inheritance law, security and privacy may be partially solved by interpreting existing laws. However, in the future, with the increase of robots with artificial intelligence and artificial creativity, separate laws, ethical rules and standards will be needed. In collaboration with the experts in the fields of lawyers, engineers, psychology and sociology, the preparation of legal arrangements for robots will be more accurate. However, the excessive intrusive and strict arrangements that should not be forgotten herein will reduce or block developments and innovations, such as in all areas of technology. It is necessary to make efforts to raise awareness of other consumers from the legal arrangements and education and to increase awareness in society.

References

- Armağan Ebru Bozkurt Yüksel (2017) Robot Hukuku, Robot Law, TAAD, January Yıl:7, Sayı:29 (Ocak 2017)
- Future of Life Institute (2018) "AI Principles - Future of Life Institute. [online] Available at: <https://futureoflife.org/ai-principles/?submitted=1#confirmation> [Accessed 09 Feb. 2018].
- George A. Bekey (2012) Current Trends in Robotics: Technology and Ethics, Robot Ethics, The Ethical and Social Implications of Robotics, Editors Patrick Lin, George Bekey, Keith Abney, MIT Press, 2012, pp. 25.
- YouTube (2018) Meet The Newest Atlas Robot. [online] Available at: <https://www.youtube.com/watch?v=vsMRW9rYtbM> [Accessed 09 Feb. 2018].
- Kate Darling (2012) Extending Legal Rights to Social Robots, We Robot Conference, University of Miami, April 2012.
- Science, L. (2018) Damaged Robot Can 'Heal' Itself in Less Than 2 Minutes. [online] Live Science. Available at: <https://www.livescience.com/50988-damaged-robot-heals-itself.html> [Accessed 09 Feb. 2018].
- Ugo Pagallo (2013) The Laws of Robots, Law, Governance and Technology Series, Volume 10, Springer, 2013, pp.3-59.
- Jack B. Balkin (2015) The Path of Robotics Law, California Law Review, The Circuit, 6-2015, pp.53.
- Artnet News (2018) Google's Artificial Intelligence Paintings Auction - artnet News. [online] Available at: <https://news.artnet.com/market/google-inceptionism-art-sells-big-439352> [Accessed 09 Feb. 2018].
- Madeleine de Cock Buning (2016). Autonomous Intelligent Systems as Creative Agents under the EU framework for Intellectual Property. European Journal of Risk Regulation, 7(2), 310-322. doi:10.1017/S1867299X00

T.KOSCIUSZKO - ORIENTED DIALOGUE

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Abstract

Thaddeus Kosciuszko is a unique figure. He was a national hero in Poland and the USA and an honorary citizen of France. As a symbol of liberty and justice he is known all over the world. His monuments can be found in the USA, Switzerland, Sweden, Belarus, Ukraine, Uzbekistan, Lithuania, France, Finland, Great Britain and Australia.

Keywords: Kosciuszko, international, hero, monuments, perception

1. Introduction

The present publication aims to show how the memory of a remarkable person, such as Thaddeus Kosciuszko, can induce others to visit the sites associated with him. In 2017, 200 years after his death, people visited battlefields in America and Poland and paid tribute to him at many monuments scattered throughout the world. An interesting contribution to the international and intercultural dialogue about Kosciuszko has been made by Felix Molski.

He is an Australian of Polish heritage and a former high school teacher of Economics and Geography. However, in his retirement years he is a history enthusiast who is exploring the theme of the triumph of liberty over tyranny through the ages. In the pantheon of heroes, Polish champion of liberty Thaddeus Kosciuszko was an awe-inspiring figure, one of the luminaries of this cohort (Molski F., 2017, p.29).

Felix Molski has a collection of photos from 47 sites around the world where Thaddeus Kosciuszko has been memorialized. 25 of them are in the USA, 17 in Poland, 2 in Australia and 1 in France. They are situated in major regional cities and also include battlefields and remains of engineering structures by T.Kosciuszko. Felix Molski, who has travelled across four continents, has documented most of the sites, which is a praiseworthy undertaking. The exhibition he showed *...on the bicentennial of Kosciuszko's passing, helps viewers of it to fathom Kosciuszko's impact on the human spirit and consciousness and why he can fairly be described as a Friend of Humanity (Molski F., 2017, p.29).*



Figure 1 – T. Kosciuszko monument on Wawel Hill in Krakow

2. Poland

First of all Kosciuszko is a significant figure in Poland: his legacy is indisputable and respected by people of all persuasions. Memorial sites and monuments to him are protected with care. This applies to objects as important as the Kosciuszko Mound in Krakow but also to other sites where local communities unite around the unique spiritual and material heritage of Kosciuszko.

2.1. Who was Kosciuszko. A Belorussian trace.

Thaddeus Kosciuszko was born in the Mereczowoszczynna estate in the Polesie region on February 4, 1746. It is now on the territory of Belorussia. The drawings of his birthplace show a wooden manor house typical of the Polish landed gentry residence in the east of the country. The house has a compact form and features a typical porch supported on four pillars. It has a broken gable roof (the so called Polish roof), covered with shingles. In the inter-war period, it housed a museum which was destroyed during World War II and after the war, due to the altered borders, was situated outside Poland. In 2004, owing to the efforts

of Belorussian authorities with the support of the USA, the house was rebuilt basing on the preserved drawings and Thaddeus Kosciuszko museum was reinstated. The exhibits include archival photos and period furniture aiming to reconstruct the interior contemporary with the times when Thaddeus Kosciuszko was born here.

In 1765 T. Kosciuszko began studies at the Cadet Academy in Warsaw where he attended a special engineering course for outstanding students. He graduated in 1768 attaining the rank of captain.



Figure 2 – The Kosciuszko's manor house in Merezewszczyzna

In the autumn of 1769, he left for Paris. He wanted to improve his knowledge of engineering and artillery but as a foreigner he was not allowed to study at the French military academy. That is why he officially enrolled in the Royal Academy of Painting and Sculpture (Académie Royale de Peinture et de Sculpture) studying military techniques by himself. For 5 years in Paris, he absorbed the atmosphere of pre-revolutionary France listening to advocates of liberty and human rights and opponents of absolutism. He was exposed to philosophical discussions and the ideas of the Enlightenment which had a great impact on his political and social convictions. After completing his studies, he returned home in the summer of 1775.

At the time, the Continental Army was formed in the British colonies in America and the 11nd Congress was taking power. Kosciuszko arrived in America in August,1776, a month after the Declaration of Independence was passed on July,4.

He went to America again in 1796. His engineering feats in the American Revolutionary War were highly praised and earned him the title of hero of the United States.

Meanwhile, in 1784 he returned to Poland and settled in his estate in Siechnowicze. Then he engaged in the defense of Poland against Russian army which entered the Polish territory. He took part in many battles and was appointed commander of a division in Prince Jozef Poniatowski's army. Polish army had no chance to defeat the Russians as they outnumbered Polish soldiers.

Soon Kosciuszko was involved in planning an uprising and military actions to regain the country's independence. The uprising started on March 12,1794 and was over on November 16,1794 when the last of the troops surrendered. Kosciuszko was the unquestionable leader of the uprising and the act of the uprising gave him the title of commander-in-chief and placed all power in his hands. Despite the defeat, this episode of Polish history is very important and often recalled.

After the lost war, Kosciuszko had to leave Poland for political reasons. His fight for the independence of Poland and his military feats were highly appreciated and when he came to Paris, the Legislative Assembly of Revolutionary France awarded him the honorary citizenship of France.

On his second return from America in 1798 he settled near Paris. He took part in the formation of Polish Legions in Italy but objected to the idea of combining Polish cause with Napoleon I Bonaparte's actions.

In July, 1815, Kosciuszko came to Switzerland and settled in Solothurn. During the Congress of Vienna he stayed in Vienna. Two years later he died in Solothurn. The coffin with his embalmed body was transported from Solothurn to Krakow in March,1818 and placed in a crypt in the Wawel Cathedral.

2.2. Kosciuszko Mound: Krakow

Kosciuszko, the glorious defender of human liberty, is commemorated in Kraków by an artificial mound, officially 35.54 metres in height and 73.25 metres in diameter, built by human hands in the tradition of Kraków's prehistoric sepulchral mounds of Krak

and Wanda (built for the legendary founder of Kraków, the Polish King Krak, and his daughter Princess Wanda). Shortly after Kosciuszko's funeral service in the Royal Cathedral of Wawel, it was decided to honour him with the erection of a symbolic tomb or mound on Bronisława Hill (natural) named in honour of the 13th-Century Norbertine sister, Blessed Bronisława. In a profound coincidence, Bronisław means glorious defender. A Mound Construction Committee was formed in 1820 and, after three years of volunteers' and professionals' toil, an 'unveiling' ceremony was held on October 16, 1823, with people from around the world paying homage to Kosciuszko; moving speeches were delivered, with the Foundation Act ceremonially buried at the base in a glass and marble case. The Mound was completed ten days later. It partly consists of soil from Kosciuszko battlefields in Poland and America. In 1860, a granite boulder inscribed 'To Kosciuszko' was added to the summit. From 1850 to 1854, during the Austrian occupation, a star fort was built around the Mound.

In 1945, the Germans blew up Kosciuszko gate and the fort was further devastated after the war by the Poles who successively demolished parts of the bastions. Currently, Fort Kosciuszko features the restored curtain wall I-V of Fort Kosciuszko no 2 which is entered in the list of protected historical objects, Kosciuszko Mound, as well as the previously renovated Bastion V and the Caponier. Together they create a unique complex. It is now one of the objects in Krakow most often visited by tourists from around the world. It also houses a conference and exhibition centre dedicated to Thaddeus Kosciuszko and the headquarters of the Kosciuszko Mound Committee which was completed in 2017 on the 200th anniversary of T.Kosciuszko's death. The reconstructed and renovated place exudes charm and the authenticity of the old walls attracts the interest of many people including students of architecture.



Figure 3 – Kosciuszko Mound in Krakow

2.3. Students

As part of the celebrations of the Year of Thaddeus Kosciuszko, who has been the patron of Cracow University of Technology for 40 years, the students of architecture also took part in the commemorative events. In May, 2017, 11nd year students in their freehand drawing classes drew the historical architecture of the Fort complex with its specific charm and characteristic style. Selected works were then exhibited in the University lobby. A little later, 1st year students worked on the same theme using painting techniques. Their works were also exhibited. Both groups of students made an excellent artistic interpretation following the guidelines of the teachers.

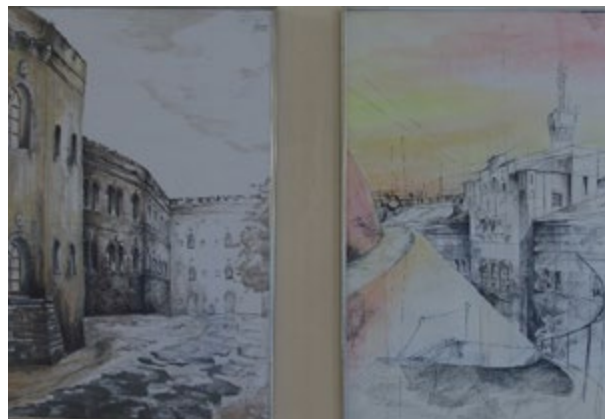


Figure 4 – Kosciuszko Mound – works of students of the Faculty of Architecture, Cracow University of Technology. Part of exhibition.

2.4. Other monuments in Poland

Monuments to Thaddeus Kosciuszko have been erected in many localities across Poland. They mostly refer to Thaddeus Kosciuszko as a hero of peasants who promoted changes in the social system and excelled in the fight for national liberty. His military genius was also highly appreciated together with the engineering prowess still evident in the fortifications built in Poland and America. He seems to be a remarkable figure in the turbulent history of Poland whose merits were unquestionable at the end of the XIXth century, throughout the XXth century and in the XXIst century. All political parties equally respect Kosciuszko and support his memorialisation in the form of plaques, monuments, obelisks and other symbols.

The author of the present paper has made note of over fifty monuments situated in the centers of urban spaces such as squares, parks and alleys.



Figure 5 – T. Kosciuszko monument in Proszowice

They include monumental equestrian statues by renowned sculptors like the one on Wawel Hill made by Leonard Marconi of Lviv and completed by Antoni Popiel. It was cast in bronze in 1900. It took the Committee for the Erection of the Monument many years to have its location approved. In 1911, it stood on the courtyard of the Fire Brigade and it was only in 1921 that the monument was placed temporarily on the bastion of Władysław IV where it was finally mounted permanently in 1932. The statue was destroyed by the Germans during World War II and replaced in 1960 with its replica presented to the residents of Krakow by the residents of Dresden. It was the only monument in Poland reconstructed by the Germans. Its author was Rudolf Luehner. As a work of art, it met with criticism as it represented the canons of the monument sculpture prevailing in the second half of the XIXth century. There were different expectations in terms of aesthetics as, in the opinion of the contemporaries, *...you cannot pay homage to Heroes by means of small-scale artworks* (Król A., 1994).

Another well-known monument is that in Poznan. It was designed by Zofia Trzcinska-Kaminska in 1929 for the National Exhibition and placed at the entrance to Poznan Fair. Between 1929 and 1930, the author worked on the proper model of the Commander's statue and three bas reliefs on the lower part of the monument representing Greater Poland (at the front) and 'Polish people' (on the sides) ready to defend the borders. The monument was unveiled on December 27, 1930 on the twelfth anniversary of the Greater Poland uprising. It was destroyed during World War II and restored in 1967.

An artistically distinctive statue of T. Kosciuszko is the one standing in the market square in the town of Proszowice. It was erected in the town centre in 1957, when creating art was no easy matter, and dedicated to general Thaddeus Kosciuszko, Commander-in-chief of the National Military Forces in the time of Kosciuszko Insurrection. The initiative to have the monument erected came from the local community and a competition for the design was held among the sculptors - members of the Krakow branch of the Association of Polish Artist. The winner was the project by Tadeusz Stulginski featuring a static sculpture of a figure on a plinth in contemporary style but with no features of social-realist convention.

The town of Polaniec, where Thaddeus Kosciuszko released the famous Declaration, later referred to as the Polaniec Declaration, in 1794 commemorated him with a monument only in October 1984 and the unveiling ceremony coincided with the 190th anniversary of the proclamation of the Polaniec Declaration. The statue stands in the square between Zapniowska street and Bartosz Glowacki street and features a massive and sturdy Commander, surprisingly modern in appearance and quite unlike the hundreds of traditional renderings. The author of the granite sculpture is Adam Myjak.

Recent years have seen the erection of a monument to Thaddeus Kosciuszko in the Zelazna Brama square in Warsaw. Attempts to have it built date back to 1817. The present statue is a replica of the statue in Washington which was a gift of the Polish diaspora to the American nation and made by Antoni Popiel in 1910. It is fulfillment of the pledge made 100 years ago on the unveiling of the original in Washington that a copy of the monument would stand in Warsaw when Poland regained independence.



Figure 6 – Kosciuszko monument in Warsaw

As for the artistic quality of the memorials, only a few evoke aesthetic emotions. Most of them are nondescript objects which merge with the surroundings and become invisible for the passers-by since they hardly ever refer to current aesthetic or cultural codes that stir aesthetic impressions.

3. Switzerland

Kosciuszko spent the last years of his life in Switzerland. He did not want to return to Poland as it was not an independent country at the time. Surrounded by a friendly and caring members of the Zeltner family he could watch the political transformations and events in Europe and America from a certain perspective.

It is worth mentioning Solothurn and Rapperswil, two Swiss towns where Polish history is exhibited, promoted and cultivated. Both are destinations also dedicated to Kosciuszko.

Polish Historical Museum has existed in Rapperswil since 1870. It is housed in a monumental defensive castle towering over the town and the lake. The stronghold was erected in the second half of the thirteenth century.



Figure 7 – The Kosciuszko's museum in Solothurn

The museum collection includes Thaddeus Kosciuszko's memorabilia which had been dispersed across the globe during the turmoil of wars. The museum is a place in the landscape of this unique part of Switzerland where traces of other Poles can be found. It is probably also visited because of its location on a picturesque peninsula on the northern shore of Lake Zurich which makes it the town's main tourist attraction.

Solothurn is a town where T. Kosciuszko died. In 1936, a Polish-Swiss Kosciuszko Society was established there and a Kosciuszko Museum opened at Gurzelngasse 12, where he spent the last two years of his life in a flat rented from Francis Xavier Zeltner. In a nearby Zuchwil, a monument to Kosciuszko was erected on the site of his burial in the former cemetery in 1817.

At present, the museum curator is Benedykt Drewnowski whose deputy is Jan A. Konopka. The former has co-authored a book titled *Kosciuszko in Switzerland in 1815-1817*, published last year. Jan A. Konopka, in turn, is known for his numerous publications in Polish, German and French. One of them is a book titled *Thaddeus Kosciuszko's letters from Solothurn 1815-1817*. Their activity goes beyond the sphere of national interest as it concerns Thaddeus Kosciuszko as a freedom fighter and an advocate of social equality. Close collaboration with the authorities of Solothurn canton makes possible honouring him and commemorating the sites associated with him which are now items in a list of things to see on a sightseeing tour of the town. The sympathy and friendliness of local people help cherish his memory. Guest books reveal the majority of the museum visitors to be Poles and Americans.

4. Conclusion

Considering T. Kosciuszko's services rendered to the cause of Polish and American independence it is no wonder that monuments to him, places honouring him and commemorating the sites associated with him, were built throughout the XXth century regardless of the social and political conditions as well as changes in the political systems, ways of thinking, aesthetic trends and their social interpretation, and, first of all, historical memory and its heroes. The latter mostly depended on the current doctrines. The figure of Thaddeus Kosciuszko seems to be the only one that consolidates the Polish nation and fosters national concord and also the only one that involves other nation, like Americans, Australians, to remember that inspiring personage.

References

180 lat Kopca Kościuszki, ed. Jan M. Małkowski (1996), Materials from the Scientific Session held on May 28, 1994, Towarzystwo Miłośników Krakowa, Kraków 1996.

Aksamit B. (2014), Pomniki nie są na zawsze, *Wyborcza.pl/piątek ekstra*, 17.04.2014, retrieved: 27/07/2016, <http://wyborcza.pl/piatekextra/51,137862,15817917.html?i=6>.

Baraniak A. (2008), Szacunek dla tożsamości/ Respect for Identity, an interview with prof. Marian Marek Drozdowski from the Institute of History of the Polish Academy of Sciences, chairman of Stowarzyszenie Budowy Pomnika Tadeusza Kościuszki/ Association for the Erection of the Monument to Thaddeus Kosciuszko in Warsaw, interviewer: Andrzej Baraniak, *Dziennik Związkowy* (Polish Daily News) December 31, 2008, retrieved: 25/07/2016, <http://dziennikzwiązkowy.com/polonia-na-swiecie/szacunek-dla-tozsamosci-z-przewodniczacym-stowarzyszenia-budowy-pomnika-tadeusza-kosciuszki-w-warszawie-prof-marianem-markiem-drozdowskim-z-instytutu-historii-polskiej-akademii-nauk-rozmawia-andrzej/>.

Drozdowski M.M. (2015), *Tadeusz Kościuszko. Dzieje i tradycja*, Publisher ATANEA, Warszawa 2015.

Forty CK Twierdzy Kraków. Fort 2 Kościuszko, retrieved: 5/02/2018, http://www.fortyck.pl/fort_2_kosciuszko.htm.

Grzesiuk-Olszewska I. (1995), *Polska rzeźba pomnikowa w latach 1945-1995*, published by NERITON, Warszawa 1995, p.195.

Hapanowicz P. (2015), *Kościuszko. Szwajcarskie reminiscencje (1815-1817)*, Towarzystwo "Pro Museo", Kraków 2015.

Konopka J.A. (2007), *Ku pamięci Tadeusza Kościuszki*, *Nasza Gazetka* 5-6/2007, pp. 14-17.

Kopiec Kościuszki w Krakowie: Twierdza a Miasto Kraków 1846-1918, retrieved: 28/07/2016, <http://www.kopieckosciuszki.pl/pl/dla-turystow/wystawy/twierdza-a-miasto-krakow-1846-1918>.

Korzon T. (1894), *Kościuszko-Bibliografia z dokumentów wysnuta*, Kraków 1894.

Kościuszce w hołdzie, ed. M.Rokosz (1994), Publisher and Printing house „Secesja”, Kraków 1994.

Król A. (1994), *Pomnik Tadeusza Kościuszki na Wawelu* [in:] *Kościuszce w hołdzie*, ed. M.Rokosz, Publisher and Printing house „Secesja”, Kraków 1994, pp.239-255.

Molski F. (2017), *Thaddeus Kosciuszko. Memorialised Worldwide. Tadeusz Kościuszko upamiętniony na całym świecie*, Kosciuszko Heritage Inc., exhibition catalogue, Published by Politechnika Krakowska, Kraków 2017.

Morkowski J., Drewnowski B. (2016), *Kościuszko w Szwajcarii 1815 – 1817*, Zamek Królewski w Warszawie – Muzeum, Warszawa 2016.

Pomnik Tadeusza Kościuszki wreszcie w Warszawie, Bankier.pl, 2010-11-17, retrieved: 5/02/2018,

<http://www.bankier.pl/wiadomosc/Pomnik-Tadeusza-Kosciuszki-wreszcie-w-Warszawie-2244517.html>

Proszowice. Pomnik Tadeusza Kościuszki, retrieved: 5/02/2018, <http://www.polskaniezwykla.pl/web/place/41960,proszowice-pomnik-tadeusza-kosciuszki.html>

Skurjat-Kozek E. (2014), Amerykańska Polonia dba o swego Kościuszkę! Puls Polonii, August 12 , 2014, retrieved: 5/02/2018, http://www.zrobtosam.com/PulsPol/Puls3/index.php?sekcja=1&arty_id=13822

Thaddeus Kosciuszko Memorial - Chicago, retrieved: 5/02/2018, http://www.waymarking.com/waymarks/WMHNFQ_Thaddeus_Kosciuszko_Memorial_Chicago_IL

Ziejka F., (1984), Panorama Racławicka, KAW, Kraków.

Tadeusz Kościuszko : historia, współczesność, przyszłość : relacje i zależności, ed. M. J. Żychowska. 2017, publ. Politechnika Krakowska, Kraków 2017.

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SESSION 3

AUTHORS

SMART CITY AND HERITAGE CONSERVATION BY MEANS OF MODERN BUILDING TECHNOLOGIES

Chair: Nina Umnyakova

Participants in alphabetical order:

Nina Buzalo - Nadejda Tsaritova - Alina Tsvetkova

Victor Dorokhov

Vladimir Gagarin - Vladimir Kozlov - Kirill Lushin - Natalia Plyushchenko

Vladimir Gagarin - Paul Pastushkov - Natalia Pavlenko - Zhou Zhibo

Alexander Gvozdokov

Vyacheslav A. Ilyichev - Nadezhda S. Nikiforova - Artem V. Konnov

Vitaly Kasyanov - Zarina Chipova

Pavel Aleksandrovich Khavanov

Svetlana Kolobova

Anatoly Krishan - Vladimir Rimshin - Elvira Chernyshova - Mariya Astafeva - Vladislav Chernyshov

Ekaterina Kuzina - Vladimir Rimshin - Vladimir Kurbatov

Natalia Kuznetsova - Elena Mishchenko - Pavel Monastyrev

Nikolay Lyubomirsky - Sergey Fedorkin - Michael Lukyanchenko - Tamara Bahtina - Aleksandr Bahtin

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Boris Shpilev - Daria Ryabinicheva

Igor L. Shubin - Vadim Nikolaevich Sukhov - S. Aimagambetova

Vladimir A. Smirnov

Ilya Tsukernikov - Igor L. Shubin - Tatyana Nevenchannaja

Nina Umnyakova

Sergey Vdovin - Stanislav A. Yamashkin - Vladimir T. Erofeev - Anatoly A. Yamashkin - Anna Piksajkina

Dmitry Y. Zheldakov

SESSION 3

NINA UMNYAKOVA¹

MAIN CONCLUSIONS REPORTED BY THE CHAIRMEN OF THE THREE SESSIONS OF THE INTERNATIONAL SYMPOSIUM “HERITAGE FOR PLANET EARTH 2018”

1. To confirm the primacy of the heritage preservation on new material use and modern building technologies question
2. To reinforce the endeavors to preserve world heritage sites with the use of modern technologies and materials, that keep heritage and don't harm nature
3. To review the current standard of the city planning development considering the existing cultural heritage for a sustainable combination ancient and modern
4. To analyze the impact of technical aspects, as lighting, energy savings, new materials, vibration, traffic etc. on monuments and historical center
5. To improve education and training on implementation of technology in heritage preservation

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NET SHELLS AS AN ELEMENT OF BIOPOSITIVE CITY ENVIRONMENT

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Abstract

Activities to protect historic cities and the revival of areas of historical importance are accompanied by a desire to maximize the entry of the natural environment into the city. Architects and builders often go for the use of non-standard design solutions, widely use spatial coating designs as the forms closest to natural ones to create a beautiful, healthy, beloved city. Constructions with curvilinear outlines, which the grate Russian engineer V.G. Shuhov invented and patented in XIX century, become the basis of modern architecture. The article presents a history of the reticulated shells and their use in architecture. Considered their main parameters, design, methods of erection. The spatial rod constructions of coating have unlimited possibilities for creating new architectural forms. The growing number of structures constructed using this technology indicates the prospects for the use of such structures, especially at low temperatures, in seismic and remote areas.

Keywords: spatial rod constructions of coating, computer simulations, solid model of node

1. Introduction

Spatial rod constructions of coating are particularly popular worldwide. Many well-known architects use coverings with curvilinear outlines based on reticulated shells. The net shells have unlimited possibilities for creating new architectural forms. The growing number of structures constructed using this technology indicates the prospects for the use of such structures, especially in harsh climatic conditions and remote areas.

The first curvilinear coverings were built in ancient Rome. Numerous domes and vaults, assembled from special shaped bricks, can rightly be considered the first shells. Since the XIX century, steel and cast iron have been actively used in construction. The use of metal allowed to reduce the mass of the shell, make it transparent to light by using glass. At this time, the Russian engineer Vladimir Shukhov (1853-1939) (Fig.1) created the first net shells and bearing structures on their basis.

V.G. Shukhov invented and patented three types of net shells: hanging, convex and net towers. In 1896 Shukhov first introduced his new coating designs (Fig.2) at the All-Russian Exhibition in Nizhny Novgorod (unfortunately, only photos of the pavilions have survived to this day).



Figure 1 – Russian engineer Vladimir Grigoryevich Shukhov (1853-1939)

The company Bari, for which the project was completed, built four pavilions with hanging covers, four others - with cylindrical mesh arches. In addition, one of the halls with a mesh hanging cover had a hanging covering of thin sheet (membrane) in the center, which had never before been used in construction.

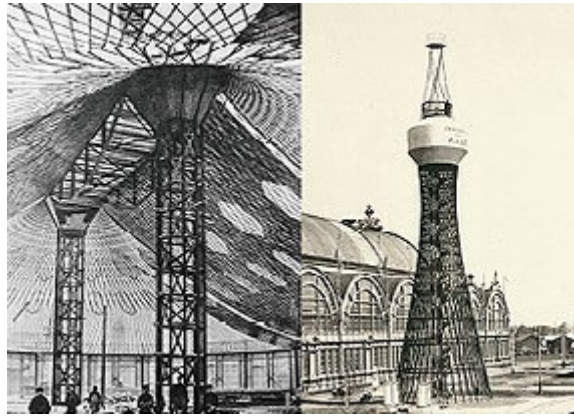


Figure 2 – Hanging net shells and net tower at the All-Russian Exhibition in Nizhny Novgorod (1896)

Until 1890, Shukhov created exceptionally light arched supporting structures of glass arches above the largest Moscow stores GUM (formerly the Upper Trade Rows) and the Petrovsky Passage (рис. 3).



Figure 3 – Net shells at the Upper Trade Rows in Moscow (1890)

V.G. Shukhov used for the first time as a covering on Vyksa metallurgical shops shells of double curvature spans 38 and 25 m, preserved to the present day (fig.4). For the first time in the world construction practice, Shukhov used the same type of rod elements to compose a spatial covering of double curvature on a rectangular plane. This design, compared with the tradition bearing structures, gave up to 30% savings in metal.



Figure 4 – Spatial covering of double curvature on a rectangular plane in Vyksa (1898)

Shukhov created a classical vaulted shell on a fundamentally new element: from metal rolling corners. For that time, it was a qualitatively new industrial building - high, bright, extraordinarily spacious. The facades of the building were stained-glass windows from the base to the top (fig.5). The overall dimensions of the building – 75,0 × 38,5 m.

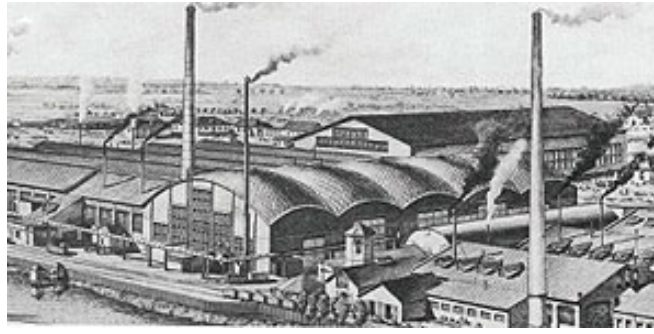


Figure 5 – Exterior view of the metallurgical plant in Vyksa (1899)

2. Spatial Rod Constructions of Coating in Modern Architecture

The spatial rod constructions of coating (SRC) have unlimited possibilities for creating new architectural forms. The growing number of structures constructed using this technology indicates the prospects for the use of such structures, especially at low temperatures, in seismic and remote areas.

The design of reticulated shells is self-supporting and has higher bearing properties compared to other types of structures. This is due to the uniform distribution of loads on all the rods of the structure, which virtually eliminates brittle fracture. The aerodynamic shape of the reticulated shells provides the best wind flow compared to other structures, which makes them stable during destructive hurricanes and tornadoes.

One of the variants of reticulated shells is the dome, the parameters of which are determined by the frequency of the partition and the height (Fig. 6).

The reticulated shells enable a rational manner to search for various options of space planning solutions, create buildings of multipurpose functional use due to application of large-span transformable structures, diversify architectural forms and compositional tools.

At the basis of contemporary global trends in construction industry development lies the increasing degree of prefabrication of building structures and their components, reduction of materials consumption and manufacturing labor hours. The spatial rod constructions of coating meet these requirements to the uttermost as they allow to reduce the costs of their design, output, production specialization. All parts of the structure are unified, have a minimum number of standard sizes. The technology of the mass production of the SRC is optimum, the greatest possible number of similar parts made without changeover equipment. The all parts of the construction are easy for transporting.

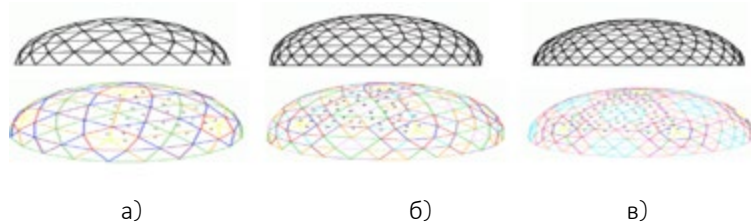


Figure 6 - The frequency of breaking and the height of the dome: a) 4V dome, height - 1/2 sphere; b) 5V dome, height - 5/8 of the sphere; c) 6V dome, height - 1/2 of the sphere

The complexity of the nodal connections and requirement of high accuracy during manufacture and assembly hamper the introduction of such constructs into mass production.

3. Numerical Simulation of Spatial Rod Constructions

The computer simulations of the SRC, the use of CAD software complexes for automation of activities on stages of design and technological preparation of production are allow to reduce the time of design development, improve the quality and reliability of the design and manufacture of elements.

The authors have set the task of designing automation SRC, they want to create a procedure for perform engineering design and

prepare the documentation and design drawings for fabrication elements of the system. The solid model of node was created in the program SolidWorks (Fig. 7).

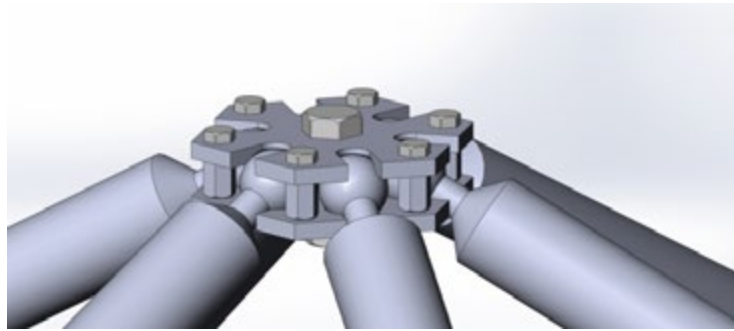


Figure 7 - Solid model of the unit, created in the program SolidWorks

The solid model of the unit was transferred to ANSYS for the numerical analysis of its bearing ability, taking into account the physical and geometric nonlinearity. The calculation model with the division into finite elements is shown in Figure 8. Parameters of node in stress-strain state were calculated in nonlinear formulation.

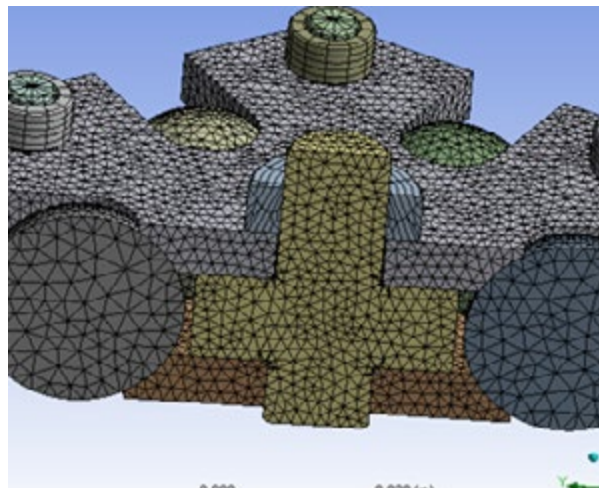


Figure 8 - The calculation model with the division into finite elements

The distributions of deformation and equivalent stress von Mises in the node with entering additional elements are shown in Figure 9 and 10.

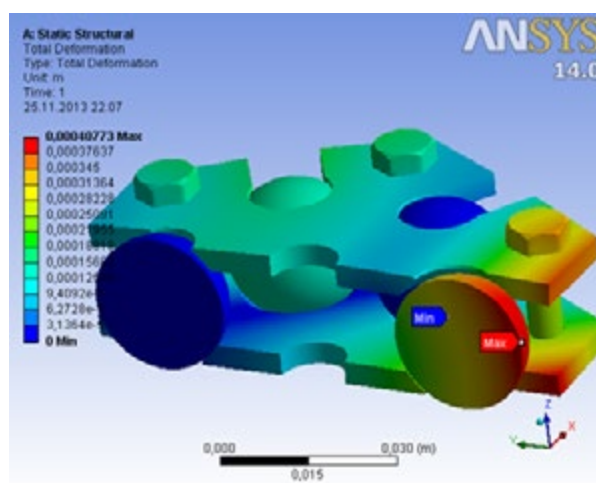


Figure 9 - The distribution of deformation in the enhanced node

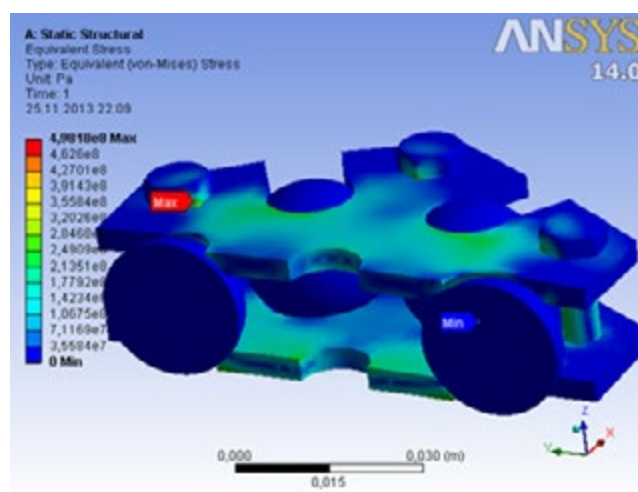


Figure 10 - The distribution of equivalent stress von Mises in the enhanced node

4. Conclusions

The spatial rod constructions of coating (SRC) are particularly popular worldwide in XXI century. They enable a rational manner to search for various options of space planning solutions, create multipurpose buildings, diversify architectural forms and compositional tools.

At the basis of contemporary global trends in construction industry development lies the increasing degree of prefabrication of building structures and their components, reduction of materials consumption and manufacturing labor hours. The spatial rod constructions of coating meet these requirements to the uttermost as they allow to reduce the costs of their output, production specialization and rationality of design solutions.

References

Shukhov V.G. Selected Works, Vol. 1, Structural mechanics, p. 192, Academy of Sciences of the USSR, Moscow, 1977.

Iliya L. Ruzhansky. Development of Constructive Forms of Spatial and Light Structures// Industrial and Civil Engineering. 2010. № 5. P 12-15.

A.S. Marutyan. Light spatial metal construction // Pyatigorsk, 2009. P. 51-60.

The rod hinged joint of a spatial of a regular structure: pat. 2586351 Ros. Federation: MPK E04B 1/58 / N.G. Tsaritova, N.A. Buzalo; applicant and patent holder Platov South-Russian State Polytechnic University – № 2015100939/03; publ. 10.06.16, bul. №16.

N.A. Buzalo, S.A. Alekseev., N.G. Tsaritova. Numerical study of three-dimensional bar swivel design // Internet magazine «Naukovedenie», 2014 №2 (21) [electronic resource]-M.: Naukovedenie, 2014: <http://naukovedenie.ru/?p=issue-2-14.pdf>.

THE APPLICATION OF TRADITIONAL AND CURRENT TECHNOLOGIES FOR CONSERVATION OF WALL PAINTING IN HISTORIC CHURCHES USED AS MUSEUMS (FOR EXAMPLE, THE SPASO-PREOBRAZHENSKY CATHEDRAL OF MIROZHNSKY MONASTERY OF 12TH CENTURY)

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Abstract

Adjustment of indoor environment and building envelope temperature and humidity conditions is the main method ensuring reliable preservation of wall paintings in architectural monuments used as museums. High humidity significantly accelerates biological, physical and mechanical degradation and chemical corrosion of painting materials. Preservation measures were developed for the Spaso-Preobrazhensky Cathedral in the 1980's based on the data from inside and outside air temperature and humidity measurements made manually inside and in front of the Cathedral entrance. Automatic heat and humidity monitoring system was commissioned in the Cathedral in 2010–2011 to maintain the proper conditions for preservation of wall paintings when the Cathedral is used as a museum. The monitoring results are used as the basis for decisions on allowing tourists inside the museum under various climatic conditions. This allows for optimization of the heat and humidity conditions for wall paintings preservation in the Cathedral used as a museum.

Keywords: Conservation of wall paintings, online environmental monitoring, non-destructive testing.

1. Introduction

Adjustment of the temperature and humidity conditions of indoor environment and building envelope – walls, arches, window and door fillings, is the main method ensuring reliable conservation of wall painting. High humidity conditions accelerate biological degradation of organic components of paint, while high temperature and humidity differences result in physical and mechanical destruction and chemical corrosion of lime plaster and paint layer. The nature of these degradation processes is directly linked to the painting method and sharp temperature and humidity fluctuations observed in most regions of Russia. Low humidity can be just as destructive, as overdamping of paintings. As our monitoring experience shows, sharp changes in the temperature and humidity conditions related to operation of the heating and ventilation systems can have quite a negative impact. Thus, for example, for a number of reasons high environment humidity was observed inside the St. Sophia Cathedral in Vologda in 1990's and the first half of 2000's, accompanied by overdamping of wall paintings with corresponding microbiological deterioration. Sharp activation of heating during the winter of 2006–2007 resulted in a quick drop of the relative humidity in the Cathedral, and appearance of mechanical damages to gesso and paint layer.

It should be highlighted that the processes mentioned above describe the wall painting deterioration processes only in the most general terms. The real wall painting deterioration processes in a specific monument are generally much more complicated. The deterioration rate depends on specific painting methods and temperature and humidity parameters of building envelope and inside environment. Retouching and renovation technologies that were used in the past and have changed the materials structure also have their impact.

2. Monument Description

Annual outside air temperature fluctuations in Pskov, where the Mirozhnsky Cathedral is located, range from approximately +30 °C to – 30 °C. Pskov climate is characterized with high air moisture content, especially in the summer. Figure 1 shows the Cathedral during different parts of the year – winter, summer, spring flooding of Velikaya River.

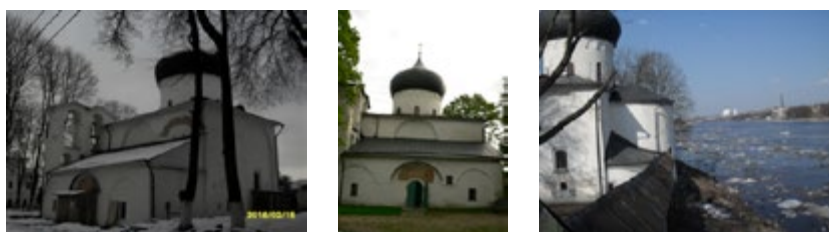


Figure 1 – The Spaso-Preobrazhensky Cathedral – winter, summer, spring river flooding

The most resistant to adverse environmental impact are wall paintings dated 12-17th century made using of tempera-mural technique on lime gesso. Paint layer is usually applied on moist gesso and demonstrates high strength properties. The latter, along with high vapor permeability of paint layer and gesso, explains a relatively good in some cases preservation of Old Russian wall paintings that have existed in unheated temples for several centuries (e.g. in the Spaso-Preobrazhensky Cathedral, where about 80% of paintings are preserved after over eight and a half centuries – Figure 2).



Figure 2 – Wall paintings in the Spaso-Preobrazhensky Cathedral – fragments.

However even Old Russian paintings are subjected to deterioration under unfavorable temperature and humidity conditions. Fluctuations of temperature and humidity values trigger moisture transfer, migration and deposition of salts in the pores of plaster. This causes mechanical destruction and chemical corrosion of painting materials. The rate of moisture evaporation depends on the temperature and humidity of indoor air in the Cathedral and structure of the plaster. The evaporation rate determines localization of the evaporation surface, which can overlap the surface of painting or shift down into the plaster base. In the first case this results in destruction of the surface painting layer, while in the second – delamination of the plaster base by the salts deposited within it. The issue of preservation of wall paintings in the Spaso-Preobrazhensky Cathedral of Mirozhsky monastery was initially brought up back in the beginning of the 20th century due to periodic flooding of the Cathedral during spring floods, and regular dampness after the winter period. A significant role in solving these issues has played the Imperial Archeology Commission, which was responsible for construction and rehabilitation works in this monument.

3. Apparatus and Methods of Temperature and Humidity Analysis

The following equipment was used in the comprehensive temperature and humidity conditions analysis method designed for this purpose:

Thermal camera with the following characteristics:

Infrared resolution	640 x 480 pixels;
Spatial resolution	1.13 mrad
Minimum focal distance	0.1 m;
Field of view	42° x 32°;
Temperature sensitivity	< 40 m°K

Dielkometric moisture meters – with different material moisture content determination depth:

1. Up to 10-12 cm;
2. Up to 5 cm

System of wireless sensors of air and material surface parameters with temperature sensitivity of 0.05 °C, relative air humidity sensitivity 2%, and surface temperature measurement sensitivity of 0.1 °C.

Infrared thermometer (pyrometer) with target indicator. Resolution: 0.1 (°C)

4. Development of Technologies to Ensure Preservation of the Monument and its Paintings

Let's move on to review of the technologies used for preservation of the 12th century monumental paintings in the Spaso-Preobrazhensky Cathedral of Mirozhsky monastery in Pskov during intense attendance by tourists. The attendance rate grows every year and will accelerate even more in the future – documents are being prepared right now for inclusion of the monument in the list of UNESCO protected heritage sites. And such enhancement of the monument status increases the interest in it. Scientific research and restoration are carried out in the monument in parallel with tourism activities – restoration of the paintings, architectural restoration, and development of paintings preservation technology. The preservation technology is based on optimiza-

tion of the temperature and humidity of the inside environment and monument structures. The main problems for temperature and humidity adjustment in the monument are:

- high attendance rate,
- high humidity of the monument envelope due to atmospheric impact and specifics of the territory around the monument,
- abnormally harsh damping of the lower part of construction due to high level of spring flooding (once every 8-12 years) of Velikaya River.

Limited heating was introduced in the Cathedral in 1980's to enhance the preservation conditions. Its value for preservation of ancient monuments is justified in the papers written by employees of the State Scientific Research Institute of Restoration and other organizations (Bogoslovsky and Sizov 1988), (Sizov 1996). The purpose of limited heating is to limit the inside air temperature during winter to the value not exceeding $+5 - +8^{\circ}\text{C}$, which significantly reduces moisture transfer inside the structures. And this is the essential preservation factor. The modern design of heating system using portable electrical heaters is illustrated in Figure 3



Figure 3 – Heating of the Cathedral with portable electrical heaters.

Implementation of various conservation measures began with our participation in 1980's and is continuously improving:

- controlled ventilation of the monument based on the inside and outside air temperature and humidity measurement data;
- preservation of the Cathedral depending on the climatic season (thermal insulation of structural elements and arrangement of natural ventilation depending on the time of year);
- management of attendance depending on the current weather conditions (closing of exhibition during rain, etc.);
- controlling of limited heating throughout the year;
- air temperature and humidity monitoring. Previously monitoring was carried out through manual measurements in selected points of the Cathedral, and since 2010 – automatically using a system of wireless sensors.

In 2010–2011 a group of researchers has created a monitoring system. The system is used for monitoring of the temperature and humidity parameters for monumental paintings conservation when the Cathedral is used as a museum. The algorithm includes:

- monitoring and recording of air temperature and humidity measurement results in the off-line mode using loggers;
- monitoring and recording of air temperature and humidity and surface temperature measurement results using wireless sensors in the on-line mode;
- periodic – several times per year – thermal camera inspection of interior and facades of the Cathedral in combination with nondestructive examination of moisture conditions of the building structures (Dorokhov et. al 1990) (Zotov and Dorokhov 1991). A method for complex analysis of temperature and humidity was developed for the first time during examination of the Cathedral in 1989-1900; later this method has formed the basis for regulatory documents (State Standard GOST R 55567-2013), (State Standard GOST R 56198-2014). Figures 4 and 6 show different frames from the thermal camera survey of the Cathedral structures;
- periodic measurements of temperature and humidity of the Cathedral's structure materials in representative cross-sections.

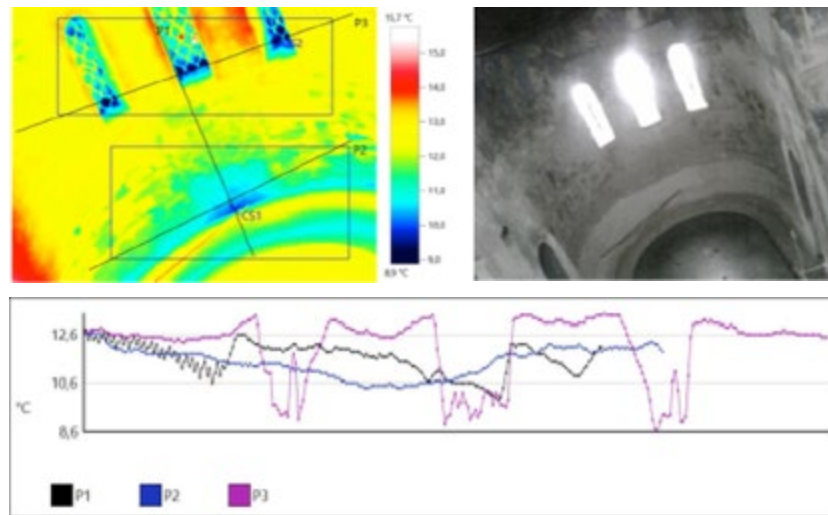


Figure 4 – Thermal camera survey – central apsis (top view from the west).

A temperature anomaly is observed in the lower part of the wall, allowing for assessment of moisture distribution over the wall surface.
Thermograph, photo in visible band and temperature profiles from thermograph

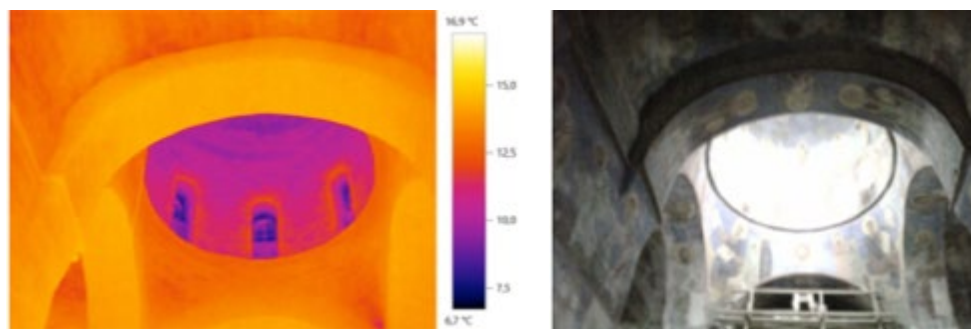


Figure 5 – Thermal camera survey. Assessment of thermal protection of window fillings in the Cathedral dome drum

The monitoring results allow for optimization of the temperature and humidity conditions for conservation of the Cathedral paintings. They are used to:

- select the Cathedral heating and ventilation mode from “Keeper’s Instruction for Ensuring Temperature and Humidity Conditions for Preservation of the Cathedral Paintings”;
- objective (based on instruments’ readings) making of decisions on opening the Cathedral for tourists without deterioration of the paintings conservation conditions.
- Current decision on admitting of organized tourist groups is based on comparison of several figures that characterize resistance of the Cathedral against influences:
- The following values are compared in the beginning of summer (from middle of April until June) – inside air temperature and moisture content, outside air temperature and moisture content, and temperature of internal surfaces of building structure averaged over several typical areas. The dynamics of these parameters are monitored. The criterion for termination of attendance is relation $t_{in} > t_{wl} + 2 \text{ } ^\circ\text{C}$, where t_{in} – inside air temperature averaged over 3 reference points, t_{wl} – temperature of inner surface of the walls averaged over 3 reference points;
- From July and until the middle of October comparison is done for moisture content and temperature of inside and outside air. After that i-d diagram of humid air is used to calculate the condition for admittance of tours – time that a group can stay inside the monument without increasing the moisture content of inside air. This process actively uses the capabilities of the west antechurch as a leveling airlock between the outside environment and inside space of the Cathedral. During rains admittance of tourist groups is often impossible.

Figures 6, 7, 8 and 9 show some graphs of relation of parameters of three spaces – outside environment, west antechurch and inside space of the Cathedral, obtained using the wireless monitoring system.

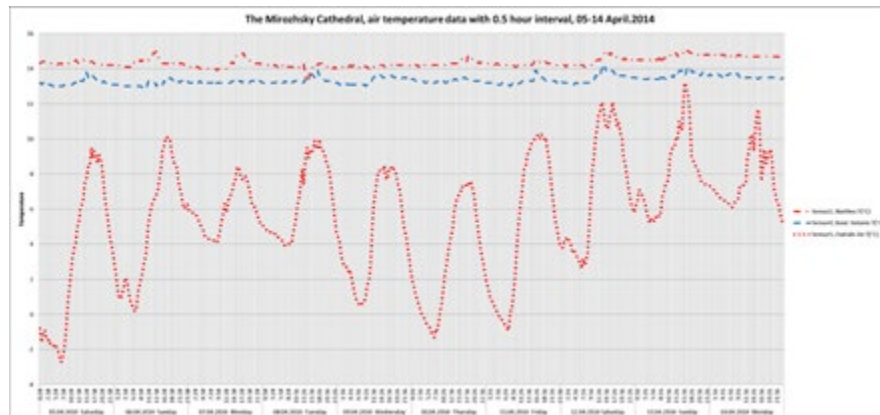


Figure 6 – Temperature graph – spring heating

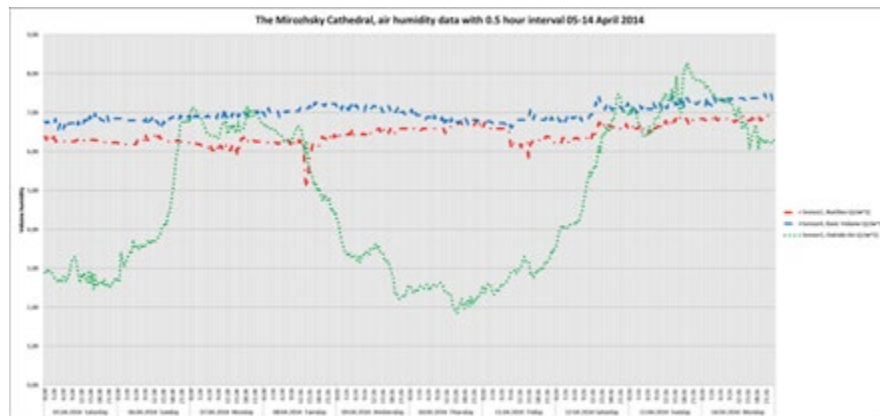


Figure 7 – Air humidity graph – spring heating

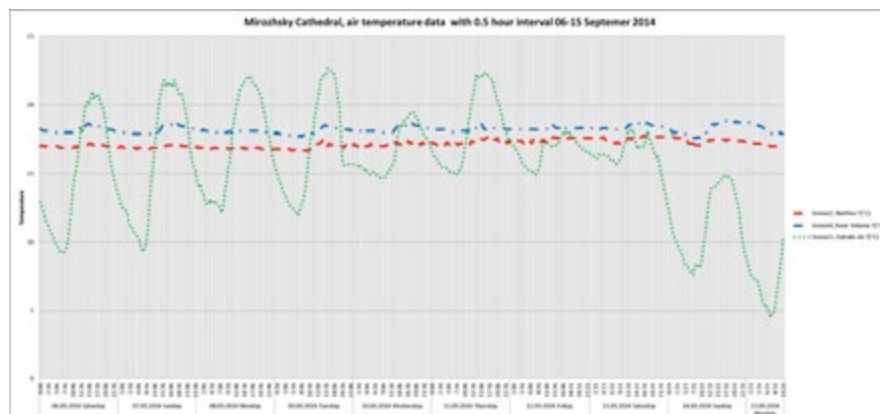


Figure 8 – Temperature graph – autumn cooling

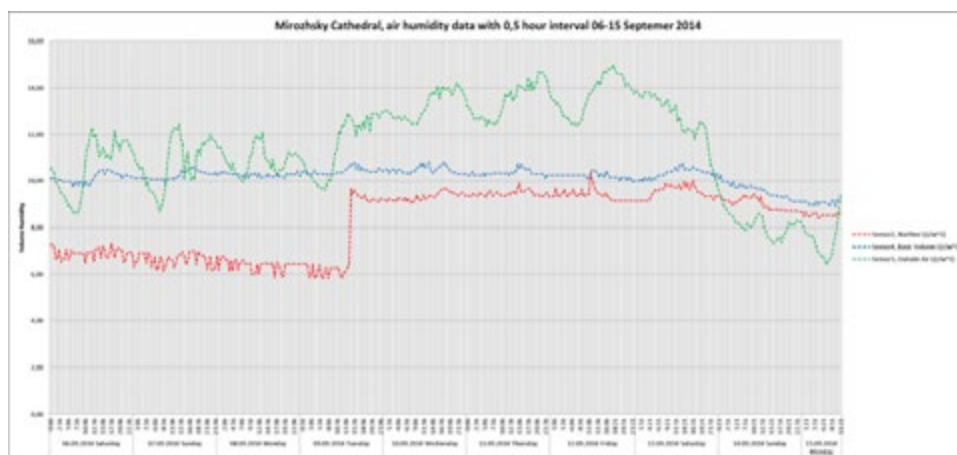


Figure 9 – Air humidity graph – autumn cooling

5. Conclusions

The Cathedral heating and ventilation mode in spring and autumn is selected on the basis of the data from on-line monitoring of air and structures temperature and humidity. Optimization of the climate in combination with monitoring significantly expands the possibility of the Cathedral attendance in spring, summer and autumn without adverse impact on conservation of the unique wall paintings.

References

- Bogoslovsky V., Sizov B. Principles of temperature and humidity condition parameters selection for ancient buildings ensuring their preservation. // *Scientific Research in Protection of Monuments. Collected works.* Warsaw, 1988, pp.297-300
- Sizov B. Evaluation of moisture content measurements in stone. 8th International Congress on Deterioration and Conservation of Stone. Berlin, 1996. Vol.1
- Dorokhov V.B., Zotov A.V., Illarionova I.V. Use of nondestructive methods for assessment of the temperature and moisture of the envelope of the Spaso-Preobrazhensky Cathedral of Mirozhsky monastery. // *Trudy nauchno-prakticheskoy konferentsiiy "Zemlya Pskovskaya, drevnaya i sovremennaya"* [Proceedings of Scientific-Practical Conference "Pskov Land, Ancient and Modern"]. Pskov1990. pp. 17-20
- Zotov A.V., Dorokhov V.B., Experience with nondestructive control methods of temperature and moisture conditions in architectural monuments. // *Muzeynoye hraneniye i oborudovaniye* [Museum storage and equipment]. Informkultura GBL. Express-inform. M., 1991 pp.24-30
- State Standard R 55567-2013 "National Standard of the Russian Federation. The order of the organization and conducting technical engineering studies on researches on objects of cultural heritage. Monuments of history and culture. General requirements."
- State Standard R 56198-2014 "Monitoring of technical state of the cultural heritage objects. Immovable monuments. General requirements."

INCREASE OF THERMAL INSULATION OF WALLS OF EXISTING BUILDINGS WITH PRESERVATION OF THE INTERIORS BY MEANS OF TECHNOLOGY OF HINGED FACADE SYSTEMS

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Abstract

When repairing buildings, it is necessary to increase resistance to heat transfer of walls to the present level. At the same time in the buildings of museums, picture galleries, office buildings, etc., the task of preserving the interior is set. To solve this problem, hinged facade systems with ventilated air gap (HFC) are often used. Calculation of the resistance to heat transfer of walls with the HFC in such buildings is necessary for predicting energy consumption in both winter and summer seasons. For this calculation, it is necessary to know the air temperature in the ventilated air gap.

To calculate the resistance to heat transfer of a hinged facade system with a ventilated air gap (HFS), it is necessary to know the air temperature in the ventilated air gap $t_{og}(x)$ at a height of x , m. For this, a theory was developed, a differential equation was compiled and its solution was obtained as an equation for calculating the air temperature in the air gap.

This equation is obtained under simplifying assumptions and contains parameters t_0 and x_0 , which depend on the structural features of the air gap and on climatic factors. Therefore, the calculation on this equation is approximate. Simplified methods for calculating heat transfer resistance have been developed, which take into account the effect of solar radiation, heat-conducting inclusions in the design of the NSF, and their effect on the parameters of equation. To increase the accuracy of calculations, the article considers the determination of these parameters by carrying out field experiments.

Field studies of air parameters in the air gap HFS have been carried out. The speed of air movement in the air gap and the air temperature at different heights in the air gap were determined. Studies were carried out in the summer, when irradiating the facade with solar radiation. Consequently, the air temperature in the air gap is higher than the temperature of the outside air. According to the experimental data, the inverse problem is solved, i.e. the values of the parameters of equation are determined. To do this the representation of a differential equation in finite differences is used. Comparisons of the values of the parameters determined from the experimental data and calculated by theoretical formulas make it possible to refine the calculated characteristics of the air gap. For example, the local aerodynamic resistance of the HFS air gap is determined.

A calculation is made of the air temperature along the height of the air gap, with the use of refined parameters. A technique was developed and calculations of the thermal performance of the wall with the HCF were performed.

Keywords: hinged facade system, air temperature of air gap, field studies of air parameters in the air gap

1. Theoretical consideration of the movement of air in a ventilated layer of the HFS

Enclosing structures with hinged facade systems (HFS) are well known in Russia [1 - 4]. Studies of the air-thermal regime of the ventilated layer are conducted to assess the effectiveness of the application of the HFS in terms of their thermal protection. These studies are conducted on the basis of the theory of natural ventilation in the air layer of the HFS. The present article is devoted to the description of the conjugation of the results of studies of the temperature regime of the air layer of the NSF with the theoretical equation for the distribution of air temperature over the height of this interlayer.

The change in air temperature along the height of the ventilated layer at a known velocity of air movement in the interlayer is considered. The air enters the lower layer of the interlayer, heats up, moves upward, and exits the upper air. The air temperature in the air layer, $t_{pr}(x)$, °C, varies with height, x , m, depends on the geometric parameters of the interlayer, the thermal characteristics of the wall and the facade cladding. It also depends on the temperature of the outside air and the intensity of solar radiation. The direction and velocity of the wind in the calculations are neglected due to the random nature of the impact.

Let x be the distance from the entrance to the air gap, m. We consider the elementary air layer in a layer of thickness Δx , m. The temperature on the underside of the layer is t_{i-1} , on the upper side is t_i . The equation of the heat balance for a given elementary layer is:

$$t_{i-1} \cdot c_{air} \cdot v \cdot d \cdot \gamma_{air} - t_i \cdot c_{air} \cdot v \cdot d \cdot \gamma_{air} + K_{konstr} (t_{in} - t_{air}) \cdot \Delta x - K_{screen} (t_{air}(x) - t_{ext}^{con}) \cdot \Delta x = 0 \quad (1)$$

where: t_{ext}^{con} - the conditional temperature of the outside air, determined by the formula

$$t_{ext}^{con} = t_{ext} + \frac{I \cdot \rho}{\alpha_{ext}} \quad (2)$$

t_{in}, t_{ext} – internal and external air temperatures, respectively, °C;

I – the intensity of solar radiation (direct and scattered) on a vertical surface of a given orientation, W/m²;

ρ – coefficient of absorption of solar radiation, fraction of units;

α_{ext} – the heat transfer coefficient of the outer surface, W/(m²°C);

K_{konstr}, K_{screen} – heat transfer coefficients of the structural parts from the indoor air of the room to the air layer and from the air layer to the outside air, respectively, W /m²°C;

v – air velocity in the interlayer, m / s;

$c_{air}=1005$ J/(kg °C) – specific heat capacity of air;

$\gamma_{air}=353/(273+t_{ext})$ kg/m³ – air density at temperature t_{ext} ;

d - air gap width, m.

x – distance from the entrance to the air layer to the point in question m;

The transformation (1) leads to the equation:

$$\frac{dt_{air\ gap}}{dx} \cdot \frac{c_{air} \cdot v \cdot d \cdot \gamma_{air}}{K_{konstr} + K_{screen}} + t_{air\ gap} = \frac{K_{konstr} t_{in} + K_{screen} t_{ext}^{con}}{K_{konstr} + K_{screen}} \quad (3)$$

The expression on the right side of the equation is the air temperature in the interlayer in the absence of a change in air temperature with altitude and is denoted by t_0 . This temperature takes place when there is no air movement in the interlayer. The coefficient at the derivative is denoted by the symbol x_0 , its physical meaning will be clarified below.

$$t_0 = \frac{t_{in} K_{konstr} + t_{ext}^{con} K_{screen}}{K_{konstr} + K_{screen}} \quad (4)$$

$$x_0 = \frac{c_{air} \cdot v \cdot d \cdot \gamma_{air}}{K_{konstr} + K_{screen}} \quad (5)$$

Equation (5) is represented as:

$$x_0 = v \cdot k \quad (6)$$

Taking into account (4) and (5), equation (3) takes a simple form:

$$x_0 \frac{dt_{ag}}{dx} + t_{ag}(x) = t_0 \quad (7)$$

Under the initial condition $t_{ag}(0) = t_{ext}$, the solution of this equation has the form:

$$t_{ag}(x) = t_0 - (t_0 - t_{ext}) \cdot e^{-\frac{x}{x_0}} \quad (8)$$

In [4] an approximate formula is derived for calculating the velocity of air movement in the interlayer:

$$v = \sqrt{\frac{0,0016 \cdot (t_0 - t_n)^2 \cdot k^2}{\left(\sum \xi_i\right)^2} + \frac{0,08 \cdot L \cdot (t_0 - t_n)}{\sum \xi_i} - \frac{0,04 \cdot (t_0 - t_n) \cdot k}{\sum \xi_i}}, \quad (9)$$

Thus, all the parameters necessary for calculating the temperature distribution in the interlayer according to (8) can be made using formulas (2), (3), (4), (5), (6).

Continuing this approach, a formula is obtained for calculating heat loss through the façade:

$$\begin{aligned}
 Q = & \left[U + \sum (\psi \cdot P) / L + \sum_{\text{nsf}} (\chi \cdot N)_k / L + \sum_{\text{spandrel}} (\chi \cdot N)_k / L \right] \cdot (t_{in} - t_{ext}) L + \\
 & \left[U + \sum (\psi \cdot P) / L + \sum_{\text{nsf}} (\chi \cdot N)_k / L \right] \cdot (t_0 - t_s) \cdot \left(x_0 - x_0 e^{-\frac{L}{\alpha_s}} - L \right) - \\
 & \left[\sum_{\text{spandrel}} (\chi \cdot N)_k / L \right] \cdot \frac{\rho I}{\alpha_s} L
 \end{aligned} \quad (10)$$

The first term on the right-hand side of (10) is the thermal loss of the wall with the NSF, reflecting the influence of all the heat-conducting inclusions of the structure and the temperature of the room and the streets ($t_{in} - t_{ext}$). The second term on the right-hand side of (10) is the heat loss through the wall with the HFS reflecting the effect of all the heat-conducting inclusions of the structure except the brackets and the air temperature of the interlayer and the outside air due to the difference in temperature. The third term on the right-hand side of (10) reflects the effect of solar radiation, whose thermal energy is perceived by the facade cladding and transmitted through the brackets in the wall. Equation (10) can be refined by the results of experimental studies [5].

2. Calculations of the resistance to heat transfer of a ventilated air layer of the HFS

To illustrate the proposed method for calculating the reduced resistance to the heat transfer of the wall from the HFS, calculations were made for the brick masonry wall of the building with the HFS in Moscow. The height of the HFS was $L=20$ m, the thickness of the layer of mineral wool is 120 mm, the thickness of the air layer $d = 0.06$ m, the coefficient of heat transfer of the HFS facing $K_{\text{screen}} = 5,7$ W/(m²°C), walls with insulation ranged from $U=1$ to $U=0,2$ W/(m²°C), mineral wool boards are fastened with dowels 7 pcs / m² with value $\chi=0,006$ W/°C, the sum of local resistances in the interlayer was taken 3.33. Brackets HFS 2.6 pcs./m², $\chi = 0.06$ W/°C. Climatic conditions are accepted for Moscow. The external air temperature $t_{\text{ext}} = -28$ °C was assumed as the design. Calculations of the values of the reduced resistance to heat transfer and the coefficients of the thermotechnical homogeneity of the wall with the NPS are presented in Table. 1. It should be borne in mind that for a particular HFS, the values of both the source data for the calculation and the results may change.

Table 1 – The calculated values of the reduced resistance to the heat transfer of the wall with the NFC at a different heat transfer coefficient of the wall with a heater

t_{ext} °C	Reduced resistance to heat transfer of wall fragment with HFS, R'_o , (m ² °C)/W	Coefficient of thermotechnical homogeneity of the HFS, r
U=1 W/(m ² °C)	0,86	0,86
U=0,5 W/(m ² °C)	1,50	0,75
U=0,3 W/(m ² °C)	2,12	0,63
U=0,2 W/(m ² °C)	2,68	0,54

The results of the calculations showed fairly low values of the coefficients of thermal engineering uniformity. Moreover, the larger the value of U , the lower the value of r .

Calculations showed that for winter operating conditions, the value of the resistance to heat transfer of a ventilated air layer is affected by its thickness, with a change from 0.02 to 0.1 cm, the heat transfer resistance of the interlayer varies from 0.10 to 0.05 (m²°C)/W. The heat transfer coefficient of the wall is also affected by the Konstr. So, when this coefficient is reduced from 1 to 0.2 W/(m²°C) resistance to the heat transfer of a ventilated air layer 6 cm thick, decreases from 0.07 to 0.03 (m²°C)/W, depending on the outdoor temperature (from 5 to -30 °C). The height of the facade slightly affects the resistance to the heat transfer of the ventilated air layer. For example, if the height is changed from 10 to 80 m, the greatest value of the change in the resistance to heat transfer of the ventilated air layer will be 0,04 (m²°C)/W. Such values are not of practical interest in calculating thermal protection for winter operating conditions. Of much greater interest is the study of the heat-shielding properties of a ventilated air layer in summer operation conditions, however, this is another topic of the study.

Conclusion

A method for calculating the parameters of the thermal protection of walls with NPS and a separately ventilated air layer based on the elemental approach is developed. The method separately takes into account the transfer of heat through the metal brackets fastened to the NFS cladding, as well as heat transfer in the air layer. The method is illustrated by an example calculation. The analysis of the influence of various factors on the resistance to heat transfer of a ventilated air layer is carried out. The obtained results show that taking into account the resistance to the heat transfer of the air layer in calculations of the reduced resistance to heat transmission of the structure with the NSF in winter conditions is not advisable.

References

- Gagarin VG, Kozlov VV, Tsykanovskiy E.Yu. Calculation of the thermal protection of facades with a ventilated air gap. // *ABOK Magazine*. 2004, N°2 pages 20-26, N°3 pages 20-26.
- Umnyakova N.P. Prototype designs of ventilated facades in the buildings of ancient Rus // *Housing construction*. 2012.N° 6. P. 25-28.
- Gagarin VG, Kozlov VV, Lushin K.I. The speed of air movement in the interlayer of the hinged facade system, with natural ventilation. // *Housing construction*. 2013. N°10. Pp. 14-17.
- Gagarin VG, Kozlov VV, Lushin KI, Plushenko N.Yu. Allowance for heat-conducting inclusions and a ventilated layer in calculations of resistance to heat transfer of a wall with a hinged facade system (NFS) // *Building Materials*. 2016. N°6. Pp. 32-35.
- Gagarin V.G. Plushenko N.Yu., Kosarev A.R. The method of experimental determination of the parameters of the air temperature distribution equation for the height of the ventilated NFC layer. // *Herald of SibADI*. 2017. Issue 6. P 107-113.

INCREASE OF THERMAL INSULATION WITH AERATED CONCRETE OF THE INSIDE OF WALLS OF ARCHITECTURAL VALUE BUILDINGS

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Abstract

The only way to increase the thermal insulation of historic buildings with architectural value is to place thermal insulation from the inside of the walls. As a heat-insulating material, it is advisable to use modern low-density aerated concrete. The choice of brand and manufacturer of aerated concrete is made by comparison. To do this, one must rely on some theory of heat and mass transfer in the material. For aerated concrete this problem is solved using the thermal – engineering quality coefficient system.

Keywords: Thermal conductivity of materials, aerated concrete, thermal-engineering quality coefficients.

1. Introduction

The only way to increase the thermal insulation of historic buildings with architectural value is to place thermal insulation from the inside of the walls. The main advantage of such warming is the preservation of the appearance of historical facades. Among the negative properties is the use of organic materials as an effective thermal insulation. These materials are fire dangerous, prone to rotting and other destruction. Therefore, as a heat-insulating material, it is advisable to use modern low-density aerated concrete. When choosing a brand and manufacturer of aerated concrete, the materials should be compared in order to reduce the thickness of the thermal insulation layer.

2. Resistance to the heat transfer of the wall with internal insulation

The resistance to heat transfer of the enclosing structure is inversely proportional to the heat transfer coefficient. The coefficient of heat transfer of the wall before the insulation was:

$$U_{old}^r = 1 / (1 / \alpha_{ext} + R_{old} + 1 / \alpha_{in}) + l \psi_{old} \quad (1)$$

After the insulation, the wall heat transfer coefficient became:

$$U_{new}^r = 1 / (1 / \alpha_{ext} + R_{old} + 1 / \alpha_{in} + R_{th.l.}^r) + l \psi_{new} \quad (2)$$

Where U_{old}^r, U_{new}^r - coefficients of heat transfer of the wall before and after warming, respectively $W/(m^2 K)$;

$\alpha_{ext}, \alpha_{in}$ - heat transfer coefficients of the external and internal surface of the wall, respectively, $W/(m^2 K)$;

R_{old} - thermal resistance of the building wall before insulation, $(m^2 K) / W$;

$R_{th.l.}^r$ - thermal resistance of the thermal insulation layer of the building wall, $(m^2 K)/W$;

l - total perimeter of window openings divided by the area of the facade, m^{-1} ;

ψ_{old} and ψ_{new} are the specific heat losses for the window unit adjoining the light barrier before and after wall warming, $W/(m K)$.

It follows from equations (1) and (2) that the coefficient of heat transfer of the wall before warming exceeds the heat transfer coefficient of this wall after thermal insulation by the amount:

$$\Delta U = U_{old}^r - U_{new}^r = \frac{R_{th.l.}^r}{(1 / \alpha_{ext} + R_{old} + 1 / \alpha_{in})(1 / \alpha_{ext} + R_{old} + 1 / \alpha_{in} + R_{th.l.}^r)} + l(\psi_{old} - \psi_{new}) \approx \frac{1}{(R_{old} / R_{th.l.}^r)(1 + R_{old} / R_{th.l.}^r)} \quad (3)$$

It follows from (3) that ΔU depends on the difference $(\psi_{old} - \psi_{new})$ and the relationship $(R_{old} / R_{th.l.})$. The value of the difference $(\psi_{old} - \psi_{new})$ is determined by the installation of window blocks in the light fixtures and represents a separate research topic.

The smaller the ratio $(R_{old} / R_{th.l.})$ the smaller the value of ΔU and the higher the thermal protection and energy saving. Consequently, the thermal resistance of the thermal insulation layer should be as high as possible. However, there are restrictions on the thickness of this layer: loss of space of premises, freezing of internal load-bearing structures resting on external walls. Therefore, the thermal conductivity of the heat-insulating material is of great importance.

3. CTQ (thermal – engineering quality coefficient) system for evaluating the thermal conductivity of aerated concrete

For the choice of aerated concrete with the lowest value of thermal conductivity, it is necessary to rely on some theory of heat and mass transfer in the material. For autoclaved aerated concrete this problem has not been solved yet. Therefore, it is proposed to use for this purpose a system of *thermal – engineering quality coefficient*, introduced in [1]. This system is based on the empirical linear dependence of the thermal conductivity, λ , W/(m °C), on the moisture content of the material, w , % by mass, at a fixed temperature:

$$\lambda(w) = \lambda_0 + \Delta\lambda \cdot w = \frac{\lambda_0 - \lambda_a}{\rho_0} \cdot \frac{\lambda_0}{\lambda_0 - \lambda_a} \left[1 + \frac{\Delta\lambda}{\lambda_0} \cdot w \right] \rho_0, \quad (4)$$

where $\lambda(w)$ - thermal conductivity of material at a moisture content w , W/(m °C);

λ_0 - the thermal conductivity of the material in the dry state, W/(m °C);

λ_a - thermal conductivity of air in the quiescent state, W/(m °C);

$\Delta\lambda$ - increment of thermal conductivity by 1% change in moisture content of the material, W/(m °C %);

ρ_0 is the density of the material, kg / m³.

The formula (1) allowed to introduce the coefficients of thermal engineering quality (CTQ):

$$\lambda(w) = CTQ_{11} CTQ_{12} [1 + CTQ_{12} CTQ_{22}] \rho_0. \quad (5)$$

Each of these coefficients has a physical meaning. CTQ_{11} shows how much the thermal conductivity of the skeleton material (without the influence of the thermal conductivity of the air) increases with an increase in the density of the material by 1 kg/m³. This coefficient is used to compare skeletons material in terms of thermal conductivity. The equation of the dependence of the thermal conductivity of a material on its density can be represented in the form:

$$l_0 = CTQ_{11} r_0 + l_a. \quad (6)$$

As a free term in this equation, the thermal conductivity of air in a quiescent state is used, λ_a . The smaller the CTQ_{11} , the less the thermal conductivity of the skeleton of the material.

CTQ_{12} characterizes the degree of influence of the thermal conductivity of air in the pores on the thermal conductivity of the material in the dry state. The closer the thermal conductivity of the material to the thermal conductivity of air, the greater the CTQ_{12} , approaching infinity. It is advisable to use this coefficient for materials with thermal conductivity that is not comparable with the thermal conductivity of air, i.e. not less than 0.1 W/(m K).

CTQ_{21} shows a fraction of λ_0 increase in the thermal conductivity of the material with an increase in its moisture content by 1% by mass. This coefficient is often used in the study of the moisture regime of enclosing structures and is an important characteristic of the material.

CTQ_{22} is the calculated moisture content of the material in the enclosing structure. This coefficient is a characteristic of not only the material, but also the design, the conditions of its operation and climatic conditions.

CTQ_{11} and CTQ_{21} are characteristics of the material that do not depend on the enclosing structure and the conditions of its operation. They can be determined separately from the characteristics of the structure. CTQ_{22} is a characteristic of the design, operating conditions and climatic conditions.

4. Comparison of aerated concrete by the value of CTQ_{11}

The performed studies of the thermal conductivity of autoclaved aerated concrete of Russian and Chinese production, as well as aerated concrete produced on fly ash - gas-ash concrete, made it possible to determine the values of KTK_{11} and compare the efficiency of the composition of the skeleton of aerated concrete from the thermal point of view [2].

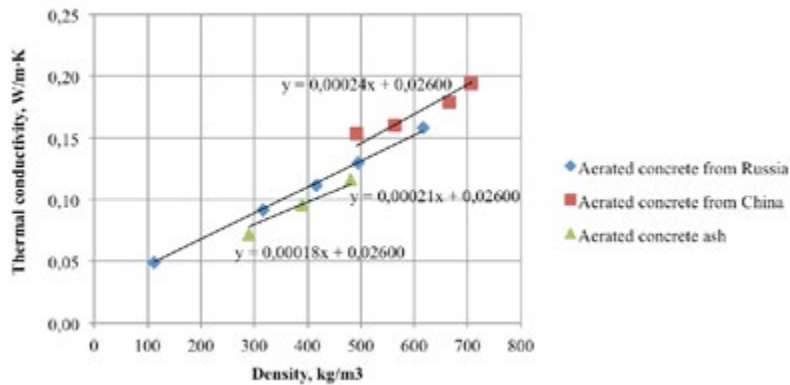


Figure 1 – Dependence of the thermal conductivity of of various composition on the density

According to the presented results, it can be concluded that the lowest value of CTQ_{11} is aerated concrete ash, therefore this material has a skeleton with the least thermal conductivity.

CTQ_{21} shows a fraction of λ_0 increase in the thermal conductivity of the material with an increase in its humidity by 1%. This coefficient is a characteristic of the material. For all the aerated concrete studied, this coefficient was determined. In Table. 1 shows the values of CTQ_{21} research using the example of autoclaved aerated concrete of Russian manufacture. It is obtained that it is approximately equal to 0.041% for all aerated concrete studied [3].

Table 1 – Results of studies of CPC_{21} of low-density aerated concrete

Concrete grade	Average sample density, ρ , kr/M^3	The thermal conductivity in the dry state, λ_0 , $W/(m \cdot ^\circ C)$	Increment the thermal conductivity is 1% moisture, $\Delta\lambda$, $W/(m \cdot ^\circ C \cdot \%)$	CPC_{21} , 1/%
D100	112	0,049	0,002	0,043
D300	316	0,091	0,004	0,043
D400	416	0,111	0,005	0,045

Conclusion

Thus, the experimental data obtained make it possible to predict the calculated values of the thermal conductivity of autoclaved aerated concrete of reduced density when used as thermal insulation from the inner side of a wall in historic buildings.

The use of thermal – engineering quality coefficients as criteria allows us to determine promising technologies for the production of aerated concrete.

References

Gagarin V.G. Theory of the state and transport of moisture in building materials and the heat-shielding properties of building envelopes. Thesis for the degree of Doctor of Technology. sciences. Moscow. 2000. 396 p. (<http://dlib.rsl.ru/01000300256>).

Pastushkov PP, Gagarin V.G. Investigation of the dependence of thermal conductivity on the density and the coefficient of heat engineering quality of autoclaved aerated concrete // Building Materials. 2017. N° 5. P. 26-28.

Künzel H. Gasbeton. Wärme- und Feuchtigkeitsverhalten. Wiesbaden - Berlin. Bauverlag. 1970. 120 S.

ENSURING OF REQUIRED PARAMETERS MICROCLIMATE IN MUSEUMS

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Abstract

The main parameters of the microclimate, influencing to the safety of exhibits in museums, are the temperature and the relative humidity of the air, as if to say more precisely, their optimal combination.

In this paper we consider the question of stability ensure the required values of temperature and relative humidity of the air supplied into the main room of the Museum buildings with a complex structure and includes exhibition halls, archives, depot and restoration workshops.

Given that in each of these the premises is required to maintain different parameters of air, it was suggested that the use of local air-conditioning systems on the basis of the contact units to the possibility of regulation temperature and relative humidity of the supply air.

On the basis of theoretical and experimental research was developed a technological installation of air conditioning, the main element of which is a contact unit for processing the supply air, allowing more precise maintaining its temperature and humidity parameters.

The data received made it possible to work out a new approach to the implementation of energy-efficient processes in the contact units air conditioning systems, based on the theory of moisture potential.

The article presents the results of using the proposed method of regulating the temperature and the relative humidity of the supply air entering into the premises of museums.

Keywords: museum, parameters of the microclimate, the temperature and the relative humidity of the air, contact units HVAC systems, control.

1. Introduction

Optimal storage conditions are the most important targets for cultural heritage preservation (Park 2000, Mecklenburg, Tumosa and Pride 2004, Bolotov 2018).

For the museums, provide heat and humidity conditions required (temperature and relative humidity) to exclude significant microclimate fluctuations in exhibits area regulated by local standards (SP 60.13330.2016, Standard ABOK 1-2002).

Special technical solutions like humidifiers and dehumidifiers showcases, unique automatic air conditioning systems with temperature and relative humidity regulation using to support required microclimate conditions in the cultural heritage area (Devina, Kudryavtsev and Yukhnovets 1987, Belova 2006, Bolotov 2018).

Non-standard technical solutions to achieve supply air values for exhibition halls, store-rooms, restoration workshops etc. are used very often.

Due to wide range piece of arts and collections which are exhibits it is very difficult to provide right range microclimate conditions which is allowed for their preservation. Air motion and exchange chart, it's illumination and purity, content of harmful substances in the supply air, seasonality and museums occupancy and operation hours should be considered.

There is no any science-based methodology to estimate variable effects impact (including microclimatic) during long-term artefacts storage. Standard solutions are: thermal conditions 20 ± 2 °C and relative humidity 55 ± 5 % (Mecklenburg, Tumosa and Pride 2004, Bolotov 2018).

2. Research subject

Centralized air conditioning systems with local (zonal) air handling units is the most relevant decision to provide right air conditions for facilities with different temperature and humidity requirements (Fig.1).

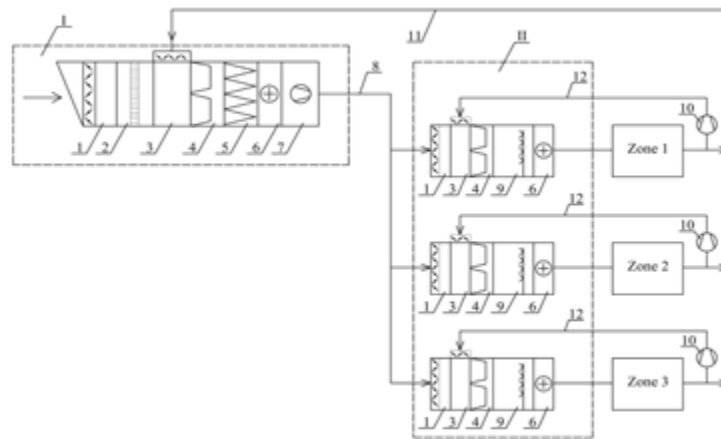


Figure 1 – Centralized air conditioning systems with local (zonal) air handling units. I – central air condition unit; II – local(zonal) air handling units: 1 – air intake section with louver valve; 2 – coarse filter, 3 – mixing section; 4 – fine filter; 5 – carbon filter; 6 – surface heat exchanger; 7 – supply fan; 8 – supply air duct ; 9 – spray (irrigation) chamber; 10 – zonal fan for recirculation; 11, 12- recirculating air duct.

Central condition unit (I) used only for air filtration and sanitary norm air supply. But final air handling provides at local units (II) which makes possible to regulate supply air values (temperature and relative humidity) individually according to unique thermal conditions for each served rooms.

Supply air moisture regulation methods

It is very important to heat and humidity outdoor air during cold period (Belova 2006, Murashko 2017). Spray chambers and steam moistening modules used for air humidification in centralized air condition systems.

Surface heat exchanger with possibility of qualitative and quantitative regulation used for heating supply air. Providing isenthalpic processes in spray chambers are the most popular application for air humidification in cold period.

In this case operation models regulation for surface heat exchangers ($K_{1c} - O_1, K_{2c} - O_2, K_{3c} - O_3$) and spray chambers in 1,2,3 zones (Fig.2) provides by supply air dew-point temperature.

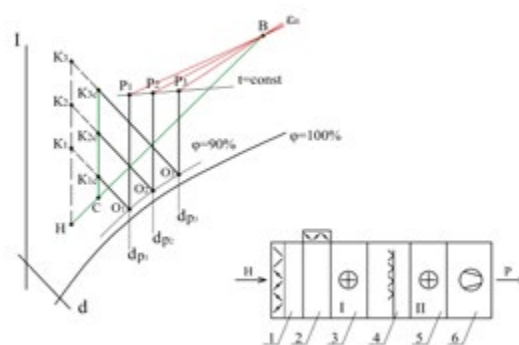


Figure 2 - Supply air regulation parameters while using recirculation exhausted air: 1 – air intake section with louver valve; 2 – mixing section; 3 – surface heat exchanger (I stage); 4 – spray chamber; 5 – surface heat exchanger (II stage); 6 – fan.

Special devices so-called steam humidifiers applied recently (Murashko 2017). Steam generators with immersion electrodes are used to produce steam. Steam air humidification flows almost without temperature changing, and control valve using allow to get the required air humidity properly to the supply air.

In case of steam humidifiers units used like centralized air condition sections, outdoor air parameters changing can be present at the I-d diagram (Fig.3)

Supply air moisture content values dp_1, dp_2, dp_3 correspond to different values of the supply air state in zones 1, 2, 3 (Fig. 1).

Steam air humidification allows to accurately control its moisture content, but at the same time, there are difficulties with salts precipitation, electrodes and pipelines clogging, which requires constant steam generators maintenance and in general reduces air conditioning systems reliability.

So, there is no any significant issues with moisture content air supply regulation during cold period.

During warm period is necessary to cool and dehumidify supply air. Air cooler sections or spray chambers are used to dehumidify air in centralized air conditioning systems. The initial and final treated air conditions can be represented at the following I-d diagram (Fig. 4):

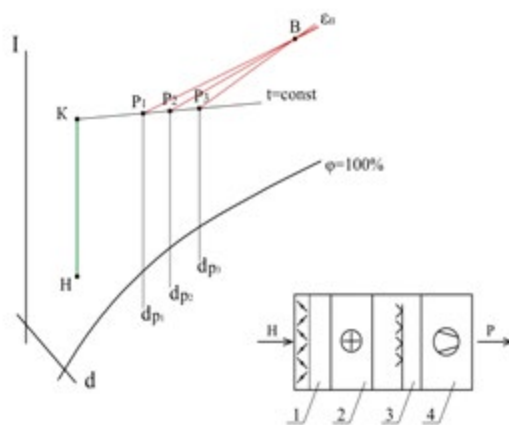


Figure 3 - Air treatment processes while using steam humidifiers: 1 – air intake section with louver valve, 2 – surface heat exchanger, 3 – steam humidifier, 4 – fan.

Air treatment process direction can be controlled by cold water temperature changing in the surface air cooler which is supplied to the pipe space (t_{w1} , t_{w2} , t_{w3}).

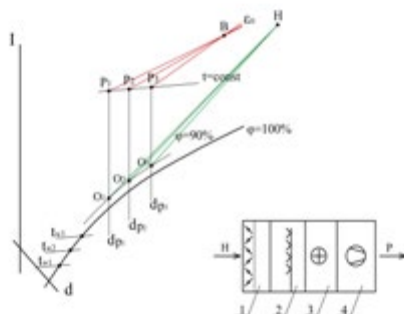


Figure 4 – The initial and final supply air treated conditions in cooling and drying processes: 1 – air intake section with louver valve, 2 – spray chamber, 3 – surface heat exchanger, 4 – fan

It is not to make possible to use surface air coolers for stable supply air moisture content (d_n), because heat and moisture exchange processes dynamic are not counted and air and water limiting equilibrium parameters achieving state conditions, especially in case of turbulence conditions.

This way, supply air humidity regulation during warm period have significant issues and requires new control methods development based on thermodynamic regularities of heat and moisture exchange processes in contact devices.

3. Scientific research results

Taking into account the above, a method has been developed for air treatment in the warm period of the year, allowing to regulate and maintain the required moisture content of the supply air when changing the thermal and humidity loads in the room or in any his control area (using multi-zonal air conditioning systems, Fig.1)

Control method is shown at Fig. 5 and 6 and doing in the following way (Gvozdkov 2006, Bogoslovsky and Poz 1983) Outside air having parameters t_H , d_H (Fig.6) is cooled and dehumidified in the spray chamber 1 to the state, for example, t_{p1} , then it is

heated to the indoor air parameters in zone 1 ($p.P1$) and supply to the room. Room air temperature is maintained by the control valve 4 at the signal of the device 6 and the relative humidity by the valves 10 and 12 according to the signals of the device 9 (Fig.5).

When heat and moisture accumulation in the room increased and the temperature of indoor air raised, consumption of sprayed water increases with the signals of the device 6 for change the room air temperature by opening the control valve 4.

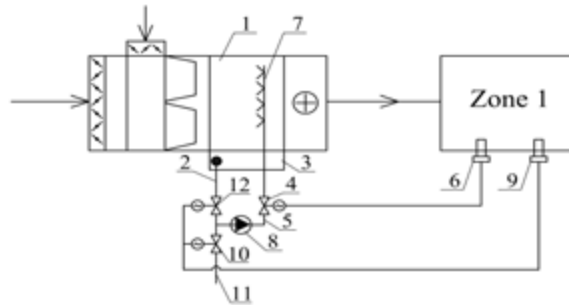


Figure 5 -The principal scheme of regulation of moisture content of supply air in the zonal air handling units : 1-spray (irrigation) chamber; 2-return water pipeline; 3-pallet; 4-control valve; 5 – supply water pipeline; 6 – air temperature sensor; 7 – riser with spray nozzles; 8 – circulation pump; 9 – air humidity sensor; 10 – control valve; 11 – cold water pipeline; 12 – control valve.

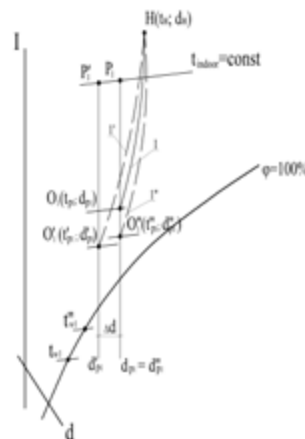


Figure 6 - Supply air moisture content regulation presented at the I-d diagram: tH - the initial parameters of the air treatment in the spray chamber; O , O' , O'' - final parameters of air after treatment in the spray chamber; $P1$ - the parameters of the supply air.

Taking into account features of the progress of processes of heat and moisture exchange in contacting units in fig.6 curves 1 of changing of air parameters along a contacting unit are presented at realizing regulation of moisture content (dp_1) of air at the outlet from the contacting unit. Direction of the air parameters change in curve 1 takes place at some value of spraying factor $B_1 = G_2/G_1$ and constant values of initial parameters of air (t_{i1}, d_{i1}) and water (t_{w1}).

When increasing a spraying factor to the value B_2 ($B_2 > B_1$) under the same initial parameters of air and water a direction of process on curve 1' (fig.6) will take place but finite parameters of air will be moved to the point O_1' and will have values t'_{p1}, d'_{p1} . The deviation of moisture content of supply air from the calculated value dp_1 to lower values - $Dd = dp_1 - d'_{p1}$ will happen.

But if at the same time with increasing spraying factor to B_2 one increases an initial temperature of water to t''_{w1} ($t''_{w1} > t_{w1}$), as a result the air processing process will go along curve 1'' (fig.6) to parameters t''_{p1}, d''_{p1} that will ensure an achievement of the required value of supply air moisture content $d''_{p1} = dp_1$.

Thus, as a result of proportional increase of initial temperature of water and increase of a spraying factor the constancy of final moisture content of incoming air is ensured and precision of air parameters in a working space is increased.

The regulation of parameters of incoming air in case if its moisture content deviates to larger values is made in the same way.

To confirm the theoretical conclusions and the approve the offered method of regulation series of experiments were conducted in the injector spraying chamber. The results of one of the series are presented in Table 1.

The analysis of the experimental results demonstrates the fact that at the increase of a spraying factor up to 1,49 kg/kg (test 2) at constant initial parameters of air, the moisture content of final parameters of air (d_p) decreases down to 8,7 g/kg.

To support the required value of moisture content $d_p=9,5$ g/kg (test 1) the initial temperature of water was increased up to 8,9°C (test 3). Thus, the possibility of air moisture content regulation at the outlet of the injector chamber is achieved with a proportional change of initial parameters of water and factor of spraying.

Table 1 – Results of tests of the spraying chamber

Test	Parameters of air, °C				Parameters of water, °C		B, kg/kg	Moisture content of finite parameters of air, d_p , g/kg
	initial		finite		initial	finite		
	t_H	$t_{\text{wet bulb}}$	t_{p1}	$t_{\text{wet bulb}}$	t_{w1}	t_{w2}		
1	2	3	4	5	6	7	8	9
1	26.1	19.5	15.1	14.0	6.9	11.0	1.0	9.5
2	26.0	19.4	12.8	12.3	6.8	10.5	1.49	8.7
3	26.1	19.4	14.0	13.5	8.9	11.8	1.5	9.5

4. Conclusions

Optimal storage conditions are the most important targets for cultural heritage preservation. In particular, provide heat and humidity conditions required (temperature and moisture content) to exclude significant microclimate fluctuations in exhibits area.

The article discusses the possibility of increasing the effectiveness of treatment of air conditioning systems by using control processes heat and moisture exchange between air and water

The regulation method of air supply parameters (in particular, its moisture content) considering thermodynamic regularities of heat and moisture exchange in contact devices is offered.

The presented method allows to regulate parameters of air operating processes heat and moisture exchange, providing thus optimum conditions of interaction.

References

- M. Mecklenburg, C. Tumosa, A. Pride Requirements for the parameters of the microclimate of historical museum buildings. ABOK, No. 7, 2004
- Belova E.M. Central air conditioning systems in buildings. M.: Euroclimate, 2006. 640 p
- Devina R.A., Kudryavtsev A.I., Yukhnovets T.M. Optimum and permissible parameters of the microclimate in museum premises // Museum storage and equipment. Informculture GBL. Express-inform. M., 1987. P. 1-24.
- SP 60.13330.2016. Heating, ventilation and air conditioning. M.: Ministry of Regional Development, 2016.
- Standard ABOK 1-2002. Residential and public Buildings. Air exchange norm. M., 2002.
- Park Sh. Microclimate systems for historic buildings. M.: ABOK, 2000, N°1. P.22-33.
- Bolotov E.N. To Preserve the Heritage: Microclimate of Museums. M.: ABOK, 2018 N° 1, P.4-14.
- Murashko V.P. Air conditioning systems. Theory and practice. M.: Euroclimate, 2017 - 672 p.
- Gvozdkov A.N. Overall characteristic of heat and moisture in contacting units and methods of their calculation. Volgograd. 2006.VolgGASU - Vol. 6 (21).- P. 148-153.
- Bogoslovsky V.N., Poz M.J. Thermophysics machines heat recovery systems, heating, ventilation and air conditioning. M. Stroyizdat. 1983
- Bogoslovsky V.N., Gvozdkov A.N. Application to the calculation of potential heat and moisture between the air and liquid. Journal of Water Supply and Sanitary Equipment, Stroyizdat M., 1985, N° 10, P. 8-10.

MODERN GEOTECHNOLOGIES FOR HISTORICAL BUILDINGS REGARDING UNDERGROUND SPACE RENOVATION

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Abstract

Based on the analysis of the worldwide practice in renovation of historical buildings and architectural monuments considering underground part construction, research was conducted on the effectiveness of modern geotechnology applications. The research was aimed at obtaining sufficient theoretical, reliable experimental and numerical data for deformation minimization of soil mass under historical buildings and monuments renovated with underground part development. A numerical research with a use of PLAXIS and MIDAS GTS software in 2D and 3D and on-site measurements of historical building settlement during renovation with underground part development allowed to devise a method for the settlement prediction of historical buildings and monuments at the initial phase of design. Calculations have been made for Moscow geology conditions. Recommendations have been done for applying innovative geotechnologies during renovation of historical buildings and monuments with underground part development. Innovations are connected with significant extension of application field of geotechnologies, increasing calculation accuracy of parameters or usage in specific soils.

Keywords: geotechnology, renovation, monuments

1. Introduction

1.1. Research aims

Additional areas in the central part of cities, where historical buildings predominate, can be obtained by developing the underground part of a building or structure. Renovation with the development of underground space in the center of cities affects old buildings that are often in unsatisfactory technical condition, as well as historical buildings, for which current standards determine small additional displacement. Therefore, special methods of construction are required for a renovation. Until now in Russia modern geotechnical technologies have been applied locally at certain objects of historical monuments' renovation without generalization and systematization considering structural design of underground parts and soil conditions.

It is necessary to offer geotechnical technologies, the innovation of which connected either with significant extension of their application field, with increasing calculation accuracy of parameters, or with usage in specific soils, and also to develop recommendations for their application.

To achieve this aim the world experience in the renovation of monuments with the construction of an underground part was analyzed. 72 examined literary sources describe the renovation of historic buildings with the construction of underground floors, including the Palacio de Lenares in Madrid (Rodrigues Ortis and Monteverde 1996), the Old Gostiny Dvor in Moscow (Konovalov P.A. and Konovalov V.P. 2011), the Porto Bay Liberdade Hotel in Lisbon (Pinto 2015), the Theater in Venice (Balossi Restelly et al. 2003), The Lenin's Mausoleum in Moscow (Ilyichev et al. 2015), The Bolshoi Theater in Moscow (Ilyichev 2007), the Mariinsky Theater in St. Petersburg (Mangushev et al 2013) and others.

Based on the analysis, research directions have been established, a program of numerical and on-site experiments has been developed. The results of these experiments were planned to be recommended for inclusion in standard documents that establish rules for the design and production of works for the renovation of historic buildings and monuments.

1.2. Technical solutions to underground part renovation of historical buildings

The underground part during renovation can be arranged below the building structure, extend out of a building outline or adjoin it.

Among the currently used innovative geotechnical technologies in the renovation with the underground space development, the following methods can be distinguished: top-down and semi top-down using a diaphragm wall, retaining structures made using jet grouting, deep mixing, the CFA method, the arrangement of a support system using steel pipes with jacks, strengthening of soil mass behind the retaining structure of the excavation and below its bottom with the use of controlled jet grouting; mitigation measures: compensation grouting, piles made by new pile technologies.

The choice of technical solutions for the renovation of bases and foundations of historic buildings and monuments in the construction of the underground part depends on a number of factors: the location of underground floors and their number, geological and hydrogeological conditions, the condition of above-ground structures of the existing buildings, the type of the renovation of the above-ground part of buildings.

Technical solutions in the part of the initial phase of the renovation with the development of underground space include installation of retaining structure and the underground part excavation support, the strengthening of the foundation and the foundation-ground contact, and also changing of the foundation type and/or strengthening of underlying soils.

2. Objects of research

2.1. Experimental research on stress-strain condition of soil mass during an underground part construction of renovated historical buildings

The experimental research on stress-strain condition of soil mass during an underground part construction of renovated historical buildings was carried out by numerical modeling and analysis of geodetic monitoring of the renovated buildings settlements.

According to the classification of Moscow soils types (Nikiforova 2016), the following types of geological conditions were considered: I - dense and medium-density sands, II - clayey soils, with very stiff, stiff, firm-stiff consistency, III - clayey soils with firm, soft-firm and very soft-soft consistency or loose sands. Type III also characterizes the weak clayey soils of St. Petersburg. Numerical research was conducted for the renovated architectural monuments in the center of Moscow: an administrative building with the construction of an underground part - below the building structures in the inner courtyard space (soil type-I); (MIDAS GTS 3D) (Fig.1), a multifunctional complex, the underground part of which adjoined the renovated historical buildings (soil type-I-II) (PLAXIS 2D) (Fig. 2), etc. During the renovation of the administrative building (Fig. 1) excavation was braced with struts and soil under foundation was strengthened with Microdur. During the renovation of the multifunctional complex (Fig. 2), the soil was strengthened by the technology of jet grouting under the foundation of each building in the complex.

For some cases, for example, the Hotel Moskva on Manezhnaya Square in Moscow (soil type II) with the construction of a 2-level and 4-level underground part below the building structures during its renovation, the calculations were done taking into account the increase in the characteristics of the soil under the historical building for a long period of exploitation according to the method contained in TKP 45-5.01-67-2007 (02250) (TKP 2008).

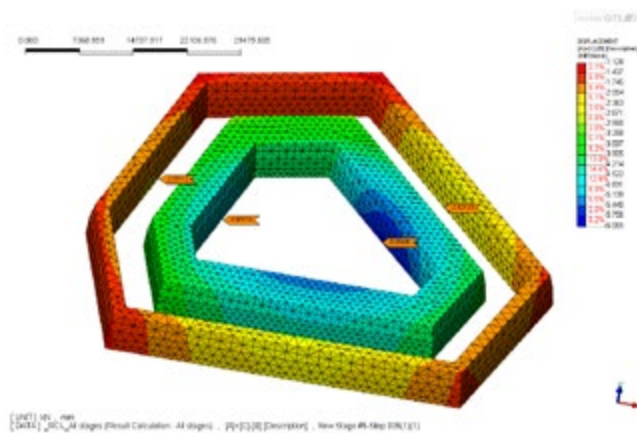


Figure 1 – Shadings of vertical displacements. Renovation of the administrative building – architectural monument in the center of Moscow.

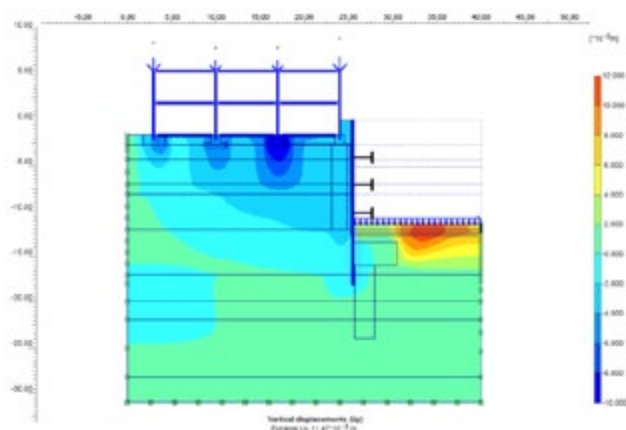


Figure 2 – Shadings of vertical displacements. The renovation of multifunctional complex.

The analysis of the geodetic monitoring data including settlements and inclinometric measurements of the retaining structure displacements was performed for two objects: the renovated Neglinnaya-Plaza complex on Rozhdestvenka street in Moscow with the construction of a 2-5 level underground part in the inner courtyard space (soil type III) (Fig. 3) and the renovated building of the Bolshoi Theater with the construction of an underground part below the building structures (soil type II) (Fig. 4).

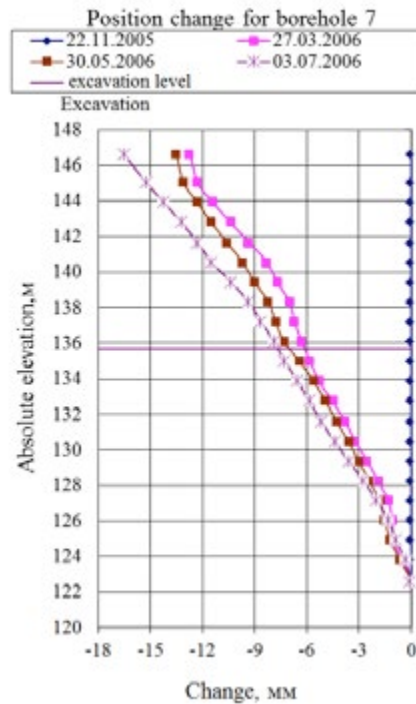


Figure 3 – Inclinometric measurements. Horizontal displacements of the pit retaining structure (the Neglinnaya-Plaza).



Figure 4 – Model showing the Bolshoi Theater after renovation (Ilyichev 2014).

2.2. Results of the experimental research

The experimental research allowed to obtain the coefficients: the coefficient of settlement reduction of the renovated buildings with various types of mitigation measures (pile underpinning, soil strengthening with Microdur injection, etc.) considering the technological settlement $K_{ct} = 0.02 \dots 0.7$; the coefficient of settlement reduction due to increased strength and deformation characteristics of the soil under the foundations of historical buildings and monuments over a long period of their exploitation $K_t = 0.8 \dots 0.9$; the coefficient of settlement increase of historical buildings renovated with the development of the underground part and the construction of the extra floor $K_{H(t)z} = 1,1 \dots 1,2$.

In addition, the main deformation criterion for the soil under renovated historic buildings with the construction of an underground space was suggested - the additional curvature of the foundation footing $P_{ad,u}$. For renovation with the underground space development of multi-storey and single-storey historical buildings or architectural monuments with load-bearing brick walls without reinforcement $P_{ad,u} = 4 \cdot 10^{-5} \text{ m}^{-1}$.

3. Method of settlement prediction of historical buildings and monuments

At the preliminary design stage the method proposed by Ilyichev V.A. (Ilyichev 2007) and the obtained coefficients K_{ct} , K_t , $K_{H(Ot)}$ can be used to calculate the foundations settlement of the renovated building with the underground part development S_{ren} :

$$S_{ren} = K_{ct} \cdot K_t \cdot K_{H(Ot)} \cdot K_r [\delta\varphi(x) + q/k], \quad (1)$$

where x is the coordinate of a foundation point ($x=0$ on the nearest end of a foundation to a pit); k is the subgrade reaction coefficient; q is the foundation pressure of strip or slab foundation; K_r is the coefficient, based on type of bracing structures for a pit: $K_r=1,0$ – bracing strut system with metal pipes; $K_r=0,6$ – reinforced concrete slabs as a bracing elements (top-down method); $K_r=2,5$ – for anchors; K_{ct} – reduction coefficient for predicted settlement without mitigation measures (presented in table 1 depending on a mitigation measure type); K_t – the coefficient of settlement reduction due to increased soil characteristics under the foundations of historical buildings over a period of their exploitation; $K_{H(Ot)}$ – the coefficient of settlement increase during a construction of an extra floor of an existing renovated building. Values of the parameters presented in equation (1) are contained in research work of Ilyichev V. A. (Ilyichev 2007).

Table 1 – Coefficient for predicted settlement without mitigation measures K_{ct}

Type of mitigation measure	K_{ct}
Compensation grouting (vertical and horizontal); prestressed strutting structures (struts with jacks); controlled jet-grouting;	0.2
jet piles in combination with micropiles or jet piles with drill pipe left in a pile	
Compensational micropiles for underpinning; soil strengthening with Microdur	0.1
Micropiles	0.6
Jacked piles	0.5
Jet piles	0.7

Notice: K_{ct} evaluated considering a settlement caused by inaccurate process sequences, i.e. technological settlement (Mangushev and Nikiforova 2017).

4. Choice recommendations for geotechnologies in renovation of historical buildings with underground part development

The choice of the technical solution is influenced by a number of factors, such as the rigidity of the retaining structure, water permeability, the value of the settlement caused by the increased load on existing foundations during the renovation of the above ground part, and also the value of the technological settlement due to the features of the work.

When renovating the foundations and underlying soil of historic buildings and monuments, the following types of innovative geotechnical technologies are recommended: considering the retaining and bracing of excavations for multi-storey underground structures – top-down and semi top-down using a diaphragm wall, retaining structures made using jet grouting, deep mixing, the CFA method, the arrangement of a support system using steel pipes with jacks, strengthening of soil masses behind the retaining structure of the excavation and below its bottom with the use of controlled jet grouting

In the case when mitigation measures for the existing foundations of historic buildings and monuments renovated with the underground part development are planned to be constructed, the following innovative geotechnical technologies are recommended: compensational injection of grout into the soil, including a geotechnical barrier, compensational micropiles, piles made by new pile technologies (jet piles, “RIT”, “DDS”, “Atlant”, “Titan”, “Fundeks” piles, etc.), jacked piles.

Choice recommendations for innovative technologies in mitigation measures for existing historical buildings and monuments with an underground space development as part of their renovation are included in Table. 19 (Nikiforova 2016) depending on the category of technical condition of their structures.

Acknowledgements

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References

- J.M. Rodrigues Ortis and P.R.Monteverde (1996) *A Review of recent Spanish interventions in monuments*, Proc. of the International Symposium on Geotechnical Engineering for the Preservation of Monuments and Historical Sites “Geotechnical Engineering for the Preservation of Monuments and Historical Sites” (Napoly, Italy, 3-4 October 1996) pp.499-508;
- Konovalov P.A. and Konovalov V.P. (2011) *Soil bases and foundations of buildings under reconstruction* (ASV, Moscow, 2016);
- Pinto A. and Pereira A. (2015) *Retaining structures and underpinning solutions at the deep excavations for the Porto Bay Hotel, in Lisbon*, Proc. of the XVI ECSMGE Geotechnical Engineering for Infrastructure and Development. pp. 979-984;
- Balossi Restelly A. et al. (2003) *Renovation of La Fenice theatre in Venice. Foundation problems*, Proc. of the XIIIth European conf. on soil mechanics and geotechnical engineering. “Geotechnical problems with man-made and man influenced grounds”. Main Session 4: Foundation in urban areas (Prague, Czech Republic, 25-28th August 2003), Vol. 2, pp 29-34;
- Ilyichev V.A. et al. (2015) *Scientific-technical supervision during renovation of the V. I. Lenin mausoleum on red square in an area of soil-bed stabilization*, Soil Mechanics and Foundation Engineering, 2015, Vol. 52. N°1. pp. 1-8;
- Ilyichev V.A. (2007) *Sovremennaya mekhanika – prakticheskomu stroitel'stvu*, Proc. of the 50th anniversary of conf., dedicated to 50 years of Russian society for soil mechanics, geotechnics and foundation engineering «Russian geotechnics – into 21st century» (Moscow, 25-28th August 2007), Vol I, pp. 80-104;
- Mangushev R.A. et al. (2013) *Proektirovanie i ustrojstvo podzemnyh sooruzhenij v otkrytyh kotlovanah* (ASV, Moscow, 2013);
- Nikiforova N.S. (2016) *Obespechenie sohrannosti zdaniij v zone vliyaniya podzemnogo stroitel'stva* (Moscow: MGSU);
- TKP 45-5.01-67-2007 (02250) (2008) *Slab foundations. Rules of designing* (Minsk: Ministry of architecture and construction of the Republic of Belarus, 2008);
- Ilyichev V.A. (2014) *Russian Society for soil mechanics, geotechnics and foundation engineering. Keynote lecture*. The Proc. of the First U.S.A.-Russia Geotechnical Engineering Workshop. (Oakland, California, March 29-30, 2012), pp171-187;
- Ilyichev V.A. et al. *Computing the evaluation of deformations of the buildings located near deep foundation tranches*, Proc. of the XVIth European conf. on soil mechanics and geotechnical engineering, “Geotechnical Engineering in urban Environments” (Madrid, Spain, 24-27th September 2007), Vol. 2, pp.581-585;
- Mangushev R.A. and Nikiforova N.S. *Tekhnologicheskie osadki v zone vliyaniya podzemnogo stroitel'stva* (ASV, Moscow, 2017).

RECONSTRUCTION OF THE NALCHIK CITY AND PRESERVATION OF ITS HERITAGE

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Abstract

Nowadays, small cities all over the world, are some kind of keepers of cultural heritage and national originality, whose main features are uniqueness and peculiarity. The tendency of preservation of architectural heritage of Nalchik, founded about 300 years ago and having many buildings and constructions of historical significance is considered. This article discloses the characteristics, analysis and problems of modern development, also considers the perspective of tourism development in Nalchik. The scale, rhythm, materials, the whole style of new buildings, had to keep on with old-fashion style. On the example of Nalchik, possible ways of transforming the functional-planning structure are considered, aimed both at preserving of natural attractiveness of a small city, and on revealing of new opportunities for urban development.

Keywords: reconstruction, restoration, re-creation, moral and physical deterioration of building, infrastructure, historical heritage, architecture, improvement

Introduction

Nalchik is a capital of Kabardino-Balkaria - one of the most unique in terms of natural, historical and cultural characteristics of Russia.

In 2015, Nalchik entered the top five of the cleanest cities and took the 3rd place out of 100 in the rating of the most attractive cities in the Russian Federation in terms of ecology. The date of the foundation of the city is 1724, its area is 150 square kilometers, the population is 239 thousand people. The Republic is one of the centers of concentration of political, economic and scientific potential of the South of Russia, it is one of the most attractive and stable regions of the North Caucasus Federal District of the Russian Federation and has the broadest development prospects.

Nalchik (the Kabardino-Circassian name is "Nalshyk", the Karachay-Balkar name is "Nalchik") means "horseshoe", as the city is geographically located in a semicircle of mountains resembling a horseshoe, which became the emblem of the city.

In this article we will consider all the important aspects of city reconstruction, namely the essence of reconstruction, modern problems of city and district reconstruction, modern principles of city reconstruction, and also we will reveal many other issues related to the reconstruction of the city Nalchik.

1. Reconstruction of the city is a continuous process of renovation of the building in order to create comfortable living conditions for the population and therefore the reconstruction of the existing environment is closely connected with the solving of the question of the ratio of "old" and "new" in the city.

The existing buildings, their groups or quarters may, with further development of the building, be either a larger or a smaller part in the composition of newly created compositions [1]. In the first case, the new elements of the composition should be additions to existing ones. The scale, the rhythm, the materials, the whole style of additions should, as far as possible, continue the features of the existing framework.

In another case, the existing elements that will be included in the new compositions should become subordinate compound parts of these compositions. Here, the stored must be included with more complete preservation of their features.

The ecological condition of Nalchik is generally stable. In general, about the environmental situation in Nalchik, we can say that the composition of atmospheric air does not go beyond the norms for the resort region, the quality of the water remains at a stable level. The industrial production, can not significantly affect the environment, due to its small development. The motor transport exerts its influence on the quality of air, but in general, it exceeds the limit of permissible emissions only at rush hour. The city is a balneological and mountain climatic resort. About a quarter of the city is defined as a resort.

In the resort part of the city and around it there are about 40 sanatoriums, rest houses, camp sites, boarding houses. The balneological treatments that provided by the sanatoriums can include bathing within sanatoria and balneary of the city. The city has two attraction parks, four artificial lakes (which filled during the swimming season from the Nalchik river), two rope roads, mineral sources, a huge park (one of the largest in Europe), continuation of is the forest "terenkur", zoo, hippodrome. The picturesque mountains around are for tourism, for Hiking and mountaineering. There are the restaurant complex "Sosruko" and observation platforms with an overview of the city, of its immediate and distant surroundings and mountain ranges, on the mount Malaya Kizilovka which is situated in the opposite of the resort part of the city.

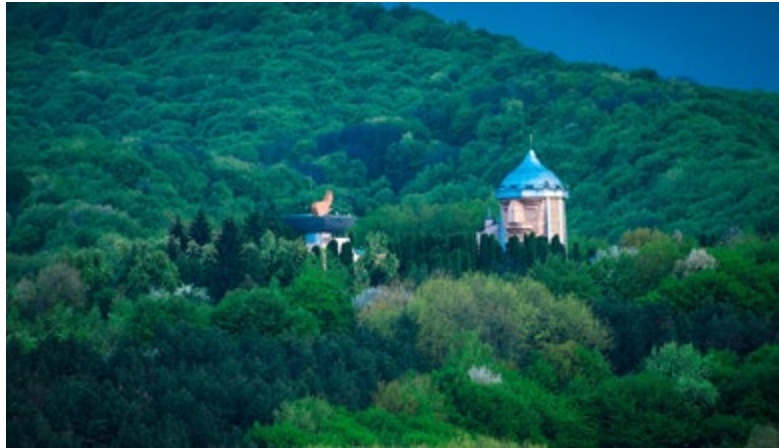


Figure 1 -The restaurant complex "Sosruko"

In July 2016, the city Planning Council of Nalchik discussed the new master plan of the capital of Kabardino-Balkaria. Its development is carried out by the regional scientific-research and design Institute of urban planning of the Rostov-on-don city. An important feature that differentiates this document from the previous ones is not the normative, but the predictive and analytical trait. The main aim of the developed document is to overcome the negative phenomena of natural and anthropogenic nature. In addition to the traditional aspects are: search of the directions of further territorial development, streamlining of the functional zoning, studying the problems of engineering and transport system, the new master plan pays a great attention to the environmental protection and environmental issues. The concept of spatial urban development of Nalchik, includes the reconstruction and restoration of buildings. A specific part of reconstruction is the work with monuments of history and culture. Here are used the terms: restoration, renovation, re-creation. At the same time, in the practice of restoration, the same term "reconstruction" refers to purely theoretical and graphical assumptions about the original appearance of the object. The main condition for the reconstruction of the city is the preservation of the most important, valuable and sustainable elements, taking into account the existing functions and spatial relationships.

The reasons that dictate the necessity of the reconstruction:

- The discrepancy of the existing planning structure, to the increasing requirements, to the new functions and the ecological pressures on the urban environment;
- The lack of the efficiency of use of the housing stock and urban areas;
- The moral and physical deterioration of building;
- The difference of the terms of service of individual elements of the urban environment;
- The loss of valuable historical architectural qualities of urban environment in the process of development ;
- The improvement of transport infrastructure.
- First of all, the objects of reconstruction should include:
- The international Airport of Nalchik and the airstrip.



Figure 2 - Nalchik airport

2.The State enterprise of KBR (Kabardino-Balkar Republic)”The balneary resort “Nalchik””.



Figure 3 - «The balneary.»

3.The historical building of the “Kabardino-Balkarian state University named after Berbekov H. M. - The medical faculty”, which is currently in disrepair.



Figure 4 - The medical faculty of the KBSU

4.The sanatorium “Mayak” (building N° 1)



Figure 5 - The sanatorium “Mayak” (building N° 1)

5. The sanatorium “Blue spruces”.



Figure 6 - The sanatorium “Blue spruces”.

6. The object of the cultural heritage "the House with chains"



Figure 7 - "the House with chains"

The problems of the reconstruction of Nalchik include the strengthening of the banks of the river Nalchik.



Figure 8 - "the Nalchik river"

A few people take seriously the River Nalchik, but in vain. This, at first glance, a harmless blue ribbon of water crossing the city, in the period of the spill can seriously “stained” the lives of the people of the coast. Of course, the banks of the river are fortified, but not enough. The river was first strengthened in the 70 – 80s. concrete fasteners – the tetrapods, which are actively operated in conjunction with a deck (for mounting the bottom) in the absence of a bottom erosion. But in the process one nuance was missed – that tetrapods was made for valley (plain) rivers that flow at low speed, and the Nalchik river, is mountainous, despite of its small size. For this reason, the housing and communal services carried out additional fastening of the river banks with a concrete slabs, and at this time, in our opinion, a big mistake was made – an artificial straightening of the original zigzag riverbed to reduce the area of the floodplain for the construction of its houses, which accelerated the flow of the river. As they say, it makes no sense to argue with nature.

The Nalchik river during the flood “knocked out” all the fortifications and flooded the houses nearby. The newspaper named it “the sunken millions”. A special project to fix the banks of mountain rivers through the construction of a network of cascades, was developed after the incident. And it allowed to reduce the flow rate significantly, and to reduce the channel and stop the bottom and side erosion. These measures allowed the beloved city “to sleep peacefully” for twenty years. But as you know, nothing lasts forever: the water wears away the stone (little strokes fell great oaks) – the cascades eventually began to collapse, the side and bottom erosion are formed again, and it can lead to the collapse of banks.;

By the order of the administration of Nalchik, it is planned to improve the floodplain of the river “Nalchik” with the saturation of its entertainment fields : with beaches, cafes, sports grounds, even water parks. It should be noted that any intervention in the natural processes should be carefully thought out, so as not to have to regret the time, forces and means wasted. Having carried out the analysis of the actual condition of an infrastructural objects of Nalchik, for creating of favorable conditions of life activity of the population and preservation of the historical heritage it is recommended to include the following objects in the plan of reconstruction :

- The international Airport of Nalchik and the airstrip.
- The state enterprise of KBR “water-mud Baths of the resort “ Nalchik””.
- The historical building of the “Kabardino-Balkarian state University named after Berbekov H. M. - the Medical faculty”, which is in a poor condition, by the present.
- Central roads.
- The sanatoriums “Mayak” and “Blue spruce”.
- The object of the cultural heritage “the House with chains».
- The strengthening of the banks of the river “Nalchik” .

Conclusion

The main reasons for the reconstruction of Nalchik is the mismatch of the existing planning structure to new town-planning requirements, the moral and physical deterioration of buildings, the loss in the development of valuable historical architectural qualities of the urban environment, the growth of the population and the need to improve the quality of the reconstruction of the urban environment.

The main tasks to be solved in the process of reconstruction of the city:

- the evaluation and analysis of the condition of the housing Fund of Nalchik;
- the determination of ways to strengthen the banks of the river Nalchik;
- the increase in the housing stock due to the growth of the population and the house providing standards, creating an optimal density of development;
- the increase of the level of the improvement
- the increase of stability and improvement of aesthetic appearance of artificial coastal structures of the river Nalchik;
- the qualitative improvement of the urban transport network;
- providing convenient connections of housing with the main objects of labor and cultural services;
- improving the architectural and artistic qualities of historical and administrative buildings.

References

Kasyanov V.F. Reconstruction of residential buildings. Publishing house of the Association of Construction Universities. Moscow, 2005. p.36

Master plan for the development of Nalchik [1].

Residential area and micodistrict / Baranov N.V. (responsible editor) - Moscow:1.Stroyizdat,2011.-375 p.

Architecture and town planning. Encyclopedia/ Ch. Ed. Ikonnikov A.V. - Moscow: Stroyizdat, 2010

Magazine "Architecture, Construction, Design", No 4, 2012.

INFLUENCE OF THE STRUCTURE OF HEAT SOURCES ON ATMOSPHERIC AIR POLLUTION OF HUMAN SETTLEMENTS

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Abstract

The municipal heat and power industry of Russia is mainly oriented towards the use of fossil fuel energy resources, the share of renewable and alternative energy resources is 0.15-0.2%. The publication compares air pollution with heat sources of heat supply systems with various architectural and planning solutions for the development of the settlement. The current stage in the development of heat generation systems for the heat supply of populated areas has led to the formation of new approaches based on a broader application of the principles of decentralization of systems. Widely used autonomous heating systems, such as in apartment buildings in multi-storey buildings, cottage systems for landscape building. On the basis of computational studies, a qualitative and quantitative assessment of the sanitary and hygienic indices of the state of atmospheric air is given with the appropriate placement of heat generating plants, taking into account their installed capacity and structure. Tasked to conduct the comparison of the three architectural and planning solutions for heating areas of different types of construction with identical population for identical climatic conditions. The centralized system of a heat supply farmstead buildings with a single heat source. Decentralised heat supply farmstead of building the same plan with the installation of a heat source in each cottage. Decentralised heat supply of multi-storey buildings with door-to-door heating systems from Combi boilers. In accordance with the recommendations, it is assumed that the total toxic multiplicity of overlapping zones of dispersion of harmful emissions is determined by summing the calculated values for the most unfavorable conditions for maximum values of ground level concentrations of harmful substances at the border zones of dispersion; the amount of emissions was calculated with a maximum installed capacity of heat-generating equipment. Calculated values of emissions: carbon oxide, nitrogen oxide, taking into account some background concentration of these substances. Characteristic of dispersion of products of combustion and the heat source in each case was determined by the technical characteristics of chimneys and capacity of heat source. The main results of the calculations for received source data in the Central European zone of Russia is shown in table and graphically illustrated. Least air pollution in the maximum total toxic ratio, while significantly larger values of the installed capacity of the heat source, has a place for a Central boiler room. Important is the conclusion that an eight-fold overlap of the zones of dispersion in per-apartment heating and fourfold overlap in the cottage heating is caused by the corresponding density and must be considered in the development of architectural and planning concepts and engineering solutions for the heat supply.

Keywords: architectural and planning solutions, air pollution, heat generating plants.

1. Introduction

A significant reduction in the cost of heating is possible while increasing the proportion of decentralized heating [1]. This will help create more comfortable conditions, as well as provide real fuel economy. Decentralized heat supply is efficient and relatively inexpensive. Reasonable application of decentralized systems of heat supply in combination with energy-saving in construction and reconstruction of buildings will give huge energy saving.

For the past twenty years in European countries, almost do not build quarterly and district boiler houses.

Autonomous heat generating plants, such as individual gas boilers [2], roof and modular boiler houses are able to provide the most effective and comfortable solutions for the needs of a separate apartment or cottage, as well as an apartment building or a cottage community. Development of heat generation systems for heat has led to the emergence of new approaches, aimed mainly at decentralized systems. Comparative evaluation of the energy efficiency of heating systems [3] with varying degrees of centralization was carried out in many works, and authors largely determined the field of rational use of such systems.

However, in publications, the issues of comparative assessment of air pollution for the various technical solutions under consideration were practically not reflected.

With the growth of industrial production, exceptional sharpness acquired the problem of the interaction of human society with the environment, in particular the problem of protection of the atmosphere [4], hydrosphere and soil from pollution. The needs of human society are increasing continuously. However, the amount that we take from nature, due to the needs of development, growing exponentially, because the doubling of industrial production in the world occurs every 8-10 years. Every year, billions of tons of mineral resources are extracted from the bowels of the earth, but approximately one percent of all the raw materials produced are converted into useful products for society. All the rest is thrown into the environment in an environmentally dangerous, poisonous form.

All this leads to irreversible shifts in the Earth's biosphere, and consequently, the main problem is the protection of the environment, i.e. its protection from pollution and changes that occur as a result of the operation of enterprises for technological

processing of resources and heat and power engineering. The main pollutants are Sulphur and nitrogen oxides, carbon dioxide, smoke and soot particles, as well as many other gases.

2. Method

Carrying out this comparison, it is necessary to start from the most common indicators and characteristics of the operation of systems. Do not specify their quantitative side, but highlight, define and evaluate qualitative aspects. For this purpose, three technical solutions for the heat supply of different type of development areas with approximately the same population for the same climatic conditions are compared.

1. Manor buildings with one source of warmth and centralized heat supply (figure 1).

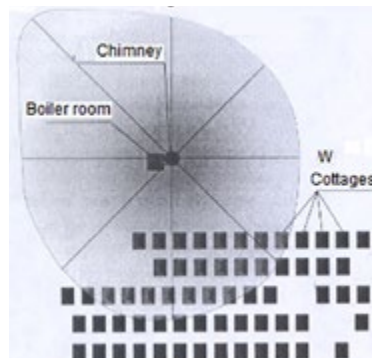


Figure 1 - Dispersion of impurities for option 1

2. Mansion building of the same layout (figure 2) with the installation of the heat generator in each cottage.

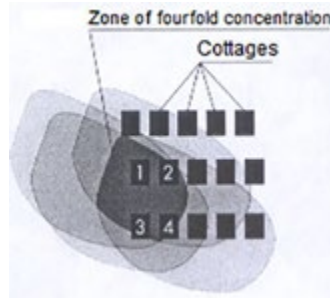


Figure 2 - Dispersion of impurities for option 2 (fragment)

3. Multistory building (two five-storey buildings on the same number of mixtures) (figure 3) with pokvartirnymi heat supply systems of Combi boilers [5].

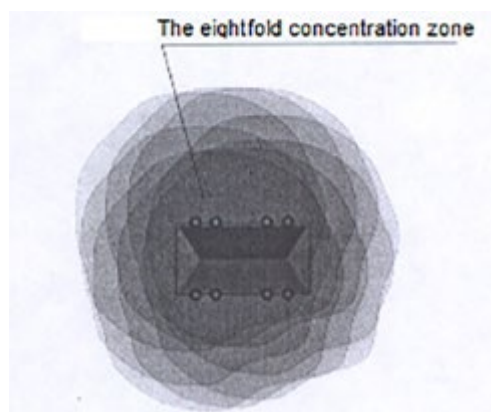


Figure 3 - Dispersion of dangerous substances for option 3 (fragment)

For carrying out the general qualitative research of a question, it is possible to allow:

- a) the type of fuel is not critical for a qualitative assessment, although according to point 3 it is possible to use only network natural gas;
- b) the total capacity of the heat generating plants will be different and determined by the consumption norms in these types of buildings;
- c) all emission sources with lumped parameters are considered as point, and the dimensionless total concentration (total toxic multiplicity) is defined as the additive quantity:

$$K_{\Sigma} = \sum_{i=1}^n K_i = \sum_{i=1}^n \frac{C_i + C_{bi}}{MAC_i}, \quad (1)$$

K_{Σ} - total toxic multiplicity; MAC_i - maximum allowable concentration of pollution, mg/m³; C_i - the concentration of component i, mg/m³; C_{bi} - background concentration of component i, mg/m³.

In accordance with [6], that:

- 1) the total toxic multiplicity when overlapping the zones of dispersion of harmful emissions is determined by summing the calculated values for the most unfavorable conditions according to the maximum values of surface concentrations of harmful substances;
- 2) calculation of harmful emissions is carried out at the maximum design capacity of heat generating equipment;
- 3) specific emission values are calculated for the comparative evaluation: carbon monoxide, nitrogen oxide, benz(a) pyrene, taking into account the background concentration C_{bi} of harmful substances [7];
- 4) influence of wind load for clarity is taken into account shown in figure 1 eight-screw «wind rose».

Calculation of surface concentrations C_i of harmful emissions and distance from the chimney X_M at which the surface concentration of harmful substances under unfavorable meteorological conditions reaches a maximum value and other characteristics were made according to the recommendations of OND-86

The characteristics of the heat source and the chimney dispersion conditions in each specific case were determined by the power of the heat source and the technical characteristics of the chimneys.

For centralized source options (item 1): the total TDP 6000 kW boiler with free-standing chimney height of 30 m, a diameter of 0.81 m (per boiler Vitoplex S (Viessman).

For suburban sprawl: auxiliary source ACV Heat Master output 64 kW (80 cottages-total capacity of 5120 kW) with chimney in each cottage complete with a height of 8 m, a diameter of 160 mm. The calculation is performed for a single cottage. For multi-storey cottages: gas boiler SD 235E ISOFAST TDP 32 kW (total power sources 2560 kW), the chimney of the building for each partition, i.e. 5 boilers, with a height of 18 m, a diameter of 220 mm. 8 pipes per building, the total number of pipes (two buildings) -16 pieces.

The calculation is performed for a single building.

3. Results

The main results of the calculation to the data source for the Central European zone of Russia at a temperature of cold five days $T_{x5} = -29^{\circ}\text{C}$ and calculated year $T_{x5} = -29^{\circ}\text{C}$ are shown in table 1 and their graphic illustration given in figures 1-3.

Table 1

Basic results of comparative calculations

#	Characteristic	Centralized source	Independent source (cottage)	Apartment source
1	Power, kW: unit/quantity total	2000/3 6000	64/80 5120	32/5 (total 80 boiler) 2560
2	Annual leave heat Mj/g when $h_{\text{year}} = 4300 \text{ h/g (kW}\cdot\text{h/g)}$	$9.29 \cdot 10^7$ ($2.57 \cdot 10^7$)	$7.93 \cdot 10^7$ ($2.2 \cdot 10^7$)	$3.96 \cdot 10^7$ ($1.1 \cdot 10^7$)
3	Chimney: height, m number of tubes mouth diameter, mm	30 1 800	8 80 160	18 16 220
4	Natural gas consumption, m ³ /s	0.181	0.00224	On one pipe 0.004263
5	The consumption of products of combustion at the outlet from the chimney, m ³ /s	4.25	0.047	0.117
6	Calculated values from one source, the g/s: carbon oxides nitrogen oxides benzo (a) pyrene	3.4 0.34 $0.8 \cdot 10^{-7}$	0.0336 0.00376 $0.01 \cdot 10^{-7}$	On one pipe 0.084 0.00716 $0.02 \cdot 10^{-7}$
7	Mass emission, g/kWh: CO NO _x benzo (a) pyrene	$5.7 \cdot 10^{-4}$ $5.7 \cdot 10^{-5}$ $1.4 \cdot 10^{-11}$	$5.25 \cdot 10^{-4}$ $5.7 \cdot 10^{-5}$ $1.6 \cdot 10^{-11}$	$4 \cdot 10^{-4}$ $4.5 \cdot 10^{-5}$ $1.25 \cdot 10^{-11}$
8	The annual mass emissions, thousands of kg/year: CO NO _x benzo (a) pyrene	14.71 1.47 $5.06 \cdot 10^{-4}$	11.55 1.3 $3.52 \cdot 10^{-4}$	4.4 0.495 $1.38 \cdot 10^{-4}$
9	Maximum surface concentrations, mg/m ³ : CO NO _x benzo (a) pyrene	0.046 0.0046 $1.16 \cdot 10^{-9}$	0.02122 0.00237 $6.3 \cdot 10^{-10}$	0.009551 0.00107 $6.3 \cdot 10^{-10}$
10	Total toxic emissions per source multiplicity (one tube), taking into account the background concentrations	0.125	0.090	0.071
11	Distance to the zone of maximum concentrations from the emission source, X _m , M (without wind load)	414.4	55.8	104
12	The number of overlapping zones of dispersion for the architectural planning solutions, pieces	-	4	8
13	Possible local maximum total toxic multiplicity given overlay zones scattering	0.12	0.376	0.576

The results of comparative calculations based on the comparison of quantitative characteristics allow us to identify the main qualitative indicators of technical solutions [8]. Thus, the considered architectural and planning solutions for the construction of residential areas suggest significant differences in living conditions in a multi-storey building or in a cottage, however, in the issues under consideration, it should be noted that the total installed capacity of all heat generators has decreased significantly (#. 1 table 1).

Therefore, the total mass of emissions reduced for high-rise buildings more than two times (# 8 table 1) under identical environmental performance of boilers [9].

Comparing the total multiplicity of toxic emissions from a single source of pollution, it is easy to see that the change of the capacity and height of the chimney leads to minimum contamination from a group of pipe with a height of 18 m (5 boilers, when a five-storey building, # 10 table. 1) [10]. However, the analysis of the imposition of dispersion zones from all sources of pollution (# 12 table 1) shows that residential heat supply is inferior to other solutions considered by environmental indicators (# 13 table 1).

4. Conclusion

It should be noted that changing the dispersion zones when taking into account the «wind rose» does not have a significant effect on quality, and in terms of quantitative characteristics when using natural gas and moderate background concentrations, the sanitary indicators of air pollution are very far from the limit values

Moreover, the lowest air pollution at the maximum total toxic multiplicity, despite the significantly higher values of the installed capacity of the heat source, takes place for the central boiler house (# 13 table 1).

Certainly, the provided calculations have estimated character and are executed with a number of assumptions. However, it is important to conclude that the eightfold imposition of dispersion zones in the apartment heat supply and the fourfold overlap in the case of cottage heat supply is due to the corresponding density of construction and must be taken into account.

SOCIO - ECONOMIC EFFICIENCY OF RENOVATION IN MOSCOW

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Abstract

The article examines the socio-economic conditions of the State program of renovation of the city of Moscow. The main objective of the renovation Program is to prevent the mass appearance of dilapidated housing in Moscow and at the same time to adjust accumulated over the previous decades imbalances in the development of the city and shape the urban environment fundamentally new quality. The Program includes more than 4 thousand houses of the first period of industrial house building height from five to nine storeys, in which live about 1 million people. The program is estimated at 3.5 trillion RUB from the city budget. Conducted architectural and urban planning competitions of the five pilot sites of renovation of the housing stock in Moscow. 12 built starter houses for the resettlement of residents. Evaluation of the effectiveness of a restoration program will be carried out in several areas: assessment of economic efficiency, the evaluation of budget effectiveness, the definition of social efficiency and evaluation efficiency and effectiveness of the State program.

Keywords: program of renovation, housing, starter homes, socio-economic impact

1. Introduction

Monitoring of physical and moral depreciation of houses of the first period of industrial housing the leading research institutions of Moscow and the State housing inspection of Moscow, it was revealed that the technical condition of houses, characterized by a reduction in carrying capacity and operational characteristics of building structures and in the next 10-15 years will lead not only to lower consumer characteristics of housing, and will lead to an emergency situation. In July 2017 was adopted the state program of renovation of the housing stock in the city of Moscow, which provides for the order of events.

Renovation of the housing stock of the city of Moscow is aimed to prevent the growth of emergency housing, removal of unbalanced development of the urban environment and the creation of new comfortable and safe living conditions of citizens. It is important to retain the historic appearance of the capital.

Currently, the housing Fund of the city of Moscow is of 243.6 million sq. m., approximately 3.5 million apartments.

A significant part of the housing stock was built in the era of industrial housing, which began with the plan of reconstruction of Moscow in the years 1951-1960.

The renovation will cover about 5,000 homes and about 350 of the thousands of apartments that will be about 10% of the housing stock of the capital. The programme will build more than 15 million square meters of housing. The new apartments will move about one million Muscovites. This was at VII Moscow urban forum was told by the head of the Department of urban planning policy of Moscow Sergey Levkin.

The main objective of the program is the renovation of the housing stock that was built in the 1950-1960-ies. Now wear these homes ranges from 45 to 60 percent, and in the next 10-15-20 years it will be 70 and more. This is an emergency condition.

A program of this scope could not be achieved in one day or one year, it lasts on average for 15 years.

The reconstruction program is the second phase of the program of complex reconstruction of Moscow, which began in 1999. At the first stage in a programme of comprehensive reconstruction of residential areas the first period of industrial housing was included 1722 five-storey buildings demolished series K-7 and II-32 and II-35, 1605-AM, 1 mg-300, which was built in the late 1950's-early 1960-ies. In the first phase of complex reconstruction was destroyed in 1671 houses with a total area of 6.1 million sq m, which accounted for about 97% of the total number of five-storey buildings of the first period of industrial housing. The financing of the first stage of complex reconstruction of 5-storey residential buildings occurred at the expense of budget resources, extrabudgetary funds, financial resources of administrative districts and the investors' funds.

In the Central, Northern, southern, South-Eastern, Eastern, northwestern and Zelenograd administrative districts of Moscow, the demolition of five-storey houses "demolished" series is fully completed. By 2020 it is planned to carry 51 more building, with an area of 0.2 thousand sq. m. the Financing of the renovation program is carried out with attraction of means of city budget of Moscow, as well as from other sources in accordance with the legislation of the Russian Federation. The renovation programme in Moscow will be allocated 400 billion roubles from the city budget.

Residents who agreed to participate in the renovation programme, will receive free property, In the Central, Northern, southern, South-Eastern, Eastern, northwestern and Zelenograd administrative districts of Moscow, the demolition of five-storey houses "demolished" series is fully completed. By 2020 it is planned to carry 51 more building, with an area of 0.2 thousand sq. m. the

Financing of the renovation program is carried out with attraction of means of city budget of Moscow, as well as from other sources in accordance with the legislation of the Russian Federation. The renovation programme in Moscow will be allocated 400 billion roubles from the city budget.

2. Literature review

Thus, there were different series of buildings of mass industrial construction, including II-07, B, 1-447, II-20, II-28, 1-303, 1-335, II-32 (later 1-515/9ш), II-35, K-7, 1 MG-300, 1605AM, 1-510, 1-511, 1-515. And series K-7, 1-510, 1-511, 1-515 had the largest spread in Moscow. Only Moscow for 1956-1970 years, was built 25,5 thousand sq. m of total area of 5-storey residential houses, of which 22.3 thousand sq. m. the most popular series K-7, 1-510, 1-511, 1-515. The table data shows that the program of reconstruction of five-storey buildings in Moscow today demolished 85% of homes series II-32, 98% of homes of the series K-7 and 88% of the houses of the series 1605-M. Home of such series as II-35, 1 MG-300 today completely demolished in the years 1999-2010 and the remaining 100 houses series 1-447 of the total built 300 houses in this series.

The following table 1 volume of construction of 5-storey residential houses serial (GUP MNIITEP, 2002).

Table 1 - The volume of construction of 5-storey residential houses serial
(thousand sq m total area)

Years of construction	Series of a typical project					
	II-32	K-7	1605-AM	1-510	1-511 (brick)	1-515
1951-1955					26	
1956-1960	13	115	37	976	2343	341
1961-1965	1138	2686	795	2941	4636	4247
1966-1970	40	626	200	256	831	2045
1971-1975		8		3	91	73
1976-1980					2	3
1981-1985						3
Total	1191	3435	1032	4176	7929	6712
The state currently	85% demolished, 15% remained in the WEST-ERN and EAST ADMINISTRATIVE DISTRICT	98% demolished 2% remained in the NORTH-EASTERN ADMINISTRATIVE DISTRICT	88% demolished, 12% remained in the WESTERN ADMINISTRATIVE DISTRICT	Included in the program renovation	Included in the program renovation	Included in the program renovation

In order to upgrade the living environment and create favorable living conditions of citizens, public space can prevent the growth of emergency housing in the city of Moscow, development of residential areas and improving the resolution of the Government of Moscow from August 1, 2017 N 497-PP "About the Program of renovation of the housing stock in the city of Moscow". The resolution identifies the term renovation.

Renovation of the housing stock in the city of Moscow - a set of measures aimed at the upgrading of living environment and creation of favorable living conditions of citizens and public space in order to prevent the growth of emergency housing in the city of Moscow, development of residential areas and their improvement.

The main objective of the renovation Program is to prevent the mass appearance of dilapidated housing in Moscow and at the same time to adjust accumulated over the previous decades, imbalances in the development of the city and shape the urban

environment fundamentally new quality.

According to the chief architect of Moscow Sergey Kuznetsov renovation is the largest project in Russia associated with the relocation of residents in the environment of a new quality. Renovation is the economic efficiency of development of the city a successful cultural life, comfort and safety of the urban environment (Sergey Kuznetsov, 2018).

In the process of renovation, the city will receive qualitatively new areas. The parameters of construction, which today count increases the density is about 2.5 times. The city will have modern neighborhoods, parks, squares and new social facilities.

The program of renovation of the housing stock in the city of Moscow has been prepared and implemented in accordance with the Law of the Russian Federation of 15 April 1993 N 4802-1 “About the status of the capital of the Russian Federation”, the Law of city of Moscow from 17 may 2017 N 14 “About additional guarantees of the housing and property rights of physical and legal persons in the implementation of the renovation of the housing stock in the city of Moscow” that is adopted in order to implement the said law of the Russian Federation and the Moscow city law, normative legal acts of city of Moscow on the basis of the results of voting and results of the General meetings of owners of premises in apartment houses, announced in the manner prescribed by resolution of the Government of Moscow from May 2, 2017 N 245-PP “About accounting of opinion of the population on the project of renovation of the housing stock in the city of Moscow”.

3. Materials and methods renovation in Moscow

3.1. The principles of renovation in Moscow

Basic principles for the renovation in the capital: voluntary; closure of the list of homes participating in the program; right of refusal to participate in the program; the possibility of obtaining property by selecting equivalent or equivalent flat finish comfortclass in your area or cash compensation; the improvement of housing conditions waiting list; the exemption from contributions for capital repairs; assistance in moving preferential categories of citizens; the resettlement of communal apartments; the decision of problems of the mortgage of apartments; warranty against eviction; free registration of property; the right of increasing the living space; the right to retain the lease or purchase of property of the leased premises; a public discussion with residents of projects proposed.

In the summer of 2017, the authorities carried out “door-to-door” vote in the “Active citizen” and in the multifunction center -MFC (My documents); according to its results, the program included about 4 thousand homes. List of houses included in the draft programme of renovation, has identified the residents of the five-story building by a vote. Participation in voting in the “Active citizen” in the igsc My documents was received by the inhabitants of the houses 4543. The inclusion of his home in the project was expressed by the residents 4079 houses – 90 percent.

The yards and grounds around the houses will be refurbished under the new standards, create parks, bike paths, sports and playgrounds with safe rubber coating, where there are swings, slides and shells. In the quarters there will be walking areas with lighting, flower beds and benches.

3.2. The results of the architectural-urban planning competition

At the end of 2017 and early 2018, the city held an open exhibition of the 20 finalists ‘ projects Architectural and urban planning competition for the concept development of pilot sites renovation of the housing stock in Moscow. At the exhibition, meetings were held with the authors of projects in which residents were more interested in each concept, asked questions.

Architectural and urban planning competition for the development of the concepts of the five pilot sites renovation of the housing stock in Moscow. Sites located in areas Kuzminki, Golovinskiy, Tsaritsyno, Prospekt Vernadskogo, Khoroshevo-Mnevniki. These are the areas where the residents voted to participate in the renovation.

The authors of renovation projects has developed a unique economic model of the project, allowing not only to calculate the amount of investment structure and funding sources of the project, but also to fundamentally new quantitative assessment of all micro - and macroeconomic effects of the project – from the calculation of standard indicators of investment effectiveness to assess the effectiveness of the project for the budget of the city, its housing sector and the economy of the city as a whole within 15 years of implementation of the program. It allows to choose not only the best architectural design solutions and provide economically viable project, and therefore to reduce the risks for the market and for budget investments in the renovation. Specially developed economic model renovation are applicable not only in the formative stages of the project, but also for operational management of the project in the future, due to the special instrumentation stress-testing different management actions depending on specific future market conditions that are currently difficult to predict.

3.3. The launch pad for the construction of houses under the program of renovation

Was taken a launching pad for the construction of houses under the program of renovation: the address list 210 contains sites located in all administrative regions and 75 districts.

Already built 12 houses are now recent work: apartments in them are according to the standard renovation. To relocate they

would have in the current year, and to finish the relocation by 2019. Then begins the second “wave” of renovation: 151 launch pad will provide housing 83 to thousands of Muscovites, whose resettlement will begin in 2020.



Figure 1 - Examples of home houses for resettlement under the program of renovation
Beskudnikovsky Boulevard; b) Ul. Red dawn



Figure 2 - Examples of home houses for resettlement under the program of renovation
Ul. Gzhatskaya; b) 5-ya Parkovaya street

4. Socio-economic effect of renovation

Evaluation of the effectiveness of a restoration programme will be carried out in several areas: assessment of economic efficiency, the evaluation of budget effectiveness, the definition of social efficiency and evaluation efficiency and effectiveness of the State program.

The first direction is the evaluation of economic efficiency to justify the socio-economic, urban planning decisions and investment decisions in the interests of the city. Economic strategy of renovation of the territory includes two sections: architectural planning and project economic model.

When calculating economic efficiency of the reconstruction should take into account future cost savings in:

- the refusal of capital repair of apartment houses rock-steady series included in the urban planning decision in the program of reconstruction and demolition;
- waiver of reconstruction or capital repairs of social objects, subject to reconstruction;
- cancellation of planned repairs and modernization of infrastructure, engineering networks and communications, repair of a road covering;
- introduction of innovative energy-saving and heat-saving designs, technologies, developments.

It should be noted that the most important and sometimes the decisive factor in the calculations of economic efficiency will be the time factor, so the aim should be to reduce the duration of construction works.

The author proposes to calculate the amount of funds on renovation of residential buildings according to the following formula (1):

$$K_{\sigma} = \sum_{t_0}^T \sum_{r_1}^R m_r K_r \cdot \left(1 + \frac{\beta r}{100}\right)^{t_r}, \quad \text{where (1)}$$

K_{σ} – the volume of investments taking into account credit rates at the time of completion of renovation;

$t = t_0, T$ – period (months) from start to completion of renovation;

$r = r_1, R$ – operations on attraction of funds to complete the renovation are determined by the schedule of funding;

K_r – the funds raised by the operation “r”;

β_r the rate of interest on loan in cash “r”;

m_r – the share of investment funds “r” months;

T_r – time (months) from start of renovation until the end

The formula takes into account the time factor taking into account the interest rate on the loan.

Based on the analysis of calculations for several variants of carrying out of renovation of objects, with the necessary investment, the owner is considering their future use of the criterion of expected profit.

Rental of residential and commercial buildings is one of the main sources of permanent income of the owner. Consider the economic effect of renovation before you rent.

To determine when cost recovery by the investor and the potential monthly value of the rent after renovation for residential and non-residential premises it is proposed to perform calculations by the following formula (2):

$$A = \frac{\sum_1^N K_{\sigma} \cdot \left(\frac{1}{N} + (1 - n/N) \right) \cdot \beta}{N \cdot S}, \text{ where (2)}$$

A – monthly rent for 1 sq. m of total floor space;

$N=1, N$ – periods (months) from completion until repayment of the loan (loans);

S – the total area of the premises, rent, rental;

β – the rate of interest (lending rate)

The time-cost investor will come when will be fulfilled the equation (2). In the formula (2) leading to the calculation specified time before anticipated expenses in a given period of time. If the rent would be unrealistic for market conditions, you should take a longer period before the time of cost recovery. The reality of this period is one of the indicators, along with the amount of rent, determining the efficiency of renovation. Followed by adjustments in volume, composition of works, their timing, sequencing of works and etc. The result of this analysis, the building owner selects appropriate option.

After the occurrence of a cost rent will remain the owner of the property. In the result of renovation, the monthly rent will increase by (3):

$$\Delta A = A_r - A_0, \text{ where (3)}$$

A_r, A_0 – rent before and after renovation of the facility.

This technique demonstrates a flexible mechanism of real estate management at its further use, in particular rental.

The second area is the estimation of budget effectiveness when comparing the cost and income sides of the budget during the implementation of the investment project. According to the Budget Code of the Russian Federation of article 34 of the “participants of the budget process within the established budget authority is due to proceed from the need to achieve the desired results with the least amount or best results using a specific budget amount”.

The third area is the definition of social efficiency through indicators of improved consumer quality of apartments, houses, district.

The fourth area is the evaluation of the efficiency and effectiveness of Government programs. Implementation of the State program shall be considered: - excellent, if the efficiency more than 100%; - good, if efficiency is from 95% to 100%; - satisfactory, if the efficiency is less than 95%; - unsatisfactory, if the efficiency is less than 75%.

5. Conclusions

It should be noted that as a result of tasks in the renovation process inevitably raises the quality of consumer properties of objects of residential development, and, consequently, the cost of housing as a market goods.

Socio-economic efficiency of renovation of the areas are obvious because of the use of available city land and infrastructure engineering; the saving of heat and hot water 35-50% and cold water by about 40-50% and, therefore, reduces the load on wastewater disposal at new facilities; improving the quality of architecture of residential development; create a comfortable and safe living environment; appears within walking distance of social, cultural and domestic purposes by placing them on the first floors of residential houses.

It can be noted that today is technology smart home, smart neighborhood. This unified management of engineering systems and communications channels and a separate collection of waste. This is a new level of security: surveillance cameras on the entrance, in the neighborhoods, the breeding information to a Central control and dispatching. And is a step towards smart city.

References

The research report of GUP MNIITEP on the topic: "lessons learned from the reconstruction and operation of industrial 5-9-12 storey houses of typical series", Moscow, 2002.

The resolution of the Moscow Government dated 1 August 2017 N 497-PP "About the Program of renovation of the housing stock in the city of Moscow".

Sergey Kuznetsov , Moskovskaya Perspektiva, 23-29 January 2018, p. 5, www.mperspektiva.

<https://stroi.mos.ru/arhitekturnye-konkursy/arkhitekturno-ghradostroitel-nyi-konkurs-na-razrabotku-kontsieptsii-ekspierimiental-nykh-ploshchadok-rienovatsii-zhilishchnogho-fonda-v-moskvie?from=cl>

CALCULATION OF STRENGTH RESISTANCE OF LOAD-BEARING STRUCTURES OF ARCHITECTURAL OBJECT OF CULTURAL HERITAGE

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Abstract

In the process of restoration of architectural objects of cultural heritage it is often necessary to use non-standard solutions for strengthening of load-bearing structures. Adequate theoretical evaluation of the strength resistance of such structures is possible on the basis of nonlinear deformation model that requires the use of material deformation diagrams. The purpose of this paper is to offer a generalized diagram of deformation of steel, behaving under the conditions of volumetric stress state. Such diagrams are recently used for uniaxially stretched steel. Ilyushin's single curve hypothesis is accepted for the volumetric stress state. In this case, the current stresses and strains are replaced by stress intensity and strain intensity respectively. As a result, the coordinates of the parametric points of the generalized deformation diagram of steel, behaving under the conditions of volumetric stress state, are obtained. This diagram describes the behavior of S 245 – S 590 steel classes.

Keywords: generalized steel deformation diagram, stress intensity, strain intensity

1. Target Setting

At the present time steel reinforced concrete constructions are widely used (Furlong, R.W. 1967; Liang Q.Q. et al. 2004; Nishiyama I. et al. 2004; Patel V.I. et al. 2012; SP 266.1325800.2016). Their main advantages over traditional steel and reinforced concrete structures are higher load bearing capacity and rigidity. The use of steel reinforced concrete structures with the same overall dimensions of cross section makes it possible to bridge over several large spans. Shape steel is often used as the fixed formwork in these structures, and it gives them additional technological advantages.

Traditional calculation procedures of strength resistance of such structures are mostly based on the method of limiting forces and empirical formulas (De Oliveira W.L.A. et al. 2009; Dundu M. 2012; Fattah A M 2012; Fujimoto T. et al. 2004; Han L.H. 2007; Saatcioglu M. and Razvi S.R. 1992; Tao Z. et al. 2008; Tsuda K. et al. 2000). Therefore, they have significant limitations in the field of application. However, in recent years calculations of load-bearing structures based on the use of nonlinear deformation model have been increasingly developed. In such calculations it is recommended to take into account the geometric and physical nonlinearity of the structure, the processes of crack formation, creep and shrinkage of concrete, which makes their results more reliable (Kotsovos M.D. 1980; Krishan A.L. 2008; Krishan A.L. and Troshkina E.A. 2014). The normative document on the design of steel reinforced concrete structures (SP 266.1325800.2016) also proposes to carry out calculations of their bearing capacity on the basis of the deformation model.

These calculations are based on deformation diagrams of materials. The more these diagrams correspond to the actual behavior of concrete and steel in the loaded structure, the more accurate calculation results are obtained. In this regard, researches on the refinement of the parametric points of the structural steel deformation diagram are of great current interest.

2. Target Setting

In the set of rules (SP 266.1325800.2016) three-linear diagram of steel deformation in generalized parameters $\bar{\sigma} = \sigma/R_y$ and $\bar{\epsilon} = \epsilon E/R_y$ (Figure 1) is offered for simulation of nonlinear behavior of steel in the calculations for the first group of limiting states, where R_y is the calculated steel resistance, which is assumed to be appropriate for the calculation for the first group of limiting states; E is the modulus of elasticity of steel. The values of the coordinates of the parametric points of this diagram should be taken from Table 1.

Table 1 – Coordinates of the parametric points of the steel deformation diagram.

	Steel classes according to the set of rules SP 16.13330.2011					
	C245, C255	C285	C345, C345K, C375	C390	C440	C590, C590K
$\bar{\epsilon}_{ny}$	0,80	0,80	0,80	0,90	0,90	0,90
$\bar{\sigma}_{ny}$	0,80	0,80	0,80	0,90	0,90	0,90
$\bar{\epsilon}_{ym}$	1,70	1,70	1,70	1,70	1,70	1,70
$\bar{\sigma}_m$	1,00	1,00	1,00	1,00	1,00	1,00
$\bar{\epsilon}_{xm}$	14,0	15,0	16,0	17,0	17,0	18,0
$\bar{\epsilon}_\theta$	141,6	123,0	88,3	67,1	49,6	26,2
$\bar{\sigma}_\theta$	1,653	1,54	1,415	1,345	1,33	1,16
$\bar{\epsilon}_p$	251	211	153	115	87,2	51,1
$\bar{\sigma}_p$	1,35	1,31	1,26	1,23	1,20	1,10

The application of the steel deformation diagram in generalized parameters, on the one hand, makes it possible to unify the method of evaluating the strength resistance of load-bearing structures and, on the other hand, to ensure its high accuracy.

Note. Designations of stresses and strains at the parametric points of the diagram are agreed in accordance with SP 266.1325800.2016.

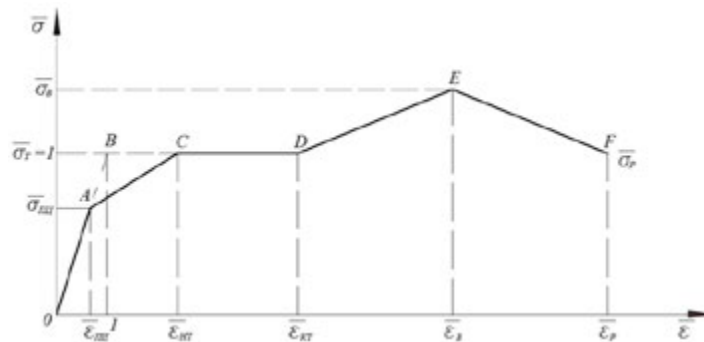


Figure 1 – Generalized calculation diagram of steel behavior.

One of the features of the strength resistance of steel reinforced concrete structures is that steel often behaves under the conditions of volumetric stress state. This is typical for concrete filled steel tube columns with various cross-sectional shapes. Then the coordinates of the parametric points of the generalized deformation diagram must be assumed with consideration of such a state.

Definition of the coordinates is based on the following preconditions. The strength resistance of a short centrally compressed element is considered. Stress strain state is accepted under the assumption that steel behaves like an isotropic body.

The following basic preconditions and assumptions are accepted:

1. There is short-term load on the element;
2. Relation between stresses and strains is written in the form of generalized Hooke’s law, but with variable values of the deformation modulus and the coefficients of transverse deformations;
3. The normals of principal planes for all stages of loading, including the limit state, are considered to be coincident with the

geometric axes of symmetry of centrally compressed concrete filled steel tube element. This is confirmed by the analysis of the experimental data obtained from the study of strength resistance of concrete filled steel tube columns (Krishan A.L. et al. 2014; Krishan A.L. et al. 2016; Storozhenko L.I. et al. 1991);

4. When yielding of metal takes place, the value of stress intensity is considered to be constant, and the relation of principal stresses obeys the Genki-Mises condition.

Taking into account the accepted assumptions, the dependencies between strains and stresses for any point of the external steel shell of concrete filled steel tube column of circular cross-section in the elastic and elastic-plastic stages are written in the following form:

$$\begin{Bmatrix} \varepsilon_{pz} \\ \varepsilon_{pt} \\ \varepsilon_{pr} \end{Bmatrix} = \frac{1}{\nu_p E_{s,p}} \times \begin{bmatrix} 1 & -\nu_p & -\nu_p \\ -\nu_p & 1 & -\nu_p \\ -\nu_p & -\nu_p & 1 \end{bmatrix} \times \begin{Bmatrix} \sigma_{pz} \\ \sigma_{pt} \\ \sigma_{pr} \end{Bmatrix}. \quad (1)$$

In system (1), σ_{pz} , σ_{pt} , σ_{pr} are the normal (principal) stresses in the tube in the axial, circumferential and radial directions; ε_{pz} , ε_{pt} , ε_{pr} are the relative strains of the steel shell in the corresponding directions; $E_{s,p}$ is the initial modulus of elasticity of steel; ν_p is the coefficient of elasticity of steel; ν_p is the coefficient of transverse strain of the tube steel.

Next, the well-known A.A. Ilyushin's single curve hypothesis (Ilyushin A.A. 1948) is used, according to which the relation between stresses and strains «s – e» obtained under uniaxial tension is considered to be applicable to any stress state. In this case the current stresses σ and strains ε are replaced by the current stresses intensity σ_{pi} and the strain intensity ε_{pi} respectively for the steel that is under the conditions of complex stress state.

Then, when simulating the behavior of steel sections that are under the conditions of complex stress state, it is reasonable to use

the calculating deformation diagram in the following generalized parameters $\bar{\sigma}_{pi} = \sigma_{pi}/R_y$ and $\bar{\varepsilon}_{pi} = \varepsilon_{pi}E/R_y$. This diagram is presented in figure 2 using designations established by European regulations.

When considering stresses and strains arising across the principal planes of the calculated steel section (for which tangential stresses and shear strains are zero), the expressions for the intensity of stresses and strains are written in the following form:

$$\sigma_{pi} = \frac{\sqrt{2}}{2} \sqrt{(\sigma_{pz} - \sigma_{pt})^2 + (\sigma_{pt} - \sigma_{pr})^2 + (\sigma_{pr} - \sigma_{pz})^2}; \quad (2)$$

$$\varepsilon_{pi} = \frac{\sqrt{2}}{3} \sqrt{(\varepsilon_{pz} - \varepsilon_{pt})^2 + (\varepsilon_{pt} - \varepsilon_{pr})^2 + (\varepsilon_{pr} - \varepsilon_{pz})^2}. \quad (3)$$

When $\sigma_{py} = \sigma_{px} = 0$ the stress intensity is $\sigma_{pi} = \sigma_{py}$, and the strain intensity is

$$\varepsilon_{pi} = \frac{2(1+\nu_p)}{3} \varepsilon_p, \quad (4)$$

where ν_p is the coefficient of transverse strain of steel.

Consequently, the slope of the OA section of three-linear deformation diagram in the axes $\bar{\sigma}_{pi} - \bar{\varepsilon}_{pi}$ becomes higher in comparison with the analogous section of the diagram in Figure 1. When $\nu_p \approx 0,3$, such exceedance is about 15% in the plastic stage of steel behavior. Therefore, starting from the point C, the coordinates of considered generalized diagrams can be accepted to be equal.

Thus, the values of the coordinates of the parametric points of the generalized deformation diagram of steel, behaving under the conditions of complex stress state, can be taken from Table 2 and Figure 2. Since the post-yield behavior of steel is not taken into account in the practical evaluation of the strength resistance of load-bearing steel reinforced concrete structures, the diagram limited by D point is used in the calculations. The data in Table 2 show that the limit of elastic behavior $\bar{\sigma}_{el,p}$ increases when there is the transition from relative stresses $\bar{\sigma}_{el,p}$ to relative stresses intensity $\bar{\sigma}_{pi}$. As a result, the original three-linear diagram is modernized into a two-linear one for S390 and higher steel classes.

3. Discussion

the fact of introducing the generalized calculation diagram of steel behavior in the refined form (in comparison with the more simplified Prandtl diagram) must be regarded as positive. The behavior of uniaxially stressed steel in the section of the diagram between the elastic behavior limit and the beginning of yielding (points A and C) is substantially refined for the deformation

calculation. When carrying out the calculations of structures where concrete and steel behave under volumetric stress state conditions the advantages of using these diagrams become even more significant. In such constructions the stress state of the materials is largely dependent on the lateral pressure of the steel on the concrete. The value and sign of this pressure is mainly determined by the relation between the coefficients of transverse strains of concrete ν_b and steel ν_p .

Table 2 – Coordinates of the parametric points of the generalized steel deformation diagram constructed in the axes $\bar{\sigma}_{pi}$ - $\bar{\epsilon}_{pi}$.

	Steel classes according to the set of rules SP 16.13330.2011					
	C245, C255	C285	C345, C345K, C375	C390	C440	C590, C590K
$\bar{\epsilon}_{el}$	0,80	0,80	0,80	0,90	0,90	0,90
$\bar{\sigma}_{elp}$	0,92	0,92	0,92	1,00	1,00	1,00
$\bar{\epsilon}_{op}$	1,70	1,70	1,70	1,70	1,70	1,70
$\bar{\sigma}_{yp}$	1,00	1,00	1,00	1,00	1,00	1,00
$\bar{\epsilon}_{2p}$	14,0	15,0	16,0	17,0	17,0	18,0

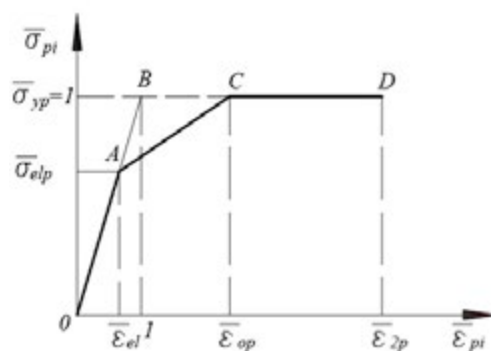


Figure 2 – Generalized calculation diagram of steel, behaving under the conditions of complex stress state.

For example, in centrally compressed elements when $\nu_b > \nu_p$ concrete behaves under the conditions of volumetric compression, and steel behaves under the conditions of compression-tension-compression. It is known that the coefficient of steel transverse strains starts to increase immediately after the end of its elastic behavior. Thus, the application of the refined deformation diagram of volumetrically stressed steel in the calculations (Figure 2) will allow to describe its behavior more accurately in terms of both quantity and quality. It results in the more reliable evaluation of the structure strength resistance.

4. Conclusion

The coordinates of the parametric points of the generalized deformation diagram of steel, behaving under the conditions of volumetric stress state, are obtained. The diagram is constructed in the axes “stress intensity - strain intensity”. It describes the behavior of S245 - S590 steel classes. The practical application of the deformation diagram can be realized when evaluating the strength resistance of steel reinforced concrete structures on the basis of the deformation model in the cases where shape steel is under the conditions of complex stress state.

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References

- Furlong, R.W. (1967) *Strength of steel encased concrete beam-columns* in Journal of the Structural Division, 1967, 93(5), pp.115–130;
- Liang Q.Q. et al. (2004) *Local buckling of steel plates in double skin composite panels under biaxial compression and shear* in Journal of Structural Engineering, ASCE, 2004, 130(3), pp. 443-451;
- Nishiyama I. et al. (2004) Summary of research on concrete-filled structural steel tube column system carried out under the US-JAPAN cooperative research program on composite and hybrid structures, Japan, 2002, 176 p;
- Patel V.I. et al. (2012) *High strength thin-walled rectangular concrete-filled tubular slender beam columns, part II: Behaviour* in Journal of Constructional Steel Research, 2012, 70, pp. 368-376;
- SP 266.1325800.2016. Steel reinforced concrete structures. Design rules. Ministry of Construction of Russia, 2016, 261 p;
- De Oliveira W.L.A. et al. (2009) *Influence of concrete strength and length/diameter on the axial capacity of CFT columns* in Journal of Constructional Steel Research, 2009, 65, pp. 2103-2110;
- Dundu M. (2012) *Compressive strength of circular concrete filled steel tube columns* in Thin-Walled Structures, 2012, 56, pp.62-70;
- Fattah A M (2012) *Behaviour of concrete columns under various confinement effects* (Kansas, USA: Kansas State University) p 399;
- Fujimoto T. et al. (2004) *Behavior of Eccentrically Loaded Concrete-Filled Steel Tubular Columns* in Journal of Structural Engineering, 2004, Vol.130, pp. 203-212;
- Han L.H. (2007) *Concrete filled steel tubular structures (Second edition)*. Beijing: China Science press, 2007, pp. 118;
- Saatcioglu M. and Razvi S.R. (1992) *Strength and ductility of confined concrete* in Journal of Structural Engineering, 1992, 118 (6), pp. 1590-1607.
- Tao Z. et al. (2008) *Design of concrete-filled steel tubular members according to the Australian Standard AS 5100 model and calibration* in Australian Journal of Structural Engineering, 2008, 8(3), pp.197-214.
- Tsuda K. et al. (2000) *Simplified Design Formula of Slender Concrete-Filled Steel Tubular Beam-Columns* in Proceedings, 6th ASCCS Conference on Composite and Hybrid Structures, Los Angeles, 2000, vol. 1, Pp. 379-396.
- Kotsovos M.D. (1980) *A mathematical model of the deformational behavior of concrete under generalized stresses based on fundamental material properties* in Journal of Material of Construction, 1980, 13, p. 289-298.
- Krishan A.L. (2008) *New approach to estimating the durability of compressed pipe-concrete columns* in Concrete Durability: Achievement and Enhancement: Proceedings of the 7th International Congress held at the University of Dundee, Scotland, UK on 8-10 July 2008, pp.143-151.
- Krishan A.L. and Troshkina E.A. (2014) *Estimation of carrying capacity of eccentrically compressed concrete-filled steel tube columns* in Electronic magazine "Advances of Environmental Biology". Vol. 8, N°6, May 2014, pp 1974-1977
- Krishan A.L. et al. (2014) *Concrete filled steel tube columns of circular, annular and square cross-section: Monograph*. – Magnitogorsk: Magnitogorsk. State. Tech. University named by G.I. Nosov, 2014, 209 p.
- Krishan A.L. et al. (2016) *Calculating and designing the concrete filled steel tube columns: monograph*. Saarbrücken, Deutschland: Palmarium Academic Publishing, 2016, 261 p.
- Storozhenko L.I. et al. (1991) *Calculation of concrete filled steel tube structures*, Kiev: Budivel'nik, 1991, 120 p.
- Ilyushin A.A. (1948) *Plasticity*, Moscow: State tech. publ., 1948, 376 p.

MODERN METHODS OF TECHNICAL SURVEY AND CALCULATION OF LOAD-BEARING REINFORCED CONCRETE STRUCTURES DURING THE BUILDINGS RECONSTRUCTION AND REORGANIZATION

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Abstract

In recent years, both Russian and foreign researchers have paid considerable attention to the problem of ensuring the reliability of building structures at all stages of their erection and operation, reconstruction, repair and reorganization. This is due to the growing need to ensure reliable operation of unique, expensive, historically significant structures, which dismantling and replacement are much more expensive than repair or it is impossible generally. Damage to reinforced concrete structures, as a rule, is associated with corrosion, overloading of individual elements and improper operation, design and production errors. In this article, the process of examining the reinforced concrete bearing structure of the building overlap for the possibility of its reconstruction and reorganization is considered in detail, as well as the design calculation based on computer modeling in the LIRA-CAD program.

Keywords: survey, reconstruction, reinforced concrete structures, calculation on limiting states, computer modelling

1. Introduction

The practicability of buildings and structures reconstruction and reorganization is determined by many factors, including: the architectural and historical significance of the object, urban planning problems, architectural and planning and organizational and technological solutions, environmental, social and economic issues, remoteness from urban vehicles and communications, availability of infrastructure. Each object of reconstruction is individual; it has operational characteristics differing from other buildings, as well as physical and moral wear. Therefore, before reconstruction, it is necessary to conduct a thorough organizational and technical training based on the data of technical diagnostics and examination of the actual state of the building structures using modern design calculation techniques based on computer modeling. In this article, the process of examining the reinforced concrete bearing structure of the building overlap for the possibility of its reconstruction and reorganization is considered in detail, as well as the design calculation based on computer modeling in the LIRA-CAD program.

2. Survey procedure. Researches of the materials properties

Before researches, the reinforcement position is determined in order to exclude the effect of metallic elements in the body of concrete on the instrument's reading.

3. Surveying of reinforcement and concrete

Reinforcement of load-bearing structures was determined by a non-destructive, electromagnetic method with the HILTI Ferroskan PS 200S device, and using pcontrol completions, to determine the reinforcement class (type of profile) and calibration of the device. According to the data, a statement is made with actual reinforcement compared with the project data. Control taps were made in the BB / 12 and C / 12 axes in order to clarify the reinforcement class and its diameter. According to the results of the survey, it is established that the reinforcement class A400 corresponds to the project, the diameter of reinforcing bars in the direction X in the upper support zone is 28 mm, which corresponds to the project for additional reinforcement.

The strength of concrete monolithic reinforced structures is determined by nondestructive methods. The measurements were performed by the ultrasonic method (the surface sounding method), using the "UK-1401" device. The principle of determining the concrete strength by ultrasonic method is based on the existence of a functional connection between the speed of propagation of ultrasonic vibrations and the strength of concrete. The ultrasonic method is used to determine the strength of concrete classes B7.5 - B40 (grades M100 - M450) for compression. The strength of concrete structures is determined experimentally using the calibration dependences of the "ultrasound propagation speed: concrete strength: $V = f(R)$ " or "propagation time of ultrasound t - concrete strength: $t = f(R)$ ". Statistical evaluation of the concrete strength using universal calibration dependences is not allowed. The approximate value of the conventional class of concrete is determined without statistical processing, taking it equal to 80% of the average strength of the concrete structure, site or group of structures,

but not more than the minimum specific value of concrete strength. The work includes cleaning the surface of structures, including removal of finishing layers, performing at least six measurements in each section in two directions, obtaining an average value and processing the results. According to the results of the ultrasonic measurement, it was found that the strength of the concrete slab in the surveyed areas varies from 32.1 to 41.5 MPa that corresponds to the concrete strength class for compressive strength B30 (the strength of the concrete overlapping in the project is B35). The strength of concrete columns in the surveyed areas varies from 34.2 to 40.0 MPa, that corresponds to the class of concrete for compressive strength B30 (the strength of concrete overlapping in the project is B45). According to the results of a visual inspection of the slab at -0.420 m (bottom of the slab) and at -0.120 m (the top of the slab), it is established that there are no distributed loads at -0.120 m, except for the weight of the slab and the weight of the partitions; at a mark -0.420 m to the slab cover fixes ventilation, pipelines of the sprinkler fire-extinguishing system, sewerage and other utilities, as well as sectional gates; on the upper surface of the plate near the column in the BB / 12 axes there is a single crack, with an opening 0.2-0.3 mm, a length of about 600 mm, parallel to the face of the column. The lower surface of the floor slab at -0.420 m is finished with textured plaster. There is no damage in the form of cracks in the plaster layer along the lower surface of the overlap in the axes C-BB / 11-13. It should be noted that in the areas outside the calculated zone, particularly in the middle of the span 10-11, there are cracks in the plaster texture layer. According to the results of the geodetic survey of the slab at -0.420 m (bottom of the slab) and at -0.120 m (the top of the slab), it was found that the maximum vertical deflection along the bottom surface of the slab in the span is 46 mm (relative to the mark in the support zone in the C / 13 axes -14). The maximum vertical deflection along the top surface of the plate in the span is 82 mm (relative to the mark in the support zone in the BB / 11 axes). Based on the results of the survey and the data obtained during the measurements the calculation was performed. The initial data for the verification calculation of the slab is the design documentation, the results of the survey of building structures, the architectural plan with the binding and the weight of the elements. A special feature of the computer modeling is the static calculation performed in the LIRA-SAPR software package 2015. As a result of preliminary estimation and verification of the variants in the project schemes, the element model consisting of rod elements and plates is adopted as the basic design model. The calculation was carried out in linear and nonlinear formulations.

4. Initial data for calculation

Load summary in the calculation zone is presented in Table 1.

Table 1 - Loads on the overlap at a mark -0.120.

N°	Loading name	Normative values (t / m ²)	The load reliability index γ_f	Rated loads (t / m ²)
1	2	3	4	5
1	<u>Dead load (g)</u>			
1.1	<u>Dead load</u> of reinforced concrete slab ($\delta=300$ mm; $\gamma=2.5$ t / m ²)	0.75	1.1	0.825
	Total dead load (g)	0.75	1.1	0.825
2	<u>Constant load (q)</u>			
2.1	Floor construction with screed	0.200	1.1	0.220
3.1	Loading from the premises	0.900	1.1	0.990
4.1	Suspended load	0.060	1.2	0.072
	Total constant load (q)	1.910	1.10	2.107
	Total full load ($g+q+_{vsh}$)	1.91	1.10	2.11
	Total full sustained load ($g+q+v_l$)	1.91	1.10	2.11

Load summary outside the calculation area is shown in Table 2.

Table 2 - Load summary outside the calculation area.

N°	Loading name	Normative values (t / m ²)	The load reliability index γ_f	Rated loads (t / m ²)
1	2	3	4	5
1	<u>Dead load (g)</u>			
1.1	<u>Dead load</u> of reinforced concrete slab ($\delta=300$ mm; $\gamma=2.5$ t / m ²)	0.75	1.1	0.825
	Total dead load (g)		1.1	0.825
2	<u>Constant load (q)</u>			
2.1	Floor construction with screed	0.200	1.2	0.240
	Total constant load (q)	0.950	1.12	1.065
3	<u>Temporary load</u>			
	Prolonged load (v_{L1})	0.140	1.20	0.168
	Short-term part of load	0.260	1.20	0.312
	Total temporary full load (v_{sh1})	0.40	1.20	0.48
	Total full load (g+q+vsh)	1.35	1.14	1.55
	Total full sustained load (g+q+v)	1.09	1.13	1.23

The load from the partitions is presented in Table 3.

Table 3 - The load from the partitions.

N°	Loading name	Normative values (t / m)	The load reliability index γ_f	Rated loads (t / m)
1	2	3	4	5
1	Foam block partitions t=200 mm	0.50	1.20	0.60

Load from the partitions is applied linearly due to the calculation scheme. The scheme of the calculation area is presented in Figure 1.



Figure 1 - The scheme of the calculation area.

The schemes of the bottom reinforcement along the digital axes (in X and Y) are shown in Figure 2. The reinforcement class is A400.

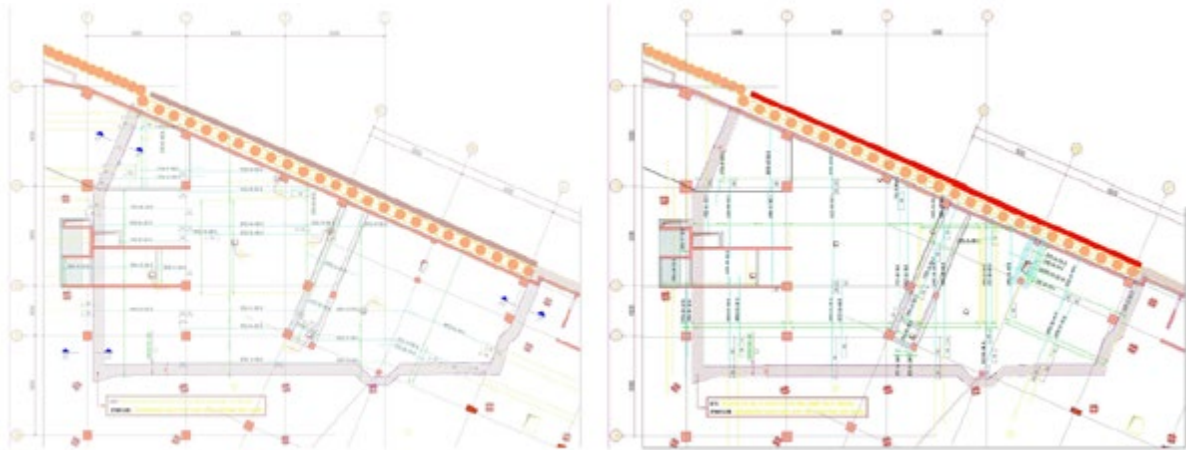


Figure 2 - The schemes of the bottom reinforcement along the digital axes (in X and Y)

The schemes of the upper reinforcement along the digital axes (in X and Y) are shown in Figure 3. The reinforcement class is A400.

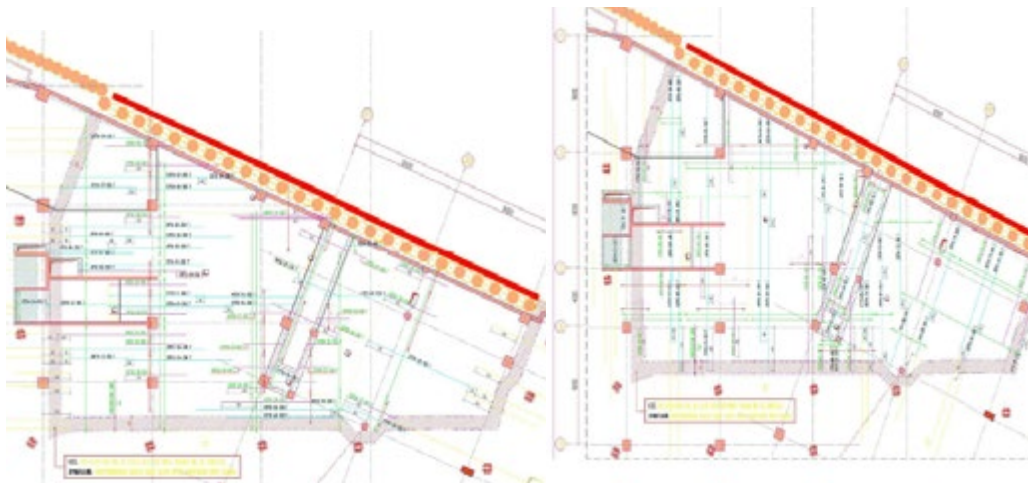


Figure 3 - The schemes of the upper reinforcement along the digital axes (in X and Y)

The scheme of the web reinforcement is shown in Figure 4. General view of the calculation model is shown in Figure 4. The reinforcement class is A400.

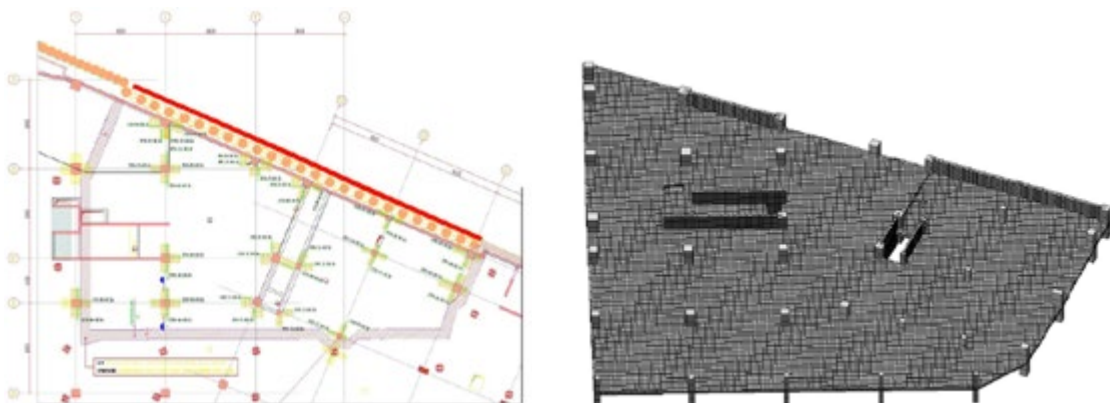


Figure 4 - The scheme of the web reinforcement and the general form of calculation scheme

The thickness of the slab is 300 mm, in the axes P-C / 13-14 the thickness is 350 mm without beams and capitals. The size of the columns section is 800x800.

5. Calculation results

The cross-sectional areas of the bottom reinforcement along the digital axes (in X and Y) per linear meter of the slab at -0.120 are shown in Figure 5. The reinforcement class is A400.

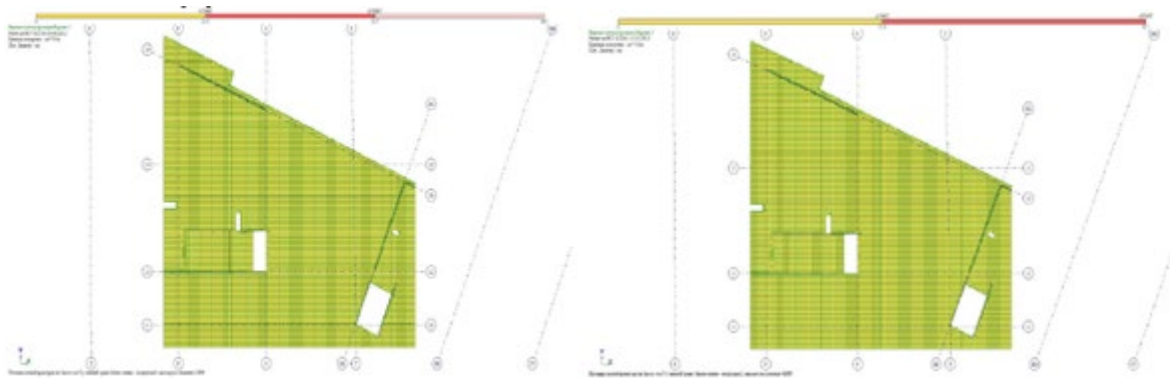


Figure 5 - The cross-sectional areas of the bottom reinforcement along the digital axes (in X)

The cross-sectional area of the bottom reinforcement according to X per linear meter of reinforced concrete slab is according to the documentation data is 32.70 cm². The maximum required area is 14.2 cm². Based on the data obtained, it can be concluded that the bearing capacity of the slab in the direction of X is sufficient. The cross-sectional area of the bottom reinforcement according to Y per linear meter of reinforced concrete slab is according to the documentation data is 32.70 cm². The maximum required area is 13.8 cm². Based on the data obtained, it can be concluded that the bearing capacity of the slab in the direction of Y is sufficient. The cross-sectional areas of the upper reinforcement along the digital axes (in X and Y) per linear meter of the slab at -0.120 are shown in Figure 6.

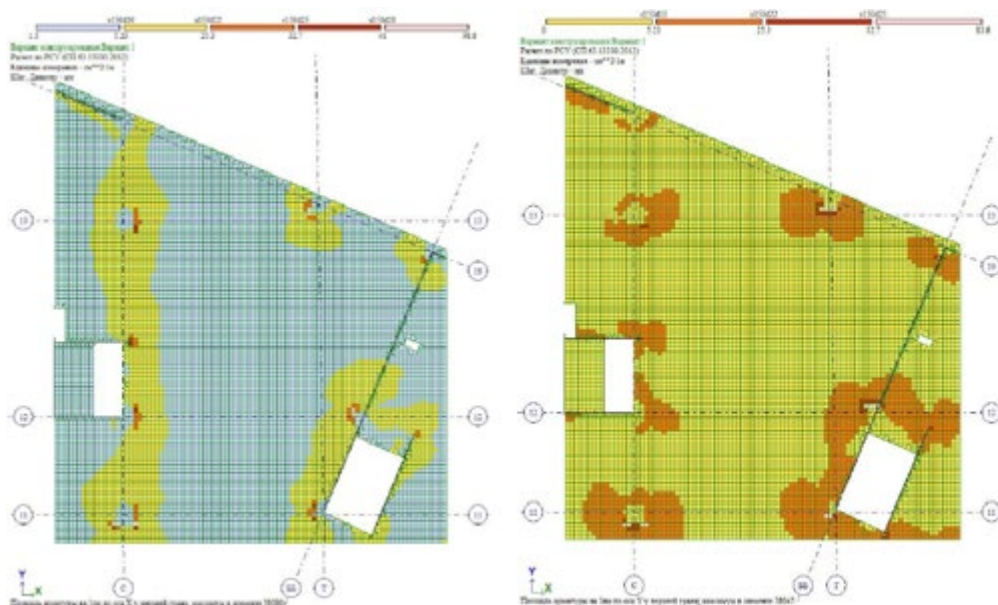


Figure 6 - The cross-sectional area of the upper reinforcement along the digital axes (in X)

The cross-sectional area of the upper reinforcement according to X per linear meter of reinforced concrete slab is according to the documentation data is 32.70 cm². The maximum required area is 47.0 cm². Based on the data obtained, it can be concluded that the bearing capacity of the slab in the direction of X is not sufficient. The cross-sectional area of the upper reinforcement in Y per linear meter of the reinforced concrete slab in the allocated zone, according to the documentation data, is 35.85 cm². The actual cross-sectional area of the upper reinforcement in Y per linear meter of reinforced concrete slab in the allocated

zone, according to the survey, is 24.50 cm². The required area is 36.00 cm². Based on the obtained data, it can be concluded that the bearing capacity of the slab in the direction of Y is not sufficient. Fragment of the zone with reinforcement lack and the vertical displacement (deflection) of the slab at -0.120 from the standard long-term loads, obtained as a result of non-linear calculation are presented in Figure 7.

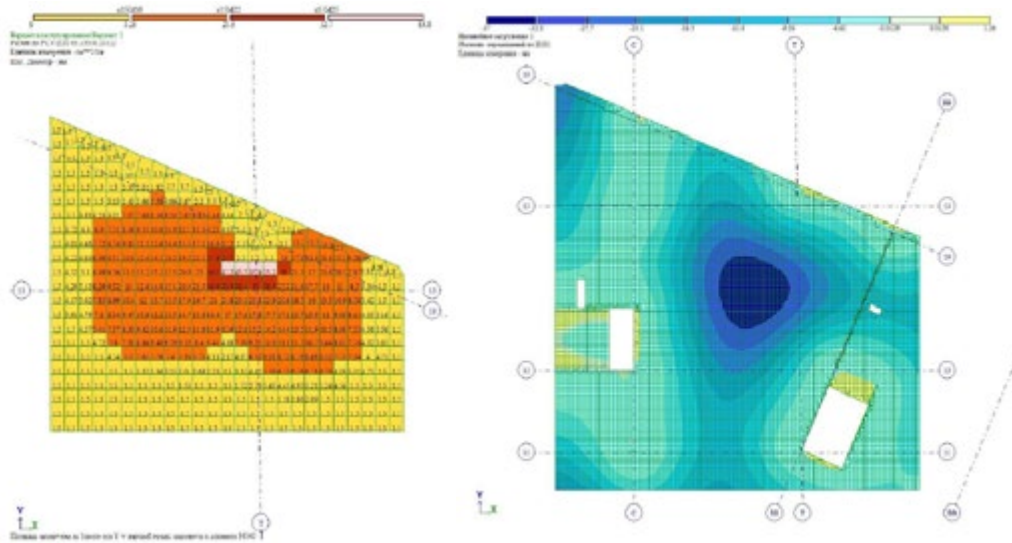


Figure 7 - Fragment of the zone with a lack of reinforcement and the vertical displacement of the slab

The maximum deflection at full load is 30 mm with a span of 10 m, which is less than the limiting limit of 40 mm.

6. Conclusions

The strength of the slab is not provided for pressing in the slab in the column area in the T/ 13 and C/11 axes and in normal sections in the support zone of the slab on the column in the axes T/13, C/12, T/11, C/12-13, T/11, BB/12. Carrying out of works on reconstruction and adaptation requires measures to ensure the strength of bearing structures. Structures rigidity is ensured. For joints in the C/12, T/11, C/12-13 axes, there are two possible ways to provide load-bearing capacity. The first way is reducing the load by replacing the concrete screed with light adjustable floors (up to 50 kg / m² in weight) in the axes 11-13 / C-U, and also limit the time load in these axes to 200 kg / m² (200 kg / m²) - the normative temporary load on the floor according to SP 20.13330.2011 "Loads and impacts", perform the strengthening, for example, using composite materials. For column joints in the C/11, T/13, BB/12 axes, adjusting loads up to a weight reduction and a temporary load of 50% does not lead the joints to a safe state, it is necessary to perform the strengthening. Due to calculations it is turned out that some of the columns joints that are outside the influence zone (for example, P/10, P/11, C/10 at -0,120), the forces from the design loads significantly exceed the forces that cause overvoltage in the joints in the calculated zone, while there is no provision for any additional reinforcements for punching (reinforcement, capitals) for these joints. In this regard, it is recommended to conduct sample surveys and verification calculations in other areas of the building in order to determine the sufficiency of the decisions taken to ensure the mechanical safety of the building or measures to ensure it.

References

- Antoshkin V D, Erofeev V T, Travush V I, Rimshin V I and Kurbatov V L (2015) The problem optimization triangular geometric line field *Modern Applied Science* N° 9 N° 3 pp 46-50
- Erofeev V T, Bogatov A D, Bogatova S N, Smirnov V F, Rimshin V I and Kurbatov V L (2015) Bioresistant building composites on the basis of glass wastes *Biosciences Biotechnology Research Asia* N° 12 N° 1 PP 661-669
- Bazhenov Y M, Erofeev V T, Rimshin V I, Markov S V and Kurbatov V L (2016) Changes in the topology of a concrete porous space in interactions with the external medium *Engineering Solid Mechanics* N° 4 pp 219-225+
- Erofeev V, Karpushin S, Rodin A, Tretiakov I, Kalashnikov V, Moroz M, Smirnov V, Smirnova O, Rimshin V and Matvievskiy A (2016) Physical and mechanical properties of the cement stone based on biocidal portland cement with active mineral additive *Solid State Phenomena* T 871 pp 28-32

- Erofeev V T, Zavalishin E V, Rimshin V I, Kurbatov V L and Mosakov B S (2016) Frame composites based on soluble glass *Research Journal of Pharmaceutical, Biological and Chemical Sciences* T 7 N° 3 pp 2506-2517
- Cherkas A., Rimshin V. (2017) Application of composite reinforcement for modernization of buildings and structures. *MATEC Web of Conferences* Editors: S. Jemioło, A. Zbiciak, M. Mitew-Czajewska, M. Krzemiński and M. Gajewski. 2017. C. 00027.
- Rimshin VI, Valievich DM (2017) Scientific substantiation of measures to strengthen building structures during the reconstruction and modification of the functional purpose of buildings. *Science and Innovations in Construction (to the 45th anniversary of the Department of Construction and Municipal Economy): a collection of reports of the International Scientific and Practical Conference. Belgorod State Technological University. V.G. Shukhov. 2017. P. 25-29.*
- Rimshin VI, Kuzina ES, Filkova NV (2017) Methods of technical examination of the walls of an apartment building in the city of Moscow for events during the overhaul. *Bulletin of the Belgorod State Technological University. V.G. Shukhov. 2017. No. 8. P. 47-51*
- Korotaev S.A., Kalashnikov V.I., Rimshin V.I., Erofeeva I.V., Kurbatov V.L. (2016) The impact of mineral aggregates on the thermal conductivity of cement composites *Ecology, Environment and Conservation*. 2016. T. 22. N° 3. C. 1159-1164.
- Erofeev V., Karpushin S., Rodin A., Tretiakov I., Kalashnikov V., Moroz M., Smirnov V., Smirnova O., Rimshin V., Matvievskiy A. (2016) Physical and mechanical properties of the cement stone based on biocidal portland cement with active mineral additive. *Materials Science Forum*. 2016. T. 871. C. 28-32.
- Krishan A.L., Troshkina E.A., Rimshin V.I., Rahmanov V.A., Kurbatov V.L. (2016) Load-bearing capacity of short concrete-filled steel tube columns of circular cross section *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 2016. T. 7. N° 3. C. 2518-2529.
- Bazhenov Y.M., Erofeev V.T., Rimshin V.I., Markov S.V., Kurbatov V.L. (2016) Changes in the topology of a concrete porous space in interactions with the external medium. *Engineering Solid Mechanics*. 2016. T. 4. N° 4. C. 219-225.
- Kuzina E., Rimshin V. (2018) Deformation Monitoring of Road Transport Structures and Facilities Using Engineering and Geodetic Techniques. In: Murgul V., Popovic Z. (eds) *International Scientific Conference Energy Management of Municipal Transportation Facilities and Transport EMMFT 2017*. EMMFT 2017. Advances in Intelligent Systems and Computing, vol 692. Springer, Cham

INTEGRATION OF CULTURAL HERITAGE OBJECTS WITH THE URBAN ENVIRONMENT OF THE HISTORIC CITY CENTER

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Abstract

Preservation of architectural heritage concentrated in historical city centers cannot be achieved only by restoring cultural heritage sites; it is important to develop an approach to managing changes aimed at creating an integrated historical urban environment. In the paper, the problem of creating an integrated urban environment of a historical city center is considered from the perspective of a system-structural approach. The analysis has resulted in the formulation of functional, social, environmental and phenomenological indicators, forming a system of integration layers. Given the restoration of cultural heritage objects, the developed scenarios for transforming the historical urban environment will create an integrated space in the architectural, spatial and temporal development

Keywords: historical urban environment; cultural heritage object; integration; environment transformation scenarios; public space; restoration.

1. Introduction

Preservation of cultural heritage as part of the urban historical environment is inextricably linked to the need to create new functional approaches that are in line with the changing needs of society and integrated with the city development strategies [Ikonnikov, 2006]

Practical approaches to the preservation of the heritage are based on two different principles: the preservation of the authentic physical environment as the image of the object [Ruskin, 2006]; restoration of the object in perfect condition - a stylistic restoration using Viöle-le-Djuk's principles [Viöle-le-Djuk, 2003].

The concept of the historical urban landscape as a way of preserving and managing the heritage of historic cities is reflected in the Vienna Memorandum and the UNESCO Declaration on the Preservation of Historic Urban Landscapes adopted on its basis [Vienna Memorandum, 2005; UNESCO Recommendations Paris, 2011]. The urban historical environment is considered as a collection of physical objects (buildings, structures, sculptural and architectural forms), open spaces, images as elements of individual perception of the open space filled with physical objects [NITIAG, 2010].

The natural development of the historical urban environment implies the coexistence of objects that appeared at different times, the process of constant changes of elements of buildings and ensembles, the combination of different historical layers, different models of spatial structure. Urban systems formed by layering historical transformations and additions, acquire new properties, creating the unity of perception and multilayered image in the space-time aspect. The concepts of "spirit of place", "sense of identity" (*genius loci phenomenon*) reflect the perception of the old urban environment as an "imagination" landscape, as the result of interactions of individual and collective perceptions, relationships, descriptions, memories and images superimposed on the physical substance of a historically valuable place in the context of historical time and space [Ivanov, 2008].

The preservation of the historical center environment becomes possible only through transformation, which implies the improvement of the existing environment in line with the contemporary social, cultural, economic, ecological needs of society [Valletta's Principles, 2011].

The urgency of creating an integrated urban environment of the historic center is becoming increasingly important for areas with a predominance of valuable historical prototypical buildings, the principles of preserving the integrity and historical identity of which need to be explored.

2. Materials and Methods

The problem of creating an integrated urban environment of the historical center is considered from the perspective of the system-structural approach. The urban historical environment is seen as a system of architectural spaces consisting of individual components, as well as relations, links, indicators. When developing an integration strategy, the system of natural and artificial layers of integration has been used.

3. Results

The problems of integration of cultural heritage objects with the urban environment of the city historical center are explored using the example of the city of Tambov. The city has areas with different types of buildings, including historical ones with varying

degrees of preservation, central areas with preserved cultural heritage objects (CHOs) surrounded by modern structures.

The city of Tambov, founded in 1936, by the middle of the 19th century had had a regular plan with an orderly structure, with the correct blocks of houses and straight streets designed according to the functional zoning principles. By the beginning of the 20th century, in the central part of the city there had been regular lines of 3-4-storey buildings forming a continuous “front” with passages to the inner courtyards [Ledeneva, 2003]. In the process of creating the new master plan of 1903-1912, there was a trend to divide urban areas in accordance with the architectural qualities of the building. In the city center, along with the cult buildings, there were rental houses, offices, clubs, banks, educational institutions, municipal institutions, private theaters, while small industrial enterprises were located on the outskirts. In the most prestigious central streets of the city, there were buildings designed by unique architectural solutions, ranging in style from eclectic to art nouveau and historicism. The center of the city was a densely built-up area with several remarkable buildings, which later became monuments of history and architecture.

At the moment, the urban environment of the city’s historical center has a multi-typological structure, with a diverse morphology of built-up environment, given the demolition of old buildings and the construction of new ones, heterogeneous stylistics, and various degrees of social activity.

As a social and spatial phenomenon, the city center can be viewed from different perspectives: residents’ point of view (vernacular part), urban professionals’ identification (saturation with socio-functional processes), architects’ view (visible composition and environment structure as the best model) [Gashenko, 2016].

The historical center of the city as a vernacular part occupies the largest area, encompassing areas that do not currently have a single preserved architectural monument, but in some representations, they do not cover the areas where the city originated (Fig. 1a).

Understanding the essence of the city center as a concentration of socio-functional processes leads to the allocation of the structure of streets, squares, public gardens where the greatest activity of residents occurs. The center is not seen as a single configuration, but it represents a set of separate centers of activity.

The center has the greatest semantic context as a sample of the architectural and compositional structure of historical built-up areas. Assessing the quality of the architectural environment of historical areas is often based on the construction principles related to Renaissance and classicism architectural forms. At the same time, the significance of the object environment and the stylistics of individual buildings is considered from the perspective of social activity (activity vs. oblivion). Also the dominant style of typological buildings, for example, merchant’s houses, rental houses (Fig. 1b) is not taken into account.



Figure 1 - The historical center of the city (Tambov):

a – vernacular area; b – compositional and spatial structure with architectural and town-planning dominants and spheres of their influence

The urban environment of the historical center can be viewed as a system of space components in accordance with its state, types of activity and work for its maintenance: urban (small network of streets), architectural (quality of architectural solutions and materials used), environmental (design elements of the urban environment and level of improvement) [Gashenko, 2016].

The key point when considering ways of transforming the urban environment of the historical center is to preserve its integrity as an identity, as well as to keep the integrity of visual organization principles [Grebinkina and Kuznetsova, 2017]. Due to the multi-typological structure of the historical buildings of Tambov city and the evolutionary nature of the layers in its urban environment, the integrity indicators are less pronounced, but the urban fabric has semantic integrity.

For consideration of urban built-up areas from the perspective of its integrity, a site in the historical part of the city with the most fully preserved front of architectural monuments - CHOs and typological buildings of rental and merchant houses in the area of the market area - was selected for the research (Fig. 2). For this locally holistic urban area, the following integrity indicators can be identified: architectural, stylistic, functional and semantic [Gasenko, 2016].

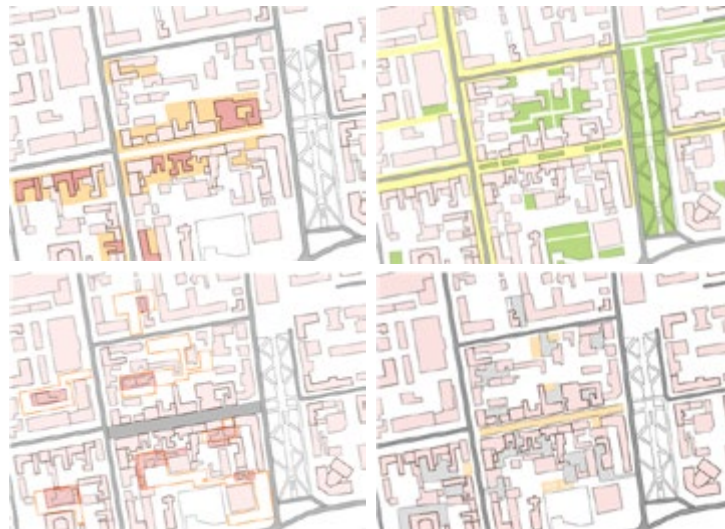
4. Discussion

The practice of integrating the architectural heritage with the historical environment of the city implies the development of guidelines for the preservation and development of the center in the considered area of Tambov city, taking into account the restoration of the CHOs, creating a system of permissible interventions to ensure the preservation of the historical integrity of the area. The integration process includes a mechanism for organizing the participation and interaction of the city administration, the local community of residents, architects, historians, entrepreneurs and creative communities.



Figure 2 - The remarkable architectural buildings in the historic center of the city of Tambov:

■ CHOs; ■ typological buildings



Implementation of integration strategies is presented in the form of a continuous process, by mastering the layers of integration. The integration layer is understood as the implementation of a certain project intervention: restoration work, additions or demolitions, improvements, changing infrastructure, lighting, and functioning modes (Fig. 3). Particular attention is given to the sequence of integration layers: from the micro-level of perception (street advertising, small architectural forms, lighting) to a large-scale level (new construction, demolition, infrastructure); and this sequence may be different depending on the town-planning parameters of historical area, the degree of preservation of the urban environment and individual buildings, the existing way of functioning, etc. The stage of intervention should be replaced with the stage of natural transformation, which involves the process of adopting and acquiring the results of transformation, creating new links and modes of functioning and communications.

The developed scenarios for the transformation of the historical and town-planning environment, taking into account the restoration of cultural heritage sites, will help to maintain the integrity of both the local town-planning development of the historic center and to create an integrated space in the architectural, town-planning and temporal context.

References

Ikonnikov A.V. Prostranstvo i forma v arhitekture i gradostroitel'stve [Space and form in architecture and urban planning]. M.: KomKniga, 2006. 352 p. (in Russian)

Rjoskin D. Lekcii ob iskusstve [Lectures on art]. – M., 2006. – 319 s. (in Russian)

Viole-le-Djuk, Je. Je. Zhizn' i razvlechenija v srednie veka [Life and entertainment in the Middle Ages]/ Je. Je. Viole-le-Djuk; translated from French by M.Ju. Nekrasov. – SPb.: Evrazija, 2003.

Vienna Memorandum on “World Heritage and Contemporary Architecture – Managing the Historic Urban Landscape Available at: <http://whc.unesco.org/en/documents/5965> (Accessed 10.10.2017)

UNESCO Recommendations on Historic Urban Landscape of 18 August 2011 (Paris, 2011) Available at: <http://unesdoc.unesco.org/images/0021/002110/211094r.pdf> (Accessed 10.10.2017)

Metodicheskie rekomendacii ocenki istoriko-kul'turnoj cennosti poselenija i primenenija kriteriev istoriko-kul'turnoj cennosti poselenija v ocenke nedvizhimosti, raspolozhennoj v granicah istoricheskogo poselenija, s cell'ju ustanovlenija investicionnoj privlekatel'nosti [Methodological recommendations on evaluating the historical and cultural value of the settlement and applying the criteria of the historical and cultural value of the settlement in the assessment of real estate located within the boundaries of a historical settlement to justify the investment attractiveness]/ Nauch.-issled. in-t teorii i istorii arhitektury i gradostr-va Ros. akad. arhitektury i stroit. nauk (NIITIAG RAASN). – Sankt-Peterburg ; Moskva : Zodchij, 2010. – 69 s. (in Russian)

Ivanov A.V. Sohranit' nevidimoe? Duh mesta i arhitekturnaja jetika (sluchaj Icheri Sheher, Baku) [Save the invisible? The spirit of the place and architectural ethics (the case of Icheri Sheher, Baku)] // Vestnik Evrazii N°1. 2008 Izd-vo Avtonomnaja nekommercheskaja organizacija "Obrazovatel'no-issledovatel'skij i izdatel'skij centr "Vestnik Evrazii" S. 203-241. Available at: <https://elibrary.ru/item.asp?id=11839067> (in Russian)

Principy Valletty po sohraneniju i upravleniju istoricheskimi gorodami i urbanizirovannymi territorijami. [Valletta's Principles for the Preservation and Management of Historic Cities and Urban Areas]. 2011 – Available at: <http://www.ecovast.ru/images/2012/Valletta.pdf> (in Russian)

Ledeneva G.L. Grazhdanskaja arhitektura rossijskoj provincii konca XIX – nachala XX stoletij (na primere zastrojki g. Tambova): Ucheb. Posobie [Civil architecture of the Russian province of the late XIX - early XX centuries (for example, building Tambov): textbook]. Tambov: Izd-vo Tamb. gos. tehn. un-ta, 2003. 80 s. (in Russian)

Gashenko A.E. Semantika celostnosti arhitekturno-gradostroitel'noj morfologii gorodskogo centra [Semantics of Integrity of Urban Center Architecture and Urban Planning Morphology]// PRAKSEMA. Problemy vizual'noj semiotiki Tomskij gosudarstvennyj pedagogicheskij universitet Tomsk: 2 (8) God: 2016 S. 82-96. (in Russian)

Grebenkina E.V., Kuznecova N.V. Obosnovanie modeli processa formirovanija integracionnyh prostranstv slozhivshejsja gorodskoj zastrojki [Substantiation of the model of the process of formation of integration spaces of the existing urban area] // Tvorchestvo i sovremennost' / Novosibirskij gosudarstvennyj universitet arhitektury, dizajna i iskusstv. – Novosibirsk, 2017. – N°1(2). – S. 63-70. (in Russian)

SCIENTIFIC AND TECHNOLOGICAL BASES OF PRODUCTION OF BIOPOSITIVE BUILDING MATERIALS BASED ON LIME AND CARBON DIOXIDE FOR THE PRESERVATION OF HISTORICAL AND ARCHITECTURAL HERITAGE

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Abstract

It is shown that materials and products based on the lime of carbonate hardening in composition, structure and properties are similar to the original materials used in the construction of objects that represent the historical and architectural heritage today and are the most suitable for their use in restoration and renovation works. The results of experimental studies on the determination of the optimum carbon dioxide content in artificially created carbonization media and the patterns of formation of the structure and properties of calcareous and calcareous-carbonate-calcium systems of carbonate hardening are presented. The main principles of resource-saving and non-waste technologies for the production of biopositive building materials and products of forced carbonate hardening are determined.

Keywords: biopositive building materials, lime, limestone, carbon dioxide, carbonate hardening, carbonate technology

1. Introduction

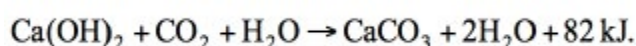
1.1. Problem statement

Preservation of the historical and architectural heritage and its transfer to new generations is one of the most important tasks of restoration, which is a complex activity reflecting the activity of society and modern culture in relation to the heritage (Moskvina 2016). The methods of restoration in the 20th – 21st centuries have undergone significant changes in terms of ideology and attitude to the preservation of cultural heritage. From the theory of the ‘critical restoration’ of Cesare Brandi (Brandi 2011), which preaches the approaches of physical restoration of monuments and the reconstruction of lost artifacts of culture, to the theory of conservation, rejecting any kinds of stylistic imitation of the real object, enshrined in the ‘Venice Charter’ and the Nark Authenticity Document (Restoration of Monuments of History ... 2008). At the present stage of development of the society, the tendency of Paolo Marconi (Blasetti 2014) prevails, suggesting the restoration of the missing parts of the heritage site with the maximum preservation of its authenticity. A significant aspect in this case is the use of building materials and products that repeat or are maximally similar in composition, structure and properties to the original materials. It is important that these materials and products are environmentally friendly, do not violate the balance of natural processes, contribute to the creation and preservation of an enabling habitat, i.e. were biopositive.

1.2. Analysis of achievements and publications

The material, which contains the potential for the development of such materials and technologies for their production, is lime. Considering the fact that the ancient structures are usually made up of natural or artificial ceramic stones bonded with lime mortar (Ikonnikov 1972), lime-based materials and products are the most suitable for their use in restoration and renovation works.

The basis of lime is portlandite ($\text{Ca}(\text{OH})_2$), which in the composition of solutions absorbs carbon dioxide and carbonizes under its influence, turning into calcite stone (CaCO_3). As a result, the mechanical properties and structure of the material are improved (Zalmanoff 1956). Carbonation of portlandite is described by a general chemical equation:



The stage of carbonate hardening is long and takes years and decades. It can be accelerated by the forced carbonization of lime by organizing the hardening of lime-based materials and products in an environment with a high concentration of CO_2 , which can be created, for example, with furnace gases.

Recently, there has been a significant increase in interest in the issue of obtaining products through the artificial carbonization of various systems based on lime. The studies are mainly devoted to the study of the processes of carbonate hardening of lime due to CO_2 from atmospheric air (Despotou 2014, Kaliyavaradhan 2017). A number of works are devoted to the development of technological principles for obtaining various types of concrete products by treating them in a carbon dioxide environment. Forced carbonation is mainly considered as an additional hardening of products, which allows to significantly reduce the risk of carbonate corrosion in the material, and also as an effective way of sequestration of greenhouse gas – CO_2 .

Considering the artificial carbonate stone, obtained as a result of forced carbonization hardening of lime, as the basis of various conglomerates, it is worthwhile to pay attention to calcareous-carbonate-calcium systems, in which fine-dispersed waste of extraction of carbonate-calcium rocks (limestones, dolomites, marbles) can act as filler. The similarity of their crystal-chemical structure with portlandite and calcite newly formed as a result of artificial calcareous hardening of lime will make it possible to obtain a sufficiently strong artificial stone (Chernyshov et al. 2015). In addition, the carbonate-calcium filler can act as a 'substrate' for the oriented crystallization of the newly formed calcite on the surface of carbonate particles with the formation of contacts by the mechanism of epitaxy (Palatnik and Papirov 1971), i.e. it can be a component that actively influences the formation of calcareous-carbonate-calcium systems of carbonate hardening.

In connection with the foregoing, the purpose of this work is the development of the scientific and technological foundations for the production of biopositive building products of carbonate hardening on the basis of lime-containing compositions by experimentally establishing the optimal content of carbon dioxide in artificially created carbonized media and the patterns of formation of the structure and properties of lime-containing systems of carbonate hardening.

2. Materials and Methods of Research

Investigation of the structure formation and properties of calcareous and calcareous-carbonate-calcium systems was carried out on semi-dry compression cylinders, respectively, with a diameter and height of 0.03 and 0.05 m and prisms with a size of 0.04×0.04×0.16 m. The molded water content of the mixtures (W_s) varied from 5 to 25% by weight, the specific pressing pressure (P_0) was from 5 to 30 MPa.

The lime was a product of soft calcination of dense carbonate rock. The lime was characterized by the following properties: activity – 68%, quench time – 20 s, quench temperature – 370 K. For making prototypes, lime was quenched in a powder and dried at 373K to constant weight. Chemical analysis of lime is presented in Table 1.

Table 1 – Chemical composition of hydrated lime [% by weight]

SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	CaO	MgO	MnO	K ₂ O	Na ₂ O	P ₂ O ₅	SO ₃	CO ₂	H ₂ O ⁻	H ₂ O ⁺
2.07	1.21	0.39	<0.05	71.2	0.59	0.02	0.16	0.08	0.05	0.15	3.73	-	20.33

As a filler in the calcareous-carbonate-calcium compositions, stone-mining wastes of nummulite and marble-like limestones were used. Nummulite limestones consist of large shells of nummulites with detritus material between them; this is a partially recrystallized sedimentary dense and fairly strong rock. Marble-like limestone is a product of metamorphism and chemical differentiation of limestones. Basically it is represented by dense and strong massive species. The chemical analysis of limestones is shown in Table 2.

Table 2 – Chemical composition of limestones [% by weight]

Type of lime stone	SiO ₂	Fe ₂ O ₃	Al ₂ O ₃	CaO	MgO	SO ₃	Loss on ignition
Nummulitic	9.87	0.65	0.92	48.35	0.47	-	38.90
Marble-like	1.90	0.68	1.57	48.08	2.54	0.67	43.80

Carbonization of prototypes was carried out in a specially developed carbonization chamber with automatic control (Lyubomirskiy et al. 2007). Before the test, the prototypes were dried to constant weight at a temperature of 353 to 373 K. Chemical analysis of the raw material was carried out using X-ray fluorescence analysis on an Epsilon 3XLE ED spectrometer (PANalytical). The mineralogical composition was determined using a system of high-temperature synchronous TGA/DTA/DSC analysis of STA 8000 (Perkin Elmer). After the carbonization, the microstructure of the prototypes was studied with scanning and raster electron microscopes EVO MA 18, Zeiss and PEM-106, SELMI. Determination of the physico-mechanical characteristics of the prototypes was carried out on the automatic test system MCC8 (Controls).

3. Results and their Analysis

3.1. Structure and properties of calcareous samples

The effect of the concentration of CO₂ in gas-air environments on the hardening processes of lime was studied on 0.03 m diameter cylinder samples obtained by semi-dry pressing of lime-shoots with different initial water content. P_0 was 7.5 MPa, the

aging time in a carbon dioxide-air gas medium was 18,000 s. The experimental data are summarized in Table 3.

The data of Table 3 show that with an increase in the concentration of CO₂ in the carbonization chamber up to 50% the values of compressive strength and water resistance of prototypes increase, and the water absorption decreases. An increase in the CO₂ concentration above 70% degrades the properties of the carbonized material with an increased initial water content (15 and 25% by weight), which is related to the onset of recrystallization of the material structure, i.e., dissolution (corrosion) of the crystals of the newly formed CaCO₃, if there is a sufficient amount of liquid phase in the system (Cizer et al. 2011). It is necessary to note the high water resistance of calcareous hardening samples (> 0,8), despite the significant water absorption, which indicates the strong water-insoluble bonds that form in the material as a result of its forced carbonization.

Estimating the experimental data obtained, it can definitely be ascertained that the optimum concentration of CO₂ in the gas-air mixture is in the range of 50 to 70%. Higher concentrations of CO₂ are undesirable because the properties of the artificial carbonate stone deteriorate.

Table 3 – Physical and mechanical properties of calcareous carbonized samples depending on the concentration of CO₂ and the initial mold water content

Concentration of CO ₂ , [%]	Initial water content of powdered lime (W _s), [% by weight]								
	5			15			25		
	compressive strength, [MPa]	water absorption, [% by weight]	water resistance	compressive strength, [MPa]	water absorption, [% by weight]	water resistance	compressive strength, [MPa]	water absorption, [% by weight]	water resistance
10	3.3	49.4	0.88	8.0	41.4	0.76	9.2	41.1	0.40
30	5.2	48.1	0.90	9.9	40.1	0.87	11.1	39.8	0.59
50	6.1	47.6	0.90	10.9	39.6	0.92	12.1	39.3	0.73
70	6.2	47.6	0.88	10.9	40.1	0.92	12.1	39.8	0.82
90	6.1	48.1	0.85	10.0	41.4	0.86	11.2	41.1	0.77

Table 4 presents the experimental data on the change in the compressive strength and average density of the experimental calcareous samples of semi-dry pressing cylinders that are subject to and are not subject to forced carbonization in the gas-air medium with a 50% CO₂ concentration for 3600s, depending on the pressing pressure and the initial water content of the powdered lime, which show that the artificial processing of calcareous samples with carbon dioxide increases the compressive strength relative to their molding strength by 4.0 to 4.5 times. And at an average density of samples of carbonate hardening of 1200 – 1300 kg/m³, the compressive strength is in the range of 12 to 30MPa. As a result of forced carbonization, prototypes become denser. On average, by 20 – 35%.

Table 4 – Properties of calcareous samples of semi-dry pressing after molding and carbonate hardening

P ₀ , [MPa]	W _s , [% by weight]	Indicators after molding		Indicators after carbonization	
		compressive strength, [MPa]	average density, [kg/m ³]	compressive strength, [MPa]	average density, [kg/m ³]
10	5	1.8	980	8.4	1115
	10	2.6	975	12.1	1220
	15	4.4	965	20.5	1230
	20	4.1	960	18.7	1270
	25	3.3	950	13.3	1250
20	5	4.7	1115	19.6	1295
	10	6.1	1100	25.7	1310
	15	7.3	1090	30.6	1340
	20	7.8	1075	27.6	1320
	25	7.8	1070	23.9	1300

Figure 1 shows the results of electron microscopic studies of the structure formation of the material of calcareous samples of semi-dry pressing in the process of forced carbonate hardening. The microstructure is modified and compacted due to the conversion of $\text{Ca}(\text{OH})_2$ to CaCO_3 . Thus, in the structure of the calcareous stone represented by calcium hydroxide laminated in the aggregates, after 60 s of aging in the CO_2 medium, various hydrated forms of CaCO_3 arise, from which small needle-shaped crystalline forms of calcite are then formed. After 3600 s of forced carbonization, the structure of the material consists mainly of CaCO_3 crystals of a scalenohedral shape measuring from 1.5 to 3.5 μm , with different optical orientations. In this case, the elements of tight junction of the crystals are observed to each other.

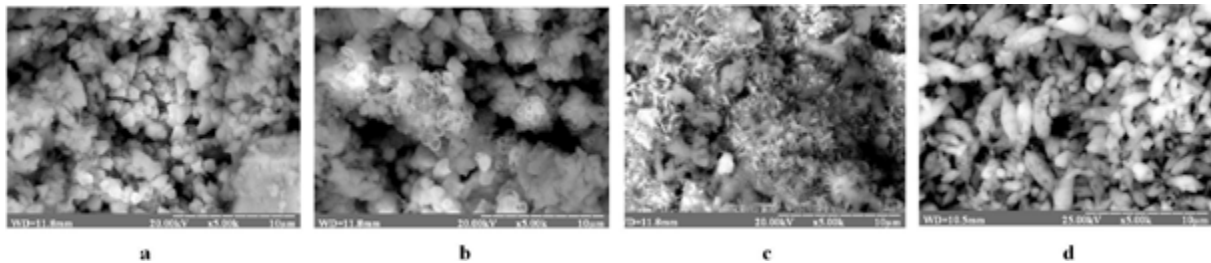


Figure 1 – Change in microstructure of calcareous samples (increase $\times 5000$) as a function of the time of forced carbonization, s: a – 0; b – 60; c – 600; d – 3600.

The structure of compulsorily carbonized calcareous samples stored for 12 months in normal air-dry conditions is characterized by a more dense packing of calcite crystals in the form of scalenohedra and rhombohedra with obvious signs of crystal fusion. The compressive strength of these samples increases by an average of 1.5 times and reaches values of 40 MPa.

3.2. Structure and properties of calcareous-carbonate-calcium samples

The introduction of limestone filler in the calcareous matrix has an active influence on the formation of the structure and properties of the artificial carbonate stone. In the presence of limestone impurities in calcareous stone under forced carbonization, the processes of $\text{Ca}(\text{OH})_2$ conversion into CaCO_3 (Lyubomirskiy and Fedorkin 2013) are accelerated, i.e. limestone particles act as a 'seed' for the formation of CaCO_3 crystals.

The structure of calc-limestone carbonate hardening samples is a dense packing of limestone particles and newly formed calcite crystals located in intergranular space (Figure 2). The photograph of the microstructure (Figure 2, c) shows that contact between the newly formed calcite crystals and limestone particles occurs.

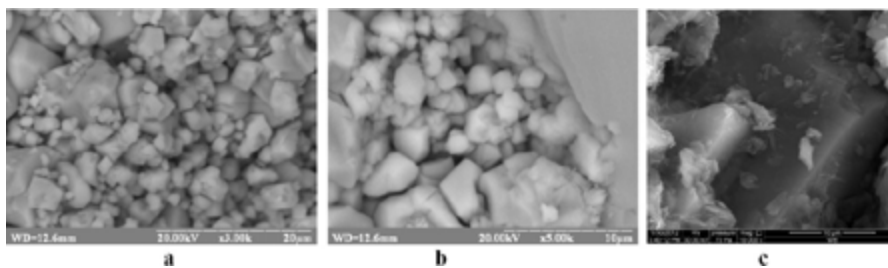


Figure 2 – Microstructure of calcareous-carbonate-calcium carbonized samples based on marble limestone: a – $\times 3,000$; b – $\times 5,000$; c – $\times 10,000$.

The high filling density of carbonate neoplasms between the interporous space between limestone particles, the formation of numerous bonds due to the junction and fusion contacts of newly formed calcite crystals with each other and limestone filler particles cause high physical and mechanical properties of the material of forced carbonate hardening. Table 5 presents the properties of calcareous-carbonate-calcium samples of semi-dry pressing, made from mixtures based on marble-shaped and nummulite limestones ($P_o = 30\text{MPa}$, $W_s = 7\%$ by weight), solidified in a gas-air medium with 50% CO_2 concentration, in for 3600 s in comparison with the properties of samples from natural nummulite limestone (rock).

As can be seen from Table 5, the properties of the artificial calcareous stone based on calcareous-carbonate-calcium compositions exceed the properties of natural limestone by all indices. It should be noted that the calc-limestone material of forced carbonate hardening for strength and deformation characteristics complies with the normative requirements of SN&P 2.03.01-84* for fine-grained cement concretes of group B.

Table 5 – Properties of calc-limestone compositions of carbonate hardening, depending on the type of limestone filler

Properties	Samples of carbonate hardening based on		Samples from nummulite limestone
	marble-like limestone	nummulite limestone	
Average property, [kg/m ³]	2050	2000	1960
Strength limit, [MPa] under compression	29.0	25.5	14.2
for bending tension	4.6	4.3	2.2
Prismatic strength, [MPa]	30.5	26.2	15.4
Elastic modulus, [MPa]	19000	16800	13175
Poisson's ration	0.17	0.22	0.3
Water absorption by weight, [%]	8.6	9.4	14.2
Water resistance	0.85	0.82	0.68

3.3. Technological principles of production and properties of carbonate hardening products

Theoretical and experimental studies were the basis for creating a resource-saving technology for the production of biopositive building products of carbonate hardening based on calcareous -carbonate-calcium compositions, the defining principles of which are:

- organization of hardening of semi-dry pressed products in an artificially created gas-air environment with controlled concentration of carbon dioxide in it. The source of carbon dioxide can be: lime kilns, thermal power plants, metallurgical plants, boiler rooms, etc.;
- use as a raw material base of wastes of limestone, including fine-grained limestone.

The implementation of these principles will ensure the receipt of high-quality, environmentally friendly building materials and products, the formation of a certain structure and required technical properties of which takes place at the stage of forced carbonate hardening for a short time (about 1 hour), and also opens up new opportunities for addressing a number of global resource and environmental problems:

- reduction of waste dumps in quarries and reclamation of lands occupied by these dumps;
- reduction of greenhouse gas emissions due to the complete utilization of CO₂ by binding it to environmentally friendly calcium carbonate.

Carbonate technology was tested at the time of production of a pilot batch of hollow bricks (hollowness of 30%) with a size of 250×120×65 and 250×120×80 mm (Figure 3). After carbonate hardening, bricks had the following physical and mechanical properties: average density – 1500 kg/m³; the compressive strength – 37.8 MPa; water resistance – 0.88; water absorption – 7.4% by weight; frost resistance – not less than 35 cycles. The compressive strength of the walls and partitions in the brick reached 60 MPa.



Figure 3 – Bricks of carbonate hardening from the pilot batch: a – with rectangular slit-like voids; b – dyed in imitation of marble in the mass with voids in the form of honeycomb.

Products from calc-limestone compositions of carbonate hardening have high decorative characteristics. Natural whiteness of lime, as well as the use of pigments, allows receive products of any colors, including with a picture of precious rocks (marble) (Figure 3, b). In addition, the side surfaces of the products, due to the plastic properties of the calcareous binder and the molding method (pressing), have the appearance of a polished material.

4. Conclusion

Studies have shown that the potential for lime, as an astringent material, is currently not being fully utilized, especially with regard to its use for the production of quality building products the properties of which are formed as a result of their forced carbonization due to man-made carbon dioxide gas. Carbonate hardening can be the main way of obtaining high-strength, durable, aesthetic and biopositive building products, capable, if necessary, to replace natural authentic materials in the conduct of renovation and restoration works of objects of architectural and historical heritage.

References

- Moskvina I.K. (2016) *Sovremennye kontseptsii restavratsii v kul'turologicheskom diskurse [The modern concept of restoration in the culture-based discourses]*®, in “Kul'tura i tsivilizatsiya [Culture and Civilization]”, 6 (5A), 2016, pp. 317-324;
- Cesare Brandi (2011) *The theory of restoration and other works on the themes of protection, conservation and restoration*®. C. Brandi authors. foreword. A. Rabotkevich [et al.], Moscow: Nardini editore, 2011, 264 p.;
- Restoration of Monuments of History and Art in Russia XIX and XX centuries. History problems*®, Moscow: Academic Project; Alma Mater, 2008, 604 p.;
- Blazetti L. (2014) *Recovery of stone elements St. Klary Basilica of St. Damiana convent in Assisi*®, in “Experience the preservation of cultural heritage: the problem of the restoration: collection of materials of scientific-practical conference”, St. Petersburg: Asterion, 2014, pp. 39-46;
- Ikonnikov A.V. (1972) *Opyt sohraneniya pam'atnikov arhitekturi v gorodah Italy [Experience of preservation of monuments of architecture in the cities of Italy]*®, in “Teoriya i practica restavratsionih rabot [Theory and Practice of Restoration Works]”, Research Institute of the Theory, History and Perspective Problems of the Soviet Architecture Collection, N°3, Moscow: Stroyizdat, 1972, pp. 117-135;
- Zalmanoff N. (1956) *Carbonation of Lime Putties to Produce High Grade Building*®, in “Rock Products”, August, 1956, pp. 182-186, September, 1956, pp. 84-90;
- Despotou E., Schlegel T., Shtiza A., Verhelst F. (2014) *Literature study on the rate and mechanism of carbonation of lime in mortars*®, in 9th International Masonry Conference at Guimaraes (Portugal on 7-9 July 2014), 2014, pp. 1-12. (<http://www.masonry.org.uk>);
- Kaliyavaradhan S.K., Ling T.C. (2017) *Potential of CO₂ sequestration through construction and demolition (C&D) waste – An overview*®, in “Journal of CO₂ Utilization” 20, 2017, pp. 234-242. (<http://www.sciencedirect.com/science/article/pii/S221298201730207X>);
- Chernyshov E.M., Potamoshneva N.D. and Artamonova O.V. (2015) *Kontseptsii i osnovaniya tekhnologii nanomodifitsirovaniya struktur stroitelnih kompozitov. Chast 4. Zol-gel tekhnologiya nano-, microdispersnih kristallov portlandita dlya contactno-condensatsionnogo kompaktirovaniya struktur portlanditovogo kamnya i kompozitov na ego osnove [Concepts and bases of technology of nanomodifying of structures of structural composites. Part 4. Sol-gel technology nano-, microdispersible crystals of the portlandite for contact and condensation compaction of structures of a portlanditovy stone and composites on its basis]*®, in “Stroitelnye materiy [Construction material]”, N°11, 2015, pp. 65 – 73.
- Palatnik L.S., Papirova I.I. (1971) *Epitaksilnye pleonki [Epitaxial films]*®, Moscow: Nauka, 1971, 480p.;
- Lyubomirskiy N.V., Fedorkin S.I., Loktionova T.A. and Nosatov V.G. (2007) *Avtomaticheskaya ustanovka i metodika izucheniya protsesa karbonizatsii izvesti [Automatic installation and technique of studying of process of a carbonization of a lime]*®, in “Stroitelstvo i tehnogennaya bezopasnost' [Construction and industrial safety]”, Simferopol, No 19-20, 2007, pp. 74-78;
- Cizer O., Van Balen K., Elsen J. and Van Gemert D. (2008) *Carbonation reaction kinetics of lime binders measured using XRD*®, in 2nd International Conference on Accelerated Carbonation for Environmental and Materials Engineering, 1-3 October 2008, Rome, Italy. Proceedings ACEME08, pp. 139-148;
- Lyubomirskiy N.V., Fedorkin S.I. (2013) *Vliyaniye primesey prirodnih izvestnyakov na protsess karbonizatsionnogo tverdeniya izvesti [Influence of impurity of natural limestones on process of karbonizatsionny hardening of a lime]*®, in “Resursoekonomniye materialy. Konstruktsii, zdaniya i sooruzeniya [Resource-economical material, design, buildings and constructions]”, Rivne, N°26, 2013, pp. 277-285;
- SN&P 2.03.01-84* *Betonnii i zelezobetonnii konstruktiv [Concrete and reinforced concrete constructions]*®, Moscow: Gosstroy USSR, 1989.

DESIGN, IMPLEMENTATION AND QUALITY ASSESSMENT OF EDUCATIONAL PROGRAMS IN ENERGY-EFFICIENT CONSTRUCTION

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Abstract

The paper discusses the questions of personnel training in energy efficiency of buildings for the construction industry. The analysis of educational programs of Russian universities in energy-saving construction has been conducted; the job requirements and qualifications in the labor market of the construction industry have been explored; the results of employer surveys have been analyzed. Using the example of the Master's program "Design, Construction and Operation of Energy Efficient Buildings", we show the stages of creating an educational program from the perspective of a competence-based approach. The learning outcomes for the program, taking into account the requirements of educational standards and professional standards, have been formulated. The methodology for assessing the quality of the educational program in the field of energy efficient construction has been developed and verified.

Keywords: educational program, construction, energy efficiency.

1. The relevance of educational programs of higher education in the field of energy-efficient construction

The problems of energy saving and energy efficiency began to be considered abroad much earlier than in Russia, after the first energy crisis of 1973. The modern history of improving energy efficiency in the Russian Federation begins with the Presidential Decree of the Russian Federation N°889 "On Some Measures to Improve the Energy and Environmental Efficiency of the Russian Economy". Among the main reasons for the high energy intensity of the Russian economy there are those related to insufficient educational activities in the field of energy efficiency (historically developed mentality of Russian citizens, insufficient and low professional training in the field of energy saving and efficient use of energy resources) and the reasons related to low energy efficiency of buildings and structures (high proportion of dilapidated, obsolete and worn-out buildings). To implement the tasks of the Presidential Decree of the Russian Federation and other ensuing legislative and other acts (Federal Law N° 261 "On Energy Saving and Improving Energy Efficiency") is impossible without creation and development of educational programs in the field of energy-efficient construction.

In recent years, a significant number of conferences and forums have been held in Russia (I All-Russian Forum "Energy Efficient Russia"; IX International Congress "Energy Efficiency. XXI Century. Engineering Methods of Reducing Energy Consumption of Buildings"; VI Congress of the National Association of Organizations in the Field of Energy Saving and Energy Efficiency) devoted to energy saving. They have repeatedly expressed support for the state initiative to improve energy efficiency, as well as voiced the main directions and problems in the field of energy efficient construction. The international Congress in St. Petersburg noted the impact of the economic crisis on the development of energy efficiency in the field of construction. "Vice-President of the St. Petersburg chamber of Commerce and Industry Anton M. Moroz noted that in times of crisis, customers tend to save on everything and are among the first to reduce energy saving measures in projects." [1]. Deputy Director of the Department of Urban Planning and Architecture of the Ministry of Construction A. Stepanov reported on the work on the plan project ("road map") to improve the energy efficiency of buildings and structures [2]. The draft of this document provides measures for the development of programs and amendments to the programs of training, retraining and advanced training of specialists in the design, construction and operation of buildings, to ensure compliance with energy saving and energy efficiency.

The Tambov region implements the state program "Energy Saving and Energy Efficiency Improvement of the Tambov Region for 2014-2020", which mainly includes measures for modernization of heat and energy supply systems. Within the framework of educational activities in January 2015 in the building of the Regional Administration the permanent demonstrational and educational center "Energy Saving and Energy Efficiency" started its work, in which 1024 people have already been trained. Reduction of energy consumption in the process of construction and operation of buildings is possible due to different means. All these means should be reflected in educational programmes at various levels. The main educational programs of higher education in the field of energy-efficient construction are implemented at the master's level in many universities of Russia (table. 1).

Table 1 - Educational programs of higher education in the field of energy efficient construction, master's degree

University	Educational Program
National Research Moscow State University of Civil Engineering	Energy Saving and Energy Efficiency in Buildings
Peter the Great St.Petersburg Polytechnic University	Energy Efficiency and Energy Saving in Civil Engineering
Ural Federal University named after the First President of Russia B.N.Yeltsin	Energy- and Resource-saving Technologies of Creating a Building's Microclimate, Energy Audit
Voronezh State University of Architecture and Civil Engineering	Design of Civil Buildings with the Use of Modern Constructive and Energy-Saving Solutions

It should be noted that all programs are specialized and consider only a part of directions of increasing energy efficiency of buildings.

2. A survey of employers

In 2015 Tambov State Technical University won a grant "Master Degree in Innovative Technologies in Energy Efficient Buildings for Russian and Armenian Universities and Stakeholders" [3, 4, 5]. Within the grant TSTU in cooperation with European, Russian and Armenian universities will develop master's programs in the direction 08.04.01 "Construction" in the sphere of innovative, survey and design activities of construction, reconstruction and modernization of buildings.

To develop and implement a new master's program in environmental and energy-efficient construction, taking into account the requirements of employers during 2015, a selective survey was conducted among the management of the construction industry enterprises cooperating with Tambov State Technical University [6, 7].

Organizing the survey, TSTU has set objectives of two types:

- research: to identify trends in Tambov labor market, the needs of employers in professionals competent in energy-efficient construction and operation of buildings;
- applied: collection of information necessary for the development of the master's program "Design, Construction and Operation of Energy Efficient Buildings" taking into account the needs of the labor market.

The survey involved employers in the field of design, construction, technical operation of buildings. They are interested in hiring graduates of TSTU and are able to evaluate the proposed survey positions based on their experience as temporary or permanent employees. It should be noted that among the respondents there are those who are potential employers for students and those who open positions only to certified professionals.

Employers were asked to answer 21 questions. According to the objectives, the questions were divided into three thematic parts:

- part A - basic information about respondents and their attitude to the problem of energy efficiency and resource saving;
- part B - competencies that determine the degree of efficiency of graduates' professional activity;
- part C - proposals for combining the master's program and the labor market.

When analyzing the results of filling in the questionnaires, the task of obtaining the contact details of respondents for further cooperation in the implementation of the master's program was performed. The survey involved 17 employers, including 35% in the field of construction, 18% in design, 18% - technical operation of buildings, 29% - other areas of the construction industry.

It should be noted that 24% of respondents are large scale employers (the number of employees exceeds 250 people), 29% - medium (51 - 250 people), 47% - small (less than 50 employees).

Answering the question whether energy efficiency issues are relevant, 67% of employers answered affirmatively. The remaining 33% consider these problems to be less significant.

To the question of whether there is a need for master's program graduates with certain competencies in the field of energy efficiency construction, the majority of respondents (81%) gave positive answers, indicating that employers understand the need to train specialists in the field of energy efficiency in design, construction and operation of buildings.

A survey of employers showed that graduates of the master's program should first of all have knowledge of energy saving in buildings, skills in energy audit and project management, have an idea of renewable energy sources.

According to employers, the ability of University graduates to manage projects and possess organizational skills plays an important role. Thus, when developing a new master's program, it is necessary to pay attention to the group and project forms of training that ensure the development of the above mentioned skills.

Due to the fact that adaptation to a new location is one of the first difficulties faced by new employees, it is important to

understand how much time during the internship is necessary for the young specialist to be included in the activities of the organization or enterprise. Interviewed representatives of enterprises believe that the optimal duration of internships of masters-interns can be 3-6 months. At the same time, 75% of the respondents would like to provide an opportunity for internships for graduates of the master's program "Design, Construction and Operation of Energy Efficient Buildings". Interns, according to employers, could perform the duties of assistant (37%), participate in group work (38%) and perform individual tasks (25%).

When answering the question of part C "Proposals for combining the master's program and the labor market", some respondents expressed their wishes to organize training and internships on the enterprise profile, for those students who applied for the future specialist position, as well as to implement joint research work in the field of design and construction of energy-efficient buildings.

3. Development of Master Program "Design, Construction and Operation of Energy Efficient Buildings"

In order to train qualified personnel in innovative technologies in the field of energy-efficient construction on the basis of a survey of employers, in the direction 08.04.01 "Construction" (master's degree) a program of applied master's degree "Design, Construction and Operation of Energy-Efficient Buildings" was developed [8, 9, 10]. According to the qualification framework of the European Higher Education Area, this program belongs to the second cycle and has level 7. The educational program is designed for 2 years of study and has a total weight of 120 credits. The list of courses, their weight and progress evaluation are presented in the table.2.

Table 2 - List of courses, their weight and progress evaluation of the master's program "Design, Construction and Operation of Energy-Efficient Buildings"

Courses	Semester	Progress Evaluation	Weight	
			hours	credits
Basic Part				
Courses of Basic Part	1-3	Pass/fail exam, exam	756	21
Variable Part (Compulsory Courses)				
Engineering systems of energy efficient buildings	1 and 2	Exam	216	6
	2	Course paper (CP)		
Technical operation of energy efficient buildings	2	Exam, CP	144	4
Design solutions for energy efficient buildings	3	Exam, CP	180	5
Economic efficiency of energy saving measures	3	Exam, CP	180	5
Variable Part (Elective Courses)				
Special topics of building physics	1	Exam	108	3
Building thermophysics				
Innovative building materials for energy efficient buildings	2	Exam	108	3
Modern materials of buildings enclosing structures				
Environmental safety in construction	3	Exam	108	3
Evaluation methodology for ecological safety of construction objects				
Improving the energy efficiency of buildings in operation	3	Exam	108	3
Energy saving in modernization of buildings				
Russian and international legislative regulation in the field of energy efficient construction	2	Pass/fail exam	108	3
Domestic and foreign systems of energy efficiency regulation of buildings and structures				
Educational practice	2,3	Pass/fail exam	576	8
Scientific and research work	1	Pass/fail exam	288	8
Enterprise practice	2,4	Pass/fail exam	1080	30
Final State Examination			216	6
Total			4320	120

4. The Formation of Master's Learning Outcomes in Energy-Efficient Construction

Federal state educational standards (FSSES) of the new generation require from the developers of the basic professional educational programs of higher education (BPEP HE) the competence-based approach in the process of their development. The FSSES of higher education (master's degree) in the direction 08.04.01. "Construction" lists the types of professional activities that graduates can be prepared for, mastering the educational program of the magistracy and the requirements for the results on the program completion. On the BPEP completion graduates should develop general cultural, general professional and specific professional (depending on the chosen type(s) of professional activity) competences (PC). For example, in the FSSES in the direction 08.04.01 "Construction" the types of innovative, survey and design activities include competence PC1-PC4, research and educational activities include PC5-PC9, the production and technological activities - PC10-PC17, professional expertise, regulatory and methodological activities- PC18 - PC21. When developing a master's program, the educational institution has the right to supplement the set of competencies of graduates, taking into account the focus of the master's program on specific areas of knowledge or activities [11].

Thus, the FSSES HE not only strictly prescribes the required competencies, which must a graduate develop, but also gives the educational institution the opportunity to expand them. In FSSES HE++ [12], which are actualized considering professional standards, the educational institution forms the requirements to the results of program development in terms of professional competencies on the basis of relevant professional standards, i.e. professional competencies must correspond to the generalized labor functions and the labor functions of the selected professional standards.

Designing competence is a crucial point in the development of the educational program, and the formation of professional competence is a priority task of the University. We will show the design of professional competencies on the example of one of the master's programs of Tambov State Technical University.

The development of the educational program was based on the required learning outcomes corresponding to the competences of the FSSES HE, as well as PCV, developed independently (table. 3).

Table 3 - Design of educational courses based on learning outcomes and on competences of FSSES HE, taking into account the proposals of employers (an example)

Learning outcomes (structural components of competence)	Course (practice), forming the given learning outcomes
PC-3 Possessing knowledge of design and monitoring methods of buildings and constructions, their constructive elements, including methods of calculation justification, among others, with the use of universal and specialized software and computing complexes and systems of the automated design	
knowledge of methods of modern design and monitoring of buildings and structures	estimated design of buildings and structures
knowledge of methods for calculation justification of separate structural elements and the building as a whole	
ability to use universal and specialized software and computing complexes for solving computational problems in the design of buildings and structures	Information technologies in construction
ability to use computer-aided design systems in the process of developing projects of buildings and structures	
PCV-4 ability to carry out technical operation of energy efficient buildings, to ensure reliability, safety and efficiency of their work, to increase energy efficiency of the operated buildings	
knowledge of the basic concepts connected with the technical condition of an energy efficient building, provisions of the normative documents regulating professional activity in the field of technical operation of buildings;	Technical operation of energy efficient buildings
ability to demonstrate the basic principles of technical operation and repair of energy-efficient buildings, including data on physical and mechanical processes of aging and destruction of building elements, methods for assessing their technical condition and reliability, and the principles of preventing deterioration	
ability to assess the interrelation of the building composition and properties of construction and building materials at maximum resource and energy saving, and methods of evaluating indicators of their quality	
ability to show skills in monitoring and evaluation of energy efficiency of the operated buildings with the use of modern equipment for the preparation of the object energy passport	

Learning outcomes (structural components of competence)	Course (practice), forming the given learning outcomes
knowledge of general principles and modern methods of energy efficiency improvement of the operated buildings	Energy efficiency improvement in operated buildings
knowledge of methods for developing technical solutions to improve the energy efficiency of operated buildings using software systems	
knowledge of methods for designing and calculating thermal protection of buildings with application of regulatory documentation, software and computing complexes;	
ability to apply modern construction technologies, including the use of alternative and renewable energy to improve the energy efficiency of buildings under operation.	

The analysis of professional standards (PS) in the field of architecture and construction allowed to carry out interface of labor functions (actions) and professional competences of FSES HE for the purpose of obtaining the required results of training. In addition to this, University professional competences were developed (table. 4).

Table 4 - Interface of professional standards and educational program at competence-based approach (an example)

Generalized labour functions	Labor functions	Labor activities	Professional competences	Learning outcomes	Courses
Development of design production by results of engineering design for town-planning activity*	Development and preparation of design solutions on objects of town-planning activity	Development of a draft project in the field of engineering design for town-planning activities in accordance with the established requirements	PC-4 ability to develop draft, technical and work projects of complex objects, including the use of computer-aided design	knowledge of principles and fundamentals of complex projects development	Estimated design of buildings and structures
				ability to develop draft, technical and work projects	
Development of a project to ensure compliance with energy efficiency requirements of buildings, structures and constructions**	Development of the concept of compliance with the requirements of energy efficiency of buildings, structures and constructions	Development of solutions to ensure the energy efficiency of the capital construction project for which the project is being developed	PCV-1 ability and readiness to develop draft, technical and work projects of energy efficient buildings	Knowledge of methods for calculation and design of energy-efficient and energy-active buildings, methods of providing comfortable parameters of rooms microclimate taking into account typological features of buildings	Architectural and space-planning solutions for energy efficient buildings
				ability to show the skills to perform the calculation justification of structural solutions of energy efficient buildings	
			PCV-3 ability to analyze the economic efficiency of energy-saving measures in order to justify their selection and application	ability to show the skills of economic justification of the selection and application of energy-saving measures	Economic efficiency of energy saving measures

At present Voronezh State Technical University, Tambov State Technical University, Ural Federal University named after the First President of Russia B.N.Yeltsin and South Ural State University (National Research University) prepare tutorials “Eco-Conceptual Architectural Design”, “Design Features of the Life Cycle of Energy Efficient Real Estate Objects”, “Biosphere Compatible Energy Saving Technologies in Town Planning” and “Innovative Materials and Technologies for Energy Efficient Buildings”, which will become the basis of educational and methodological support of the master’s program “Design, Construction and Operation of Energy Efficient Buildings.”

References

IX International Congress “Energy Efficiency. XXI century”. *Engineering and Construction Journal*, 2015, N°2. pp. 3–6 (in Russian)

URL: <http://www.minstroyrf.ru/press/minstroy-rossii-rabotaet-nad-proektom-dorozhnoy-karty-povysheniya-energoeffektivnosti-zdaniy-i-sooru/>

Education, Audiovisual and Culture Executive Agency. – 2015. – available at: https://eacea.ec.europa.eu/erasmus-plus_en (Accessed 1 September 2015)

Mishchenko E.S., Monastyrev P.V. Experience of International Scientific and Educational Cooperation in the Field of Architecture and Construction. *Integration of Education*, 2015, N°4, V. 19, pp. 10-15. (in Russian)

Mishchenko E.S., Monastyrev P.V. International Cooperation of Tambov State Technical University in the Field of Architecture and Construction. *Proceedings of the 2nd International Scientific and Practical Conference “Sustainable Development of the Region: Architecture, Construction, Transport”, Tambov, TSTU, September 25, 2015*, Pershin R.V. Publ., pp. 7-10. (in Russian)

Mishchenko E.S., Monastyrev P.V., Evdokimtsev O.V., Korchagina O.A., Matveyeva I.V. Energy Efficient Construction in Tambov Region: Educational Aspects. Vernadsky V.I.: Sustainable Development of Regions [Electronic Resource]. *Proceedings of the International Scientific and Practical Conference*. V.1., June 7 – 9, 2016, Tambov, TSTU Publ., 2016, pp. 232-238 (in Russian)

Mishchenko E.S., Monastyrev P.V., Evdokimtsev O.V., Korchagina O.A., Matveyeva I.V. The Relevance of Applied Educational Master’s Degree Programs in the Field of Energy Efficient Construction. *Aspects of Modern Science and Practice. Vernadsky V.I. University*, 2016, N°4(62), pp.203-209. (In Russian)

Monastyrev P.V., Evdokimtsev O.V., Milovanov A.V. Educational Programs of Institute of Architecture, Civil Engineering and Transport as Elements of Innovative Development of Tambov Region Economy. *Proceedings of the 3rd International Scientific and Practical Conference “Sustainable Development of the Region: Architecture, Construction, Transport”, Tambov, TSTU, June 27, 2016*, Pershin R.V. Publ., pp.8-14. (in Russian)

Mishchenko E.S., Evdokimtsev O.V., Monastyrev P.V. Development of Educational Program in the Field of Energy Efficiency of Buildings. *Proceedings of the II International Conference “Safety Problems of Critical Building Infrastructures”, Yekaterinburg, URFU, May 27, 2016*. URFU Information Portal at <http://www.urfu.ru>, pp.166-171. (in Russian)

Mishchenko E.S., Monastyrev P.V., Evdokimtsev O.V. Formation of Learning Outcomes of the Master Student in the Field of Energy Efficient Construction. *Aspects of Modern Science and Practice. Vernadsky V.I. University*, 2017, N°3(65), pp. 156-165. (in Russian)

Federal State Educational Standard of Higher Education in the direction 08.04.01 “Construction” (Master’s Degree), Approved by the Order of the Ministry of Education and Science of Russia on October 30, 2014 N° 1419

Federal State Educational Standard of Higher Education – Master’s Degree in the Direction 08.04.01 “Construction”, Approved by the Order of the Ministry of Education and Science of Russia on May 31, 2017 N°482

ARCHITECTURAL-LITERARY MUSEUM “THE HOUSE OF MELNIKOV AND MARGARITA” IN MOSCOW AS THE CONCEPTUAL EXAMPLE OF THE MULTIPLICATIVE APPROACH TO THE PRESERVATION OF THE CULTURAL AND HISTORICAL HERITAGE

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Abstract

The creation of the architectural-literary museum “The House of Melnikov and Margarita” in Moscow assumes the erection over this unique monument of the Soviet architecture of 1920th the transparent dome and is aimed to solve the next problems: 1. To protect the building against destructive influences, in particular, the deposits and the thawed snow. 2. To raise the urban status of the Melnikov House. 3. To use the external surface of the dome as the facet screen which shows the video information about architect Konstantin Melnikov and his house. 4. To include Melnikov House in the list of “architectural candidates” pretending to be the House of Margarita in the famous novel of M. Bulgakov.

Keywords: Melnikov House in Krivoarbatsky lane in Moscow, infobox, Bulgakov’s Margarita house, transparent dome, facet screen

1. Introduction

The destiny and the safety of the Melnikov House in the Krivoarbatsky lane in Moscow (Fig.1) are the subject of the steadfast attention and quite well-founded fears of all the world architectural society. As to the capital mayoralty and the Russian power structures as a whole for them the problem to save this unique monument of the Soviet avant-guard should be realized, among other, as one of the measures for the maintenance and increase of the state prestige. That is why there are the grounds to hope that in the near future high-grade scientific restoration of the Melnikov masterpiece will be made and its reliable preservation is provided. The future realization of these long-awaited measures is quite worthy to be embodied in the public consciousness by means of certain conceptual markers, let and not so original, as the Melnikov House itself, but, nevertheless, also applying for absence of analogues in the history of world culture. We believe that the most suitable base for the achievement of the desired result may be such architectural and cultural phenomenon, as infobox, which appeared rather recently, but every year becomes more and more popular.



Figure 1 – The fragment of the Melnikov House. Photo and photomontage of the authors, 2007–2018.

2. The Characteristics of the Infobox

Before to give the detailed characteristic of the infobox, we will remind quite obvious thing. «The attitude of any townsman to the building works usually is an unequivocal one: The building works are the inevitable inconvenience and the source of excitement connected with the noise and transport problems... The perception of the building works is rare goes back to their perception as the future prosperity, as the obvious symbol of the progress» (Gelfond, 1999). And not in the last instance it is caused by such act that « the building works are the process absolutely closed from the point of view of the future consumer, closed not only by the obligatory fence, but moreover by the information lack which inevitably awakes the advancing negative reaction» (Gelfond, 2000, p. 78).

It is also quite obvious that in now time the administration of the cities and the building organizations try to inform townspeople about the new buildings as much as possible. For this purpose, in particular, place the tablets are displayed concerning the object which is under construction with the names of the customers, contractors and designers. But in a number unusual cases (one of which is the cultural importance of the object) there arises the new type of construction which we have already mentioned before, i.e. infobox, «which must during some years to play the information, educational and educational role» (Gelfond, 2000, p. 78).

This purpose is pursued, for example, by Humboldt-box which was erected in 2011 on the Palace Square in Berlin according the project of architects Torsten Kruger, Christian Schubert and Bertram Vandrejke. Time construction has been created to inform on the course of the civil work connected with restoration of the Berlin City palace (Berliner Stadtschloß). It is supposed that Humboldt-box will exist on this place within eight years. The five-floor structure with the area of 3000 sq. m and 28 m height contains showrooms, viewing points, universal premises for carrying out of various actions. Architects name this construction «the communicative spatial sculpture» (Flierl, 2009).

3. Infobox “The House of Melnikov and Margarita”

In the case with the Melnikov House which considerably concedes in sizes to the Berlin City palace mentioned above, the infobox functions may perform the protective casing in the form of transparent dome, i.e. the spatial construction established over object for the period of its restoration (Fig. 2, 3). Modern digital technologies quite allow use the external surface of the dome surface as the facet screen for popularization the architectural creative work of Konstantin Melnikov to give the information about hid house (Fig. 4).



Figure 2 – The situational plan of the Melnikov House and its infobox.

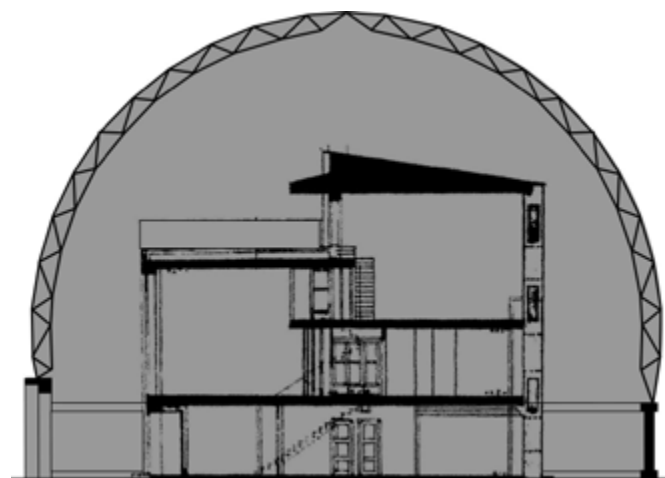


Figure 3 – The section of infobox over the restored Melnikov House along its central axis.



Figure 4 – One of critical responses about Konstantin.Melnikov's architectural work (which is characteristic for the Soviet art criticism of 1930th – first half 1950th) shown on the external surface of the protecting dome which performs also the role of the screen.

The realization of these ideas already in itself could become extremely effective event in the architectural life of the country. However, in our opinion, such infobox may have additional absolutely not ordinary resources for the attraction of the public attention. This is connected with the attempt to prove the identity of the Melnikov House and the house of Margarita from the famous novel of Michael Bulgakov (Fig. 5). In this connection the infobox over the Melnikov House could be named quite officially “The House of Melnikov and Margarita” and to receive the corresponding figurative treatment (Fig. 6, 7).



Figure 5 – Konstantin.Melnikov with the wife Anna Gavrilovna (nee Jablokovoj) near his house in Krivoarbatsky lane, 1927–1928.

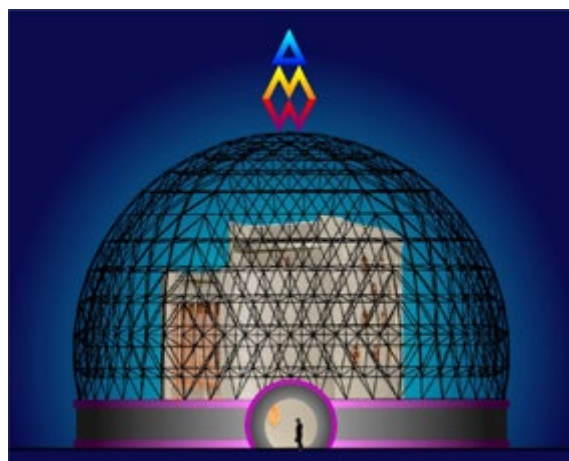


Figure 6 – Infobox “The House of Melnikov and Margarita” viewed from the Krivoarbatsky lane.



Figure 7 – The figurative elements of the infobox “The House of Melnikov and Margarita” and their explanation according to the novel “The Master and Margarita” by M. Bulgakov (Bulgakov, 1967)

4. Conclusions

After the end of reconstruction of the Melnikov House the described infobox may be transferred to the other place of Moscow (like in the middle of XIX century it was made with the well-known Crystal Palace in London) and to function as the unique museum devoted to the creativity at once of two famous Russians, working in absolutely various spheres: one in the field of architecture and design, and the other in the literature. At the same time all the conceptual positions which have led to the creation of the museum may be brought to the notice of the weight townspeople and visitors of Moscow by means of the projecting the corresponding information through the facet screens placed on the external surface of the dome.

Acknowledgments

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References

Gelfond A.L. The building works as the theatrical action // Russia in the culture of the world. Nijny Novgorod, 1999, pp. 318.

Gelfond A.L. The role of the infobox in the formation of the public space // Privolzhsky scientific magazine, Nijny Novgorod, 1999, pp. 76–79.

Flierl Th. Humboldt Forum Berlin. Das Projekt. – Berlin: Theater der Zeit, 2009.

Bulgakov M.A. The Master and Margarita. Translated from the russian by Michael Glenny. Collins and Harvill Press, London, 1967.

ACTUAL PROBLEMS OF DAYLIGHTING IN RESTORATION OF ARCHITECTURAL MONUMENTS AND WAYS OF THEIR DECISION

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Abstract

The advantages of daylight do not require to be proved. Each room with constant residence of people must have windows or other systems of natural lighting. Restoration of architectural monuments put additional restrictions in solving this problem. As a rule, architectural monuments have not enough light openings to provide necessary amount of daylight according to the norms and standards. Otherwise, the requirements of norms often do not reflect the real needs of people in such buildings. Now we can calculate the amount of daylight and all its parameters by means of mathematical formulation, graphical methods and computer programs. However, we do not exactly know what people need, what they do prefer. Methods of calculation of Daylight Factors in different situations of brightness distribution on the sky are discussed. It is shown, that the horizontal illumination can characterize the conditions of visual performance on the working place with flat objects, but it cannot characterize saturation of rooms with daylight, and visual performance characterize out badly with volume objects of work. Possibilities of implementation of light field theory for characterization of saturation of rooms with daylight are shown. Needs of people in daylighting in architectural monuments depends on their utilization which can be different. It is emphasized, that norms and standards, based on light field theory for the first time must be tightly connected with the existing system of standardization and rationing.

Keywords: Architectural monuments, Daylighting, Light openings, Restoration, Daylight Factors, Calculation, Mathematical Formulation, Graphical methods, Computer Programs, Visual Performance, Brightness distribution, Light field theory, Needs of People.

Introduction

Natural lighting in the premises of the monuments has its limitations, primarily so that the dimensions of light openings were not taken into account due to requirements to natural light. During the construction of monuments attention to this factor was paid only at the level of intuitive understanding of ancient architects of this issue. Before the onset of the Renaissance in Italy, and then in other European countries this issue is generally not given attention. The result was the use in civilian buildings of very small windows, the change that in restoration is impossible. This issue is particularly acute in Russia, where in the surviving secular buildings XIV - XVI centuries are traditionally very small windows (fig. 1), which had broad slopes due to the thickness of the walls. Monuments of architecture can live and be preserved only when they are used. In Russia their use may be different from the museum objects to the administrative and office buildings (fig. 2). Natural lighting in these buildings is normalized. Wish to ensure normalized values of the coefficients of natural light, is not always possible.



Figure 1 - Pagankin's Palaces XVth century, Pskov, Russia

2. The benefits of natural light

The benefits of natural light into buildings currently do not require evidence. With the advent of fluorescent lighting and air conditioning in the late thirties of the last century in the United States by the architects has increased the desire to fully insulate the interiors from the outside. They designed buildings without windows and skylights.

At first there were industrial buildings. Then without windows they begun to design even schools. Soon it turned out that in such industrial buildings begun sharply falling productivity. Students in schools have become quickly tired. At first, they thought that the reason was claustrophobia (confined space). However, claustrophobia develops in small areas where the internal volume of visual information is small. In production shops and classrooms internal volume of visual information is large enough to produce claustrophobia. Windows create communication between internal and external environment. In the windowless spaces and in spaces without skylights that link is missing. An attempt to artificially create this link by devices in the walls like large slides with the image of the mountains or the sea led to nothing. So now, the standards require that all premises with long stay of people must had natural light. While windows give us information that is happening outside, lighting specialists in Europe believed that the skylights in roofs of buildings do not give such information. However, they were wrong: in the 70s-80s of the 20th century, we had to deal with the reconstruction of the windowless and “skylightless” industrial buildings in the city of Cherepovets (steel plant) and Kherson (textile factory) with the arrangement in the huge shops of these enterprises the upper lanterns for natural lighting. This reconstruction was carried out due to the large number of complaints. Questionnaires of workers of these enterprises after the reconstruction has shown that communication with external environment exists mainly in preservation of the sense of time and in weather information. However, the main thing is the dynamics of range and levels of natural lighting, preserving the natural generation of hormones awakens and sleep. The monotonous illumination even at high levels of illuminance operates putting sleep. Spectral composition of natural light is also very important. Fluorescent lamps have banding spectrum, whereas natural light spectrum is continuous. How acts the banding spectrum on human health and on his state of health so far scientists cannot clearly answer. However, already there are new more energy-efficient light sources - the LEDs, that can have a continuous spectrum. With their improvement seemingly can be achieved close match of their radiation spectrum with a spectrum of natural light. Range of natural light varies depending on the cloud cover and the time of day. In future, therefore, improving the LEDs, apparently, it will be able to go towards the automatic change of the spectral composition of their radiation. However, a study of the influence of LEDs on human health is just beginning. It is of great importance for the development of systems of artificial lighting, and to develop systems of combined lighting when natural and artificial light are working together.



Figure 2 - White Palaces on the Prechistenka st., XVIth century, Russia

3. Calculation of natural lighting

Calculation of the natural lighting of buildings must be carried out with different objectives. Now clearly identified two objectives: 1) Comparison of natural lighting conditions indoors with the requirements of norms and standards. 2) Energy efficiency definition of natural lighting systems.

To achieve the first objective, it is necessary to choose one main assumption, that should characterize the distribution of brightness on the sky, which is typical for this region, and is possibly the worst, characterizing the natural light in the room. All calculations must be carried out when this basic settlement is approved. Now in Russia such admission is a cloudy sky with clouds, using ten grades, which is normed by the International Commission on illumination (CIE). Luminance distribution according to CIE obeys the law of P. Moon and D. Spencer:

$$\frac{L_{\theta}}{L_z} = \frac{1 + 2 \sin \theta}{3} \quad (1)$$

Here L_0 and L_z - brightness of the sky at the angle to the horizon and in the zenith.

At present, this Act is a little changed, as reflected in the new State Standard GOST R 57260-2016 "Climatology of construction". The parameters for the calculation of natural light, taking into account the brightness distribution on the sky in clear sky conditions are shown in Figure 3 [1,2]. For regions with a predominance of other average cloud conditions, it is possible to use 15 models of a different state of the sky, represented by Slovak scientists Dariula and Kittler [3]. These 15 models are symmetrical relative to the solar meridian and are functions of the angular distance between the Sun and the zenith. They are smooth continuous functions that is typical of clear sky and sky with uniform brightness and high brightness near the solar disk. 10-ball cloudiness is one of these models, when increasing brightness near solar disk goes to zero and the brightness at an angle to the horizon on the same latitude can be calculated according to the law of Moon and Spencer. The main task is to identify the model of the sky, typical of this region and the determination of the calculated position of the Sun. This issue devoted to scientific publications [2, 3, and 4]. Here it is important the orientation of a light opening relative to the solar Meridian. The most unfavorable orientation ranges from 105 to 225 on. In addition, the selected value is of depending to the critical illumination value under the open sky.

$$E_{KR} = \frac{E_i^{Norm}}{e} \cdot 100 \text{ лк} \quad (2)$$

Here E_i^{Norm} - standardized artificial illumination; e - standardized value of DF (Daylight Factor).

As it is well known, generally accepted criterion for natural light indoors is the daylight factor (DF). It should be noted, however, that the notion of "DF" for all models except the cloudy sky with 10-ball has no sense. If by overcast sky value does not depend on the orientation of light opening, the other models of the sky depends on the orientation of the light opening relative to the solar Meridian. For clear sky proposed standard graphics brightness distribution (fig. 3) [2]. Sky models specific to the regions of construction with other statistical terms of cloudiness in the sky yet are to be developed.

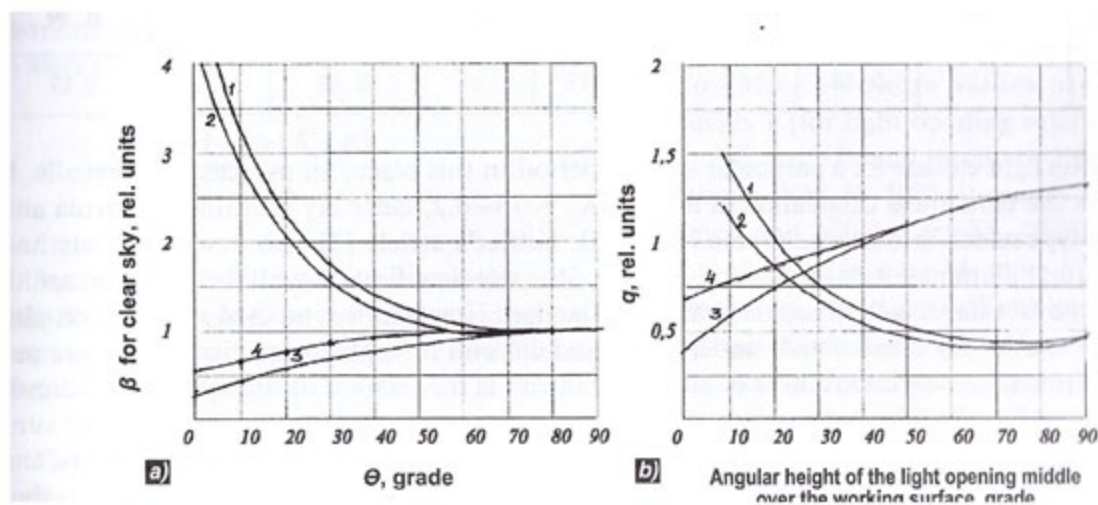


Figure 3 - Standard graphs of the relative brightness of the clear sky

Considered factors determine the so-called "global illumination", which is a fashionable term, which try to designate everything associated with natural light. However, factors of building, constructions, architectural solutions, interior and exterior finishes to this term are irrelevant, although sometimes they affect natural light more than direct light of the sky.

Calculations of DF must consider many factors, among which the main importance is the sky brightness, direct component of DF from the sky and component of DF from opposing structures, construction of light apertures, which in modern glazing designs can be of fiberglass and special selective glass, what can make a big difference in the results of calculations. In addition, account must be taken of the reflected light from the internal surfaces of premises and the adjacent surfaces of the Earth.

At present, with the wide use of computer calculations of natural lighting does not represent special complexity. There are more or less reliable calculation programs, such as AGI32 1.84, 2005 (Lighting Will Inc. United States, www.agi32.com) or Radiance 3.7.2.2005 (Lawrence Berkeley National Laboratory. United States, radiosity.lbl.gov) that you can use to not only calculate the natural light indoors but build a picture and brightness of interior surfaces and create the visualization space, lit with natural light. However, for the purposes of architectural design such calculations have one drawback: they require a long

and complex preparation of input data. So designers often use so-called “manual” methods of calculation of DK, among which the most common are methods based on graphs of A.M. Danyluk [4] and diagrams of Uoldram [5]. Both of these methods are simple enough and give reasonably accurate results. Each has its advantages and disadvantages. So, method, based on graphs of Daniluk, you can easily replace by the calculation of the component of DK from direct light from the sky and reflected light from opposing buildings using simple formulas [4].

The exact formula, obtained by the author, based on the provisions of the spherical geometry, is also given in [5]. It is quite difficult, especially if you use as your primary assumptions the “konhoidal” brightness distribution on the sky, which is a special case of a cloudy sky.

Chart of Uoldram is built on other principles. It shows the picture that we see through the window. It is very clearly but though does not accurately take into account reflection of the opposing buildings and redistribution of light streams from opposing buildings on the ceiling and the upper parts of the walls of the room, which is determining by DK. The picture is visible on the Uoldram chart, with freely positioned opposing buildings, shown in Figure 4.

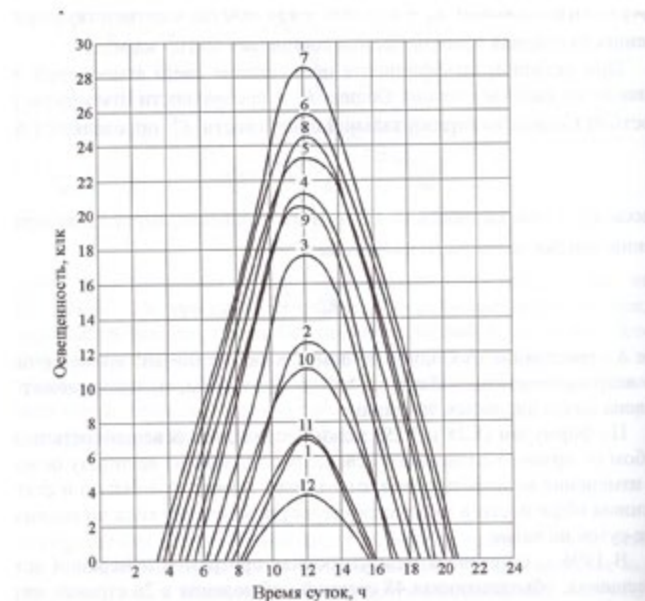


Figure 4 - Graphs of the course of external horizontal illumination

Calculation of reflected light from the internal surfaces of premises and the adjacent external surfaces can be carried out by method using tables and graphs [4,5], or more accurately using the finite light elements with the use of computers.

4. Rationing of natural light

Rationing of natural lighting is one of the least studied issues. In Russia, it is based on data collected in developing rules of artificial lighting. Artificial lighting standards are developed from the terms of better performance, and smallest fatigue when performing visual works. They depend on the accuracy of visual works, thus on the size of objects of distinction and the contrast of the object and the background. This rationing is made for flat objects of distinction, which are often substituted by Landoldt rings. The contrast is divided into small, medium and large. At the same time, especially for small contrast the background characteristic plays a significant role. The worst conditions occur at low contrast and dark background. For three-dimensional objects the significant influence have shadows, falling from the relief of the object. But it does not taken into account when normalization was done. Veiling brightness is also not taken into account by rationing illumination on flat objects with directional and absentmindedly-directional reflection. Thus, and in this respect there is a large field for research for scientists, lighting engineers and hygienists.

Is it possible to incorporate artificial lighting standards with norms of DF? This issue was studied by scientists from 40-ies of the last century. So, T. Glagoleva proposed to define standardized values of DK by logarithms of amount of natural and artificial illumination indoors per year [6]. In modern Russian norms, based on the works of Nikolai Kireev, this relationship is determined by simple equity of amount of artificial and natural illumination indoors. In some cases, the results of calculations are identical to the rules in some they differ from them. It should be noted that such an approach depends on working time in one, two or three shifts. Furthermore, the rules of artificial lighting, especially for industrial buildings depend on object-background contrast. When normalization of DF is not taken into account.

There is a need to establish criteria that could be taken into account by rationing of natural lighting. So far, these criteria have not been worked out. First, let's review the same criterion used for rationing of artificial lighting, i.e. visual work.

Whether it can be applied to natural lighting? With one hand, it seems to be clear that the more precise visual work require more natural light indoors. This means that windows in this room should be greater. For example, classrooms are designed with very large windows (fig. 5), because the value of normed DF on the school desks at a distance of 1.2 m from the wall opposite the Windows must be 1.5%. This is a very large value, which, especially in the context of urban development is a headache for designers. At the same time, large windows at high brightness of external environment creates visual discomfort, especially in the presence of the Sun. That is, high levels of illumination do not necessarily provide comfort in the room. Through the large windows in winter goes away a lot of heat, and in summer they create overheating due to insolation and heat transfer from high outdoor temperature.



Figure 5 - New school in the Kostino-Uhtomskiy district

Thus, large areas of glazing is not necessarily energy-efficient. Minimum energy costs for lighting, filling heat loss through windows in winter and elimination of heat transfer through windows in summer with the help of ventilation and cooling systems could also be a criterion for rationing of natural lighting in buildings. Energy evaluation of systems for natural lighting for rationing takes precedence over evaluation through the costs of structures, that define the capital cost, and the cost of heat and electricity, mainly determine operating costs, which are constantly changing in accordance with market conditions. Energy costs are more constant criterion.

Method of calculating energy costs is described in detail in the manual NIISF calculation and design of natural, artificial and supplementary lighting 1985 year [7]. It can be used with minor simplifications and changes associated with modern technology and air conditioning in our time. For example, the specific amount of electricity for ventilation and cooling kWh/m² a year should be determined by the formulae in which the values that define the duration of ventilation and cooling in hours, are on the table "Repeatability temperature of external air in hours" [8], as total hours descending to temperatures of +21°C and above and for temperatures of +28°C and above (the temperature at which ventilation and cooling of air must be on). With modern conditioners, especially in the case of "split-systems", power consumption and cooling is nearly in an order of magnitude more than the adiabatic cooling using "chillers" on the rooftop or on territory near the building, and «fenkoils» for feeding fresh air directly to the premises. Such systems are most common in homes in the United States.

5. Saturation of the premises of the natural light and its research methods

Energy savings in the operation of fenestration is important but not decisive criterion for rationing DF. As shown above, we can calculate all the objective parameters of internal light environment, but we do not know what a man needs. What parameters of light environment must be necessary and sufficient? Only when normalization techniques were applied to artificial lighting expert and general polls of observers have been used and the criteria, such as Visual performance, fatigue have been introduced. Therefore, we can state that the rules of artificial lighting (received on flat objects on the working surface), are more or less scientifically based. Standards of natural lighting did not have reliable scientific substantiation. It is obvious that they are associated with comfort for the Visual work and saturation of natural light premises. Comfortable conditions of visual work shall be ensured by light levels, roughly corresponding to normed levels of artificial light. Tentatively they can match them. However, comfort is defined not only in terms of visual work. In such rooms as offices, production facilities, living spaces, lobbies, the regulatory conditions are influenced by the saturation of premises of natural light. This aspect is only beginning to be explored.

Light environment is characterized by richness of light, which is determined by the spatial characteristics of the light field. The

idea of the light field is offered by outstanding foreign scientists, such as J.Lambert, D.Weber, B.Arndt. Coherent light field theory has developed an outstanding Russian scientist A.A.Gershun in the first half of the 20th century. Professors Helvig and Krohmann (Germany), M.Gurevich, N.Boldyrev, V.Meshkov, M.Gutorov, M.Epaneshnikov and many others, developed later this theory. At the Moscow State civil engineering University (NRU MGSU) a completely scientific school, dedicated to the application of the spatial characteristics of light field under natural light, works on this issue [9]. First, it was work related to the use of spatial characteristics of light field used for the determination of conditions of visual work with three-dimensional objects. Now we proceeded to the characterization of the saturation of the premises of the natural light. This may be a new approach to rationing of natural lighting. Standardized lighting consists of two components: illuminance required for Visual work and general illumination indoors, which characterizes the saturation of natural light premises. The definition of these components is possible with the help of adaptation theory, developed by one of the classics of psychophysics H.Helson (USA)[10]. His proposed formula determines the level of customization depending on the focal, background and the residual stimuli and their weights:

$$A = X^P B^Q P^R \quad (3)$$

Where A – adaptation level of the system, after which happens the most complete adoption of stimulus and is the greatest match to human reactions. X, B and P, respectively, focused, background and residual stimuli, P, Q and R - weights, taking into account the intensity of the impact of relevant stimuli. For some research in the field of natural and artificial lighting, you can use the simplified formula of Helson:

$$A = X^P B^Q \quad (4)$$

Here the residual stimulus is taken into account in the background stimulus value. Study of lighting conditions are limited to the definition of focal values and background stimuli. For example, in the study of illumination in rooms where the main functional requirement is to execute the visual work, focal stimuli X is the illumination value, in which takes place the highest performance and the smallest fatigue. It is determined by the amount of artificial light for this visual work (according to the norms for horizontal illumination or, for 3D objects according to researched spatial characteristics of light field and their ratios). Background stimuli is the average illumination level in the room. Level of adaptation (A) shall be determined by psychophysical experiment based on expert assessments. For artificial light saturation of premises light was studied in the mid-20th century by M.M.Epaneshnikov and T.N.Sidorova in underground halls of the Moscow metro (fig. 6) [10]. They first demonstrated that saturation light premises can be defined by such spatial characteristic of light field as the average cylindrical illuminance. For natural light such research we conducted in NRU MGSU. This was natural lighting in classrooms and administrative offices [11]. However, for the characteristics of natural lighting, it was necessary to use relative units such as DK. We have proposed for this purpose, use cylindrical daylight factor (CDK), which represents the ratio of cylindrical illumination value from daylight at a given point of a premise to simultaneous outdoor horizontal illuminance. To apply the value of the outer cylindrical illumination would not be appropriate, since such data are not present in any climatic reference in the world, whereas data on outer horizontal illumination are everywhere available.

In the studied premises of offices visual conditions of work and light saturation of premises plays a similar role. The role of the focal and the background stimuli valued by weights $P = 0.5$ and $Q = 0.5$. Determined in psychophysical research value is the value of A, i.e. full adaptation, corresponding to the highest evaluation of the stimulus. This demonstrates the neutralization of applied energy. In our research for administrative offices it was 120 Lux on cylindrical light exposure at largest $KECO = 2\%$ in the center of the room.

Techniques of psychophysical studies should include

1. Selection of observer groups in number.
2. Selection of observers for quality (age, gender, professional data, etc.).
3. Definition of the objectives and tasks of the experiment.
4. The correct processing of the results of the experiment. This will ensure the accuracy of the results of the predefined experiment.

6. Conclusion

Currently, the inclusion of the human factor in building-physical science is especially important. How all this affects the natural lighting of monuments? We have to learn, whether the natural lighting conditions comply with the functional purpose of this monument of architecture. Resizing and changing the position of light openings in architectural monuments is impossible. It is necessary to calculate the magnitude of DK by currently available techniques mentioned above. If the values do not correspond to the norms of DK, so in this case in relation to monuments in the norms there are exceptions and you can use supplementary artificial lighting. The rules, as has been said, does not take into account saturation with natural light. That is why to owners of premises it is necessary to show, what will be the saturation of natural light indoors. In some cases, it will be necessary to determine according to the theory of adaptation the required illumination levels both in the workplace and on average across the room.

References

- R. Kittler. "Standardization of outdoor conditions for the calculation of the daylight factor with clear skies. Proc. CIE Intersession Meeting on Sunlight. Newcastle upon Tyne. 1965.
- Victor A. Zemtsov, Alexei K. Solovyov and Igor A. Shmarov. The Parameters of the luminance of the CIE Standard Sky within Natural Room Calculations and their Application under Various Light Climate Conditions in Russia. *Light & Engineering*. 2017. Vol. 25. No.1. P. 106-115.
- Darula Stanislav and Richard Kittler. Classification of Daylight Conditions in the Cloud Cover Situations. *Light & Engineering*. 2015. Vol. 23. P. 4-15.
- Set of rules. СП 18.1325800.2018. "Residential and Public Buildings. Code for the design of natural and combined lighting. Moscow 2018.
- A.K. Solovyov. Section 18. Natural lighting of buildings. "Reference book on illumination. Edited by Yuri Ajzenberg. M: Znak. 2006.
- Glagoleva So-called natural light industrial buildings. M. Publisher VTSSPS, Profizdat. 1961.
- NIISF of Gosstroy of USSR. Manual for calculation and design of natural, artificial and stacking lighting (to Snip II-4-79). M. Stroizdat 1985.
- Gosstroy of USSR. Building regulations, part II, section and Chapter 6. "Building climatology, and geophysics. SNiP II-A. 6-72. M. Stroizdat. 1973.
- Alexei K. Solovyov. Research into Illumination of Buildings and Constructions conducted in Educational and Scientific Institutes: Review // 2017. *Light & Engineering*. Vol. 25, no. 1.
- Yepaneshnikov M.M., Sidorova T.N. Evaluation of light saturation of premises in public buildings. *Svetotechnika*: 1965. No. 1.
- Muraviova N.A., Solovyov A.K. A study of distribution of natural cylindrical illumination in rooms with side light openings. // *Svetotechnika*: 2015. No. 6.

RENOVATION OF HOUSEBOATS AND RIVER STATIONS ON A REINFORCED CONCRETE BASE

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Abstract

The methods of renovating houseboats on a reinforced concrete foundation are regarded. Areas of flooding need such projects. The article highlights the idea of searching for a new landing stage function. Another idea of this article is the preservation of historical heritage on the Great Rivers. Unique historical designs of houseboats on a reinforced concrete foundation are considered.

The author describes such methods of renovation as:

- the preservation of the historical appearance, change of functions and constructions;
- the preservation of function and historical appearance, modification of structures and engineering equipment;
- the preservation of the object as a whole.

The author identifies the problem of social infrastructure for flooded areas. One of the options for solving this problem is the design of houseboats on a reinforced concrete and composite base.

Keywords: houseboats, landing stage, flooding area, river stations, historical heritage on the Great Rivers

1. Introduction

Wooden and metal barges, houses on boats, floating structures were historical prototypes of modern houseboats and river stations on a reinforced concrete base. In architectural typology such structures are called *debarcadars*. This term follows from the French (fr. - *debarcadere*, *debarquer* - unload, disembark). The *debarcadars* function as landing stages, hotels, dormitories, housing. The *debarcadars* as landing stages were survived to this day on the Great Rivers of Russia. There are many of them on the Volga River. Most of them have not remain uncorrupted their historical appearance. Owners of the houseboats and the landing stages replace their designs, redraw the floor plans, dismantle their unique historical elements on the facades. Only reinforced concrete bases remain unchanged.

2. The Characteristics of the Object

The first wooden landing stages or *debarcadars* were built by the owners of steamship companies on the Great Rivers of the Russian Empire. Several *debarcadars* looked like palace on the water (Fig.1).



Figure 1 – River station on the Volga. Photo of the early 20th century.

The *debarcadars* on reinforced concrete bases were designed in the Soviet Union from the beginning of the 30s of the 20th century. Basically, these were landing stations on navigable rivers. Reinforced concrete as the material of the hull (in some cases, the superstructure) allowed to reduce steel consumption, repair costs; their service life has increased significantly. The large weight of reinforced concrete bases did not lead to a deterioration in the operational qualities and increase in the draft of the bases. Initially, most of the base of river stations were poorly reinforced. They were built in a monolithic process. There were

many project options. The first typical river stations were built at the Rybinsk shipyard in Rybinsk on the Volga. In the sixties the monolithic method of construction was replaced by sectional and sectional-monolithic. This method allowed to reduce the labor intensity and the terms of construction of objects. New materials such as expanded clay concrete, reinforced cement began to be used in the production process. The estimated service life of reinforced concrete bases depends on the operating conditions. The average operating period is about 65-70 years. Thus, the reinforced concrete bases of the landing stages, which were built in the 1960s can be operated until 2020-2030. Wooden superstructures destroyed much faster than reinforced concrete bases. The first superstructure was a wireframe, trimmed with a rail and insulated with tali, board and cardboard. The superstructure of the fifties were skeleton-panel. In some projects the superstructure was completely shielded. This design greatly accelerated the assembly of the superstructure. In the Soviet Union design bureaus were developed more than 90 standard projects of landing stages and about 20 projects of floating dormitories for workers. These projects also have various modifications. On average, one standard project was the basis 40 landing stages. It should be noted that private individual houses on the water in the Soviet Union were not designed.

Landing stage, that were built in the 1930s in the 20's did not retain their historical appearance. Wooden superstructures exploited short-lived and subsequently dismantled. But the reinforced concrete pontoons continued to function as piers. Now on the rivers of Russia you can see river stations and landing stage that were built after 1945. Small landing stages retained their historical appearance on the Volga and its tributaries because their reconstruction is not economically beneficial to private owners. The reinforced concrete bases of these landing stages have a small length of 82 feet. These objects are the historical heritage of the Volga cities. Among them, one-and-a-half and one-and-a-half-decker landing stages were built on the projects 39, 344, 536, 61 (A / B). The project of landing stages number 47/47B are most common (Fig.2).



Figure 2 – landing station. Project 47B. Photo of 2015

The landing stage of Project 47 is medium length. The superstructure accommodates 124 passengers. Reinforced concrete pontoons are convenient for mooring local lines. Basically, these landing stages are piers of small settlements. Nowadays many of them are literally “live out their time”. Wooden superstructures are destroyed, rot and settle. In case of significant structural violations and the danger of subsequent exploitation, the superstructure is demolished. The reinforced concrete pontoon over the greater strength of the material continues to be exploited. Unfortunately, when the owners erect a new superstructure, they do not perform historical reconstruction.

3. Methods of renovation of houseboats and river stations on a reinforced concrete base

In the process of operating the superstructure, it is necessary to replace racks of the frame, fencing elements, interior and exterior decorations, and external wood cladding. In case of wear of wooden structures, a complete replacement of the wooden superstructure is required: dismantling of the old one and erection of a new one.

Methods of renovation of houseboats and river stations on a reinforced concrete base:

- the preservation of the historical appearance, change of functions and constructions;
- the preservation of function and historical appearance, modification of structures and engineering equipment;
- the preservation of the object as a whole.

Hotel Bereginia on the Volga River in the town of Gorodets is converted from an old river stations. The design and decoration of the facade have been replaced. The interior of the Soviet period is partially recreated in the lobby of the hotel (Fig.3).



Figure 3 – Interior of the hotel Bereginia

The rooms have modern decoration and equipment. New facade decorations does not violate the historical appearance. This method of renovation will allow to preserve the unique landing stages without significant changes in the historical appearance of unique objects in the style of the Stalin Empire.

4. Results of research

Let's look at a positive example of preserving a historical object. Not all of the Volga *debarkades* were completely rebuilt. The landing stage of the Cherepovets river station is a unique example of Soviet public architecture. The river stations ZhD-133 was built on the project 628 at the Gorodets Shipyard in 1955. The landing stage has a long length (214,5 feet). Its superstructure accommodates 321 passengers. The main facade of the landing stage (due to the long length) has a triaxial composition, which is emphasized by high dormer windows with a semicircular termination. In 2012 the *debarkades* ZD-133 was reconstructed, but it almost completely preserved its historical appearance. Only the stylistic decision of this river station is a color dissonance. Originally the superstructure of the station was painted in a light turquoise color. In 2012 the facades of the superstructure were painted in bright green. Despite the change in color, the historical importance of the object did not diminish. This river stations is a positive experience of preserving the historical object. The equipment was replaced by a more modern, historical content and appearance did not change.



Figure 4 – River station in Cherepovets

The historical appearance of the river stations can be preserved only if it become museums. The landing stage for Lake Denezhnoe near Volgograd could become a museum. This landing stage No.399 was built on the project 628 in 1954. From 1954 to 1964 it was used as a river station in Kamyshin in Volgograd region. In 1964 the landing stage was towed to Lake Denezhnoye. It was

a ball training base for rowing. Since the early 1990s, the landing stage as a rowing base has not been operated. Electricity was cut off. The road to the landing was overgrown. The superstructure was in a state of collapse, major repairs and reinforcement of structures were required.

In June 2013, the landing stage was recognized as an object of cultural heritage. During the state historical and cultural examination it was revealed that “The cargo-passenger two-deck landing stage on Lake Denezhnoe” is of value from the point of view of history and social culture as one of the few remaining water piers created for use as passenger river stations of cities on the Volga River in 50 -th. XX century, which were an integral part of the historical appearance of Stalingrad, Kamyshin, and other Volga cities; the architecture of the landing stage is represented by a wooden two-storey superstructure on a reinforced concrete pontoon, made in the style of a unique “Stalinist neoclassicism” (ACT of the State Historical and Cultural Expertise). But on June 26, 2013 the landing site was destroyed by fire.

With careful restoration, the landing stage could become the only archetype of architecture on the water of the period of Stalinist neoclassicism (Fig.5).



Figure 5 – landing stage for Lake Denezhnoe. Interior of the hall

5. Conclusions

Unfortunately, at present Soviet-era landing stages are included in the category of the so-called “unrecognized architecture.” The difficulties are not only in the procedure for recognizing the debarkades by objects of cultural heritage, but also, first of all, in their typological definition. At the moment, landing stages are entered in the River Register of Russia as a non-self-propelled river transport, which can be upgraded or disposed of at the request of the owner. A large number of postside landing stages were decommissioned and disposed of in the 90s of the 20th century. The methods described by the author will allow to preserve and revive historical objects. In the process of operation there should be a legal regulation should be. Otherwise, in 10-15 years, the historical legacy of stations on a reinforced concrete base may be lost.

Acknowledgments

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References

- Higer R. “Architecture of River Stations”. Publishing of the USSR Academy of Architecture, 1940, pp. 56-57.
- Alexusin G. The steamship company “Caucasus and Mercury”. Samara, 1995, p 281.
- Egorov N., Milto A. “Reference book on reinforced concrete shipbuilding: Inland navigation vessels”. Publishing Moscow, 2012, p. 179.

“SMART CITY”: A SUSTAINABLE DEVELOPMENT CONCEPT FOR THE BUILT-UP TERRITORIES FROM THE VIEWPOINT OF ENVIRONMENTAL COMFORT

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Abstract

The article examines issues of ecological problems caused by mass urbanization and the elaboration technique of comprehensive programme which should be useful for the environmental comfort enhancement. Special attention in the article is paid to the developed technique of a complex assessment of urban environmental situation in the reconstruction area. This technique is based on the calculation of the habitat quality index and drawing up the urban environmental passport of the territory. The stages of this technique and algorithm of the urban-environmental measures selection for improving the habitat quality is also presented in the article.

Keywords: sustainable development, smart city, urbanization, ecology, urban environment, complex assessment of territories, habitat quality index, urban-environmental passport

Introduction

Under the rapid growth of the built-up urban territories, the new problems arise as a possible outcome of social, economic, and technical changes. The most obvious and noticeable of these happen in urban environment state deterioration, which in this country are due to insufficient spreading of modern technologies of household and industrial waste treatment, lack of resources, and air pollution. These are the reasons of health problems among the city dwellers, deterioration and degradation of urban environment infrastructure [1, 4].

While considering the essence of the «SMART City» concept, a set of specific factors necessary for understanding the projects implemented within the framework of this concept must be highlighted. These factors can be divided into external and internal ones, influencing different stages of elaboration, introduction, and operation of the solutions found within the framework of urban space intellectualization [5]. The project activities aimed at the creation of a «SMART City» must be oriented at the establishment of an urban space infrastructure, and comprehensive systems based on the modern technologies and capable of flexible reaction to the problems that arise [3].

It is unlikely that all cities will be “like that,” but the vectors for implementing the idea are absolutely clear: the preservation of the region’s cultural heritage and the latest developments and technological achievements of various countries in Europe, Asia and the USA (alternative energy, environmentally friendly materials, deep waste recycling, desalination, eco-transport). With the approach that provides for the consideration of the possibilities of granting settlements with features of the “smart city”, new approaches to the preservation of the historical and cultural heritage are emerging [11].

The elaboration technique of comprehensive programme for the environmental comfort enhancement

To solve the urban environmental problems and to improve the level of comfort for the residents, a set of activities including elaboration, adoption and implementation of coordinated measures for the integrated improvement of built-up areas, as well as planning of a system of improvement newly developed areas to ensure a satisfactory level of comfort must be implemented.

For the purpose of environmentally comfortable sustainable development system creation for the built-up areas, and in order to secure the conditions for increase of the quality and amenity of living for the residents, it is proposed to produce a comprehensive programme for the environmental comfort enhancement based on the provisions of the Russian Federation Ministry for Construction, Housing and Utilities priority project called “Creation of a Comfortable Urban Environment”. The programme is shown in Fig. 1

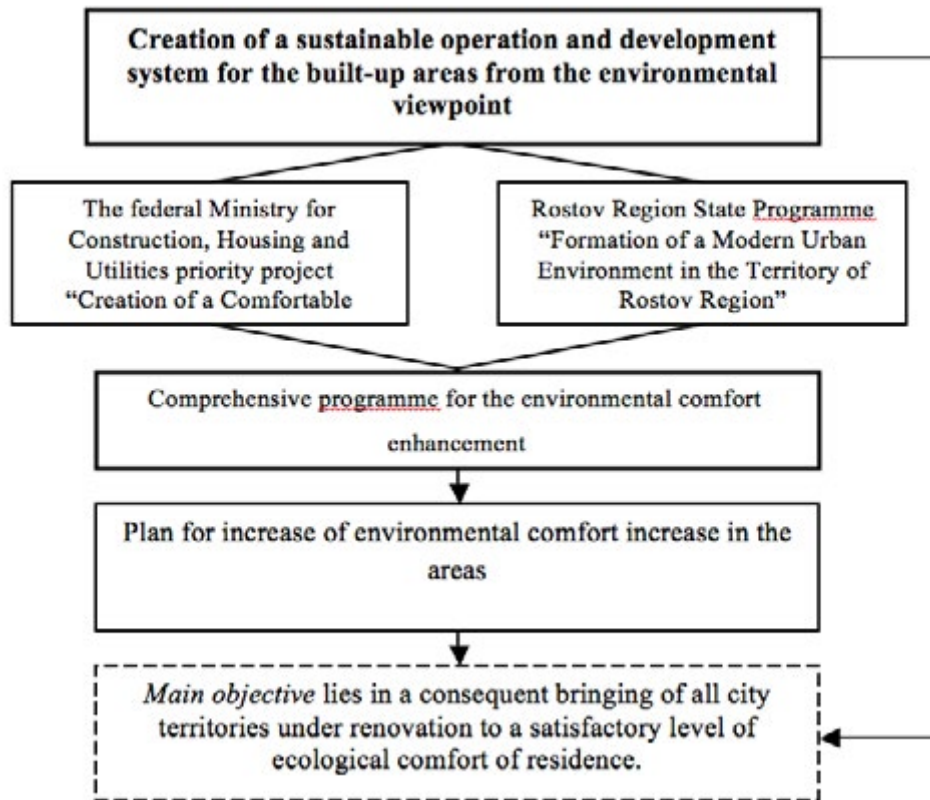


Figure 1 – Comprehensive programme for the environmental comfort enhancement in the course of urban areas improvement

The elaboration technique of this comprehensive programme includes 4 stages. Each of these stages has a specific deliverable and is aimed at the solution of particular tasks:

1. Diagnostics of current state of urban environment from the viewpoint of sustainable development;
2. Elaboration of methods for a comprehensive evaluation of urban areas;
3. Elaboration of an information pattern for environmental comfort enhancement in the course of comprehensive urban areas improvement;
4. Elaboration of environmental comfort enhancement programmes based on the comprehensive ecological monitoring in the course of urban areas improvement.

At the same time, it is obvious that the search for project solutions with an orientation toward the “smart city” model and the application of new information and technological methods should be conducted taking into account the prevailing typology of Russian cities, their diversity and real state, with their taxonomic development trends, the possibilities of preserving the historical and cultural environment and updating existing buildings, creating the necessary level of comfort and ecological well-being [11].

Solution of the modern city environmental issues demands a systematic approach and shall include the sanitation and preservation measures in respect of every component of the urban environment. One of the easiest and the least expensive measures which is nonetheless quite effective which can be taken in the course of comprehensive urban areas improvement is the increase of city greenery area. This is the reason why the offered technique concerns the enhancement of environmental comfort of residence via urban environmental measures aimed at the increase of greenery density in the built-up areas.

Technique of a complex assessment of urban environmental situation in the reconstruction area

Special attention should be paid to the developed technique of a complex assessment of urban environmental situation in the reconstruction area. The technique, which is based on the drawing up the urban environmental passport of the territory and calculation of the habitat quality index, includes 7 stages (Figure 2).

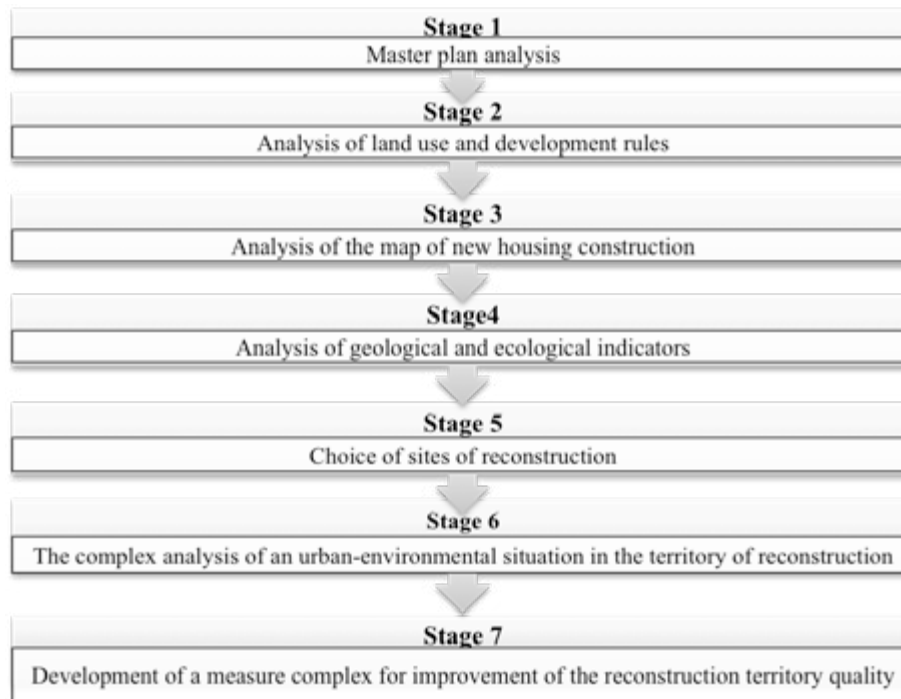


Figure 2 – Technique of a complex assessment of urban environmental situation in the reconstruction area

Technique of calculation of the habitat quality index (I_{hq}) is based on the method of integral evaluation of factors measured in a range of different scales and dimensions and converting them into non-dimensional parameters.

On the basis of calculated habitat quality index, it is determined to which zone the study area of the reconstruction refers – favorable, rather favorable, adverse, extremely adverse, and then the selection of urban-environmental measures for improvement of the habitat quality is performed (Figure 3).

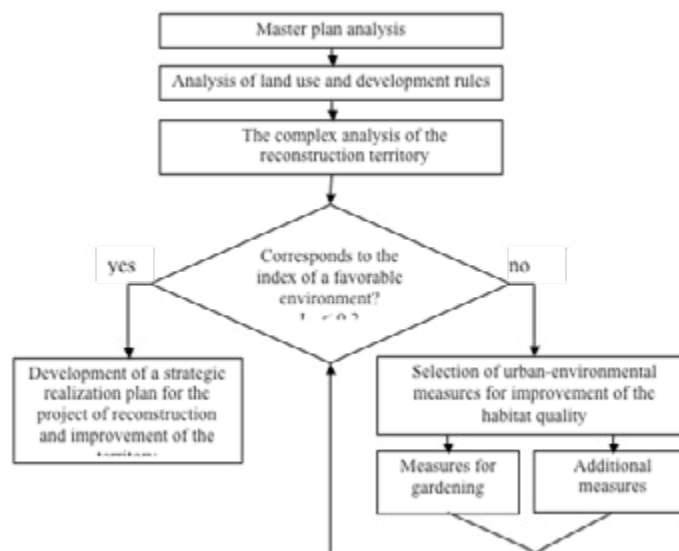







Figure 3 – Algorithm of the selection of urban-environmental measures

For carrying out complex assessment of an urban environmental situation and drawing up the urban-environmental passport of the territory 3 sites of new housing construction in Rostov-on-Don located in extremely adverse, adverse and rather favorable zones on the habitat quality index have been chosen. The complex analysis, as well as the recommended complex of urban-planning measures for improving the habitat quality in selected areas, is presented in the Table 1, which will be further used as a basis for the drawing up the urban-environmental passport.

Table 1 – Recommended complex of urban-planning measures for improving the habitat quality in sites of new housing construction (sample)

Area arrangement on the map and the satellite image	Main urban-planning and ecological indicators of the territory	Zone according to the habitat quality index	Recommended complex of urban-planning measures for improving the habitat quality
	<ul style="list-style-type: none"> • Name – Hippodrome – industrial and warehouse zone; • Administrative-territorial unit – Kirovsky and Proletarsky districts; • Total area – 570 thousand m²; • The area of green spaces – 124,7 thousand m²; • Percent of green spaces in total area – 21,9%; • Planned area of new housing construction – 686 7 thousand m²; • The territory provided for the placement of new housing construction – 95 ha. • Population– 19,4 thousand of people. • Ecological risk zone – extremely dangerous, dangerous; • Geological risk zone – dangerous; • Grounwater depth – 4-10 m; • Rate of groundwater rising – 15-50 sm/year; • Noise pollution – 64-81 dB, low-risk, dangerous zones; • Atmosphere pollution – 5-8 MAC, >8 MAC, dangerous, extremely dangerous zones; • Soil pollution – low-risk – extremely dangerous zones; • Presence of natural and architectural monuments – the zone of archaeological observations. 	<p>The site is located in EXTREMELY ADVERSE zone</p>	<ul style="list-style-type: none"> • Double-row planting: tree + bush; • Multi-row planting with increasing the density and the state of green spaces to standard ratios; • Creation of special green belts and installation of noise screens along the railways to reduce noise pollution; • Organization of green planting maintenance; • Elimination of spontaneous landfills, timely and regular disposal of solid waste; • Drinking water treatment; • Increasing of the gap between the built-up area and roadway; • Organization of a transport and pedestrian network of residential areas with priority for pedestrians; • Arrangement of drainage systems for groundwater level reduction; • Groundwater and surface water flow regulation; • Arrangement of catching structures.

 	<ul style="list-style-type: none"> • Name – Krasnyy Aksay • Administrative-territorial unit – Proletarsky district; • Total area – 190 thousand m²; • The area of green spaces – 48,3 thousand m²; • Percent of green spaces in total area – 25,4%; • Planned area of new housing construction – 268 thousand m²; • The territory provided for the placement of new housing construction – 64 ha. • Population – 8,9 thousand of people. • Ecological risk zone – extremely dangerous, dangerous; • Geological risk zone – low-risk; • Grounwater depth – 0-7 m; • Rate of groundwater rising – 0-15 sm/year; • Noise pollution – 64-81 dB, low-risk, dangerous zones; • Atmosphere pollution – 5-8 MAC, >8 MAC, dangerous, extremely dangerous zones; • Soil pollution – low-risk zone; • Presence of natural and architectural monuments – zone of regulated housing development 	<p>The site is located in ADVERSE zone</p>	<ul style="list-style-type: none"> • Double-row planting: tree + bush; • Multi-row planting with increasing the density and the state of green spaces to standard ratios; • Creation of special green belts and installation of noise screens along the railways to reduce noise pollution; • Organization of green planting maintenance; • Elimination of spontaneous landfills, timely and regular disposal of solid waste; • Drinking water treatment; • Increasing of the gap between the built-up area and roadway; • Organization of a transport and pedestrian network of residential areas with priority for pedestrians; • Improvement of elevation marks (mounding, pile foundations, padding of floodplain lands); • Arrangement of drainage systems; • Groundwater and surface water flow regulation;
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	<ul style="list-style-type: none"> Name – Leventsovsky Administrative-territorial unit – Sovietsky district; Total area – 2260 thousand m²; The area of green spaces – 356,9 thousand m²; Percent of green spaces in total area – 15,8%; Planned area of new housing construction – 2358 thousand m²; 		<ul style="list-style-type: none"> Double-row planting: tree + bush; Multi-row planting with increasing the density and the state of green spaces to standard ratios; Creation of special green belts and installation of noise screens along the railways to reduce noise pollution; Organization of green planting maintenance; Elimination of spontaneous landfills, timely and regular disposal of solid waste; Drinking water treatment; Increasing of the gap between the built-up area and roadway; Organization of a transport and pedestrian network of residential areas with priority for pedestrians; Arrangement of drainage systems for groundwater level reduction;
	<ul style="list-style-type: none"> The territory provided for the placement of new housing construction – 252 ha. Population – 79 thousand of people. Ecological risk zone – low-risk, dangerous; Geological risk zone – low-risk, dangerous; Groundwater depth – 0-10 m; Rate of groundwater rising – 0-50 sm/year; Noise pollution – 59-74 dB, not dangerous low-risk zones; Atmosphere pollution – 1-5 MAC, not dangerous, low-risk zones; Soil pollution – low-risk zone; Presence of natural and architectural monuments – zone of archaeological monuments protection. 	<p>Most of the site is located in RATHER FAVORABLE zone, however, a small part in the northeast located in ADVERSE zone</p>	
			

Conclusions

The modern city is a complex socio-economic and spatio-ecological system with many internal and external links. It is obvious that the reconstruction of urban territories requires a systematic approach, which allows identifying and solving the problems of the existing territory in the complex. In order to achieve normal living conditions and functioning of the existing urban territory, it is necessary to bring all the elements of the system to the normative level of quality, and also to take decisions on updating all elements of the reconstructed territory.

The proposed technique of complex assessment of urban environmental situation in the reconstruction area with the calculation

of the habitat quality index and the compilation of the urban-environmental passport of the reconstruction area is an effective instrument of information support for the implementation of a comprehensive program of environmental comfort improvement for urban areas.

References

Dolinina O.N., Pechenkin V.V. (2017) Smart City: An Integrative Concept of Social and Technological Design of Urban Space / Urbanistics: Experience of Research, Modern Practices, Urban Development Strategy: Joint Theses of the All-Russian Scientific and Practical Conference. Saratov, Saratov State Technical University. 88-90.

Chourabi H., Nam T. and other, Walker S., Mellouli S., Nahon K., Pardo T.A., Scholl H.J. Understanding Smart Cities: An Integrative Framework. In Proc. of the 2012 45th Hawaii International Conference on System Sciences, IEEE Computer Society pp. 2289-2296.

IEEE Smart City definition. URL: <http://smartcities.ieee.org/about/> Reference date: March 11, 2017

Learning in a Smart City Environment // R. Nikolov, E. Shoikova, M. Krumova, E. Kovatcheva, V. Dimitrov, Shikalanov // Journal of Communication and Computer 13 (2016). Pp. 338-350.

Toppeta D. The Smart City Vision: How Innovation and ICT Can Build Smart, “Livable”, Sustainable Cities” // The Innovation Knowledge Foundation, 2010. URL: intaivn.org/

Vagin V.S., Sheina S.G., Chubarova K.V. (2015). Problems of Spatial Arrangement of Cities with a Pronounced Historical Center // Internet journal “Naukovedenie”, Vol. 7(3). 1-7 URL: <http://naukovedenie.ru/PDF/116TVN315.pdf>.

P. Grabov, A. Naumov, I. Avilova Scientific aspects of productivity management in the investment and construction sector // J. International Business Management 10, 1354-1364 (2016).

Tsukernikov, I. Shubin, N. Ivanov, T. Nevenchannaya Features of railway noise rationing and assessment in housing estate territory in Russia // J. Procedia Engineering. 117, 362-367 (2015).

S. Sheina, A. Khamavova Technique for the Russian Federation regional territories assessment used to create industrial parks network // J. Procedia Engineering 150, 1960-1965 (2016).

E. Shcherbina, N. Danilina Town planning aspects of designing sustainable urban environment // Proceedings of Irkutsk State Technical University 1, 183-186 (2014).

Esaulov GV, Esaulova LG “Smart city” as a model of urbanization of the 21st century // Urban planning. 2013. No. 4 (26). Pp. 27-31.

PRESERVATION OF OBJECTS OF CULTURAL HERITAGE (HISTORICAL AND CULTURAL MONUMENTS) IN SCIENTIFIC AND TECHNICAL JOURNALS

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Abstract

The article considers the place and role of scientific and technical media publications in the effective solution of issues of reconstruction, restoration, preservation of monuments, objects of cultural heritage and historical buildings.

The nature and focus of publications on the introduction of new, information and digital technologies in design, pricing, construction production, expertise; on the integration of new constructive solutions into the overall concept of structural reconstruction and revival of cultural heritage sites in the context of «smart city» projects were studied on the example of such editions as *BST – the Bulletin of the construction equipment and Industrial and civil construction*.

One of the analysed areas is the use of international experience in preserving cultural heritage sites; involvement of citizens, public associations and organizations in development of proposals and determination of priorities in the field of reconstruction, restoration and preservation of monuments, objects of cultural heritage and historical buildings. Professional and reliable information should help to increase the effectiveness of made decisions in certain priority areas of the industry.

It is concluded that in the current conditions of management there is an increasing influence of scientific and technical editions on such sphere of social development of the society as the preservation of cultural heritage.

Keywords: mass media, scientific and technical journals, objects of cultural heritage, preservation, revival

1. Introduction

Journalism is a type of social activity on collecting, processing and transfer of relevant information via channels of mass communication, a system of enterprises and means of collecting and delivering of information, as well as a special social subject with a number of subsystems (“publisher”, “communicator”, “text”, “channel”, “audience”) that form an integral system with many internal and external factors and functions.

Russian sociologist, creator of the Soviet and Russian theory of journalism, E.P. Prokhorov, approaches the definition of the functions of journalism in terms of the fact that journalism is a multifunctional system. At present, functional tasks of journalism, according to E.P. Prokhorov, are “social orientation, management of the consciousness and behaviour of the addressee of mass information, the formation of an adequate picture of reality, as well as ideas about “the desirable future” and ways of its achievement, determination of the views of life of citizens, development of the relations to various phenomena of life”.

To fully understand the role of journalism and mass media for society, the whole “spectrum of functions” that is constantly changing and expanding due to the increasing importance of information in modern society should be considered.

2. The role of scientific and technical editions

The scientific community is a creator of scientific information and represents a complex self-organizing system in which state institutions, public organizations and other groups operate.

Providing scientific and theoretical, practical and professional activities with information is the main objective of scientific and technical editions. In this case information acts as a goal. Increase in demand and importance of scientific and technical editions are facilitated by the fact that effective operation and development of any field of activity (industry) requires objective and reliable information that specialists receive from relevant publications.

Scientific and technical editions are of great importance in the information process, as they represent a link that makes contact between science, technical research and the audience. Scientific and technical editions affect not only the motivational attitudes of the audience but also the scientific community by transforming information flows.

The activities of scientific and technical editions play an important role in the formation, functioning and development of public consciousness, in influencing all spheres and institutions of society. By the means of scientific and technical publications it becomes possible to popularize, provide information, highlight the positive and negative aspects of various events as well as show scientific and technical discoveries and implementations and shape the attitude of society towards them. All of this contributes to strengthening the interaction between society and the scientific community.

Publications in scientific and technical editions allow an active part of specialists to express their point of view, discuss draft bills in the field of protection of monuments and objects of cultural heritage: to cover this topic in a highly professional way.

Such activities contribute to the search of forms of influence on the progressive public, to the work in contact with public organizations including regional ones.

Scientific and technological achievements and developments acquire a public resonance thanks to mass media, scientific and technical editions. New sources of funding and whole programs for supporting science and technology appear in connection with reaction of society to scientific and technical materials published in scientific and technical editions.

Such issues as introduction of new, information and digital technologies in design, pricing, construction, expertise; integration of new constructive solutions into the overall concept of structural reconstruction and revival of cultural heritage objects in the context of the “smart city” project hold a special place among publications in scientific and technical editions.

Thanks to the activities of scientific and technical editions that cover international experience in preserving cultural heritage objects it becomes possible to involve citizens, public associations and organizations in development of offers and identification of priorities in the field of reconstruction, restoration and preservation of monuments, objects of cultural heritage and historical buildings.

3. Main characteristics of the audience of scientific and technical editions

When studying scientific and technical editions readers who are interested in the topic of science and technology, mainly specialists in their fields of knowledge, are considered as the target audience.

Conventionally, the target audience of a scientific and technical edition can be divided into two groups.

The first group includes professionals (fully formed specialists) who must constantly receive reliable, qualitative information about what is happening in the world of science and technology. They are specialists who have a certain level of education and are engaged in a certain field of science and practice. They are interested in the technical, methodological, productive side of a discovery, achievements, inventions. They are practicing experts, teachers, engineers, scientists who make up a permanent and unchanging audience.

The second group consists of non-professionals (amateurs). It includes people whose interest in science and technology is of random nature and is not dominant in the system of their needs and interests. Besides, to this group includes students of architectural and construction universities that are interested in certain industry topics and refer to information in scientific and technical publications due to their educational needs (learning specialists).

4. Problems of preservation of objects of culture on pages of construction journals

Professional and reliable information should help to increase the effectiveness of made decisions in certain priority areas of the industry.

In the current conditions of management there is an increasing influence of scientific and technical editions on such sphere of social development of the society as the preservation of cultural heritage.

Scientific and technical editions of architecture and construction orientation make a significant contribution to understanding the effectiveness of solutions to the issues of reconstruction, restoration, preservation of monuments, objects of cultural heritage and historical buildings. Construction scientific and technical journals publish analytical and scientific articles, comments, serve as a platform for professional discussions among specialists of the construction complex dealing with issues of the revival and preservation of cultural heritage.

Undoubtedly, scientific and technical editions and other mass media should cover topics related to the preservation of monuments and objects of the cultural heritage of the Russian Federation, initiate broad discussion and involve specialists and concerned parties (public, local authorities) in solving these issues.

Materials published in scientific and technical journals are based on examples of a particular city, region, thereby revealing more effective ways of preserving objects of cultural heritage.

Among scientific and technical, architectural and construction editions, such journals as the BST journal (Bulletin of construction equipment) and the PGS journal (Industrial and civil construction) can be outlined as an example.

The BST journal (Bulletin of Construction Equipment) is a monthly scientific and technical production journal that consists materials on technical regulation in construction. It was founded in 1944. On the pages of the journal readers find information on new regulatory documents, information on new equipment and technology of construction work, progressive types of building materials and structures, metrology and measurement technology, automated control systems, safety practice and environmental protection.

In the BST journal the issues of preservation of cultural heritage objects are considered in various contexts: methodological and technical components, development of urban agglomerations, safety of habitat, creation of a comfortable urban environment, training of personnel.

The studies of specialists of the Scientific Research Institute of Building Physics of the Russian Academy of Architecture and Construction Sciences made by N.P. Umnyakova, I.L. Shubin, V.A. Smirnov, D.V. Karpov and aimed at analysing the influence of vibrations on the preservation of cultural monuments are an example of addressing both to a specific object and to the habitat in general. Thus, the authors analyse the influence of the metro trains on cultural heritage objects on the example of the chapel of St. Nicholas in Moscow located at a distance of 40-60 meters from the Sokolniki metro line. The article describes in detail the equipment and methods for measuring vibrations, which with the help of a digital filter system made it possible to perform a spectral analysis of vertical and horizontal oscillations. In the course of the study, it was concluded that the levels of floor vibroacceleration are within the limits allowed by sanitary norms; therefore, the impact of vibrations from metro trains will not have a negative influence on other architectural monuments located at a distance of more than 60 meters from the metro line.

The approach to the training of highly professional personnel, in particular restoration architects, using the method of constructive and restoration investigation is shown in a publication of B.L. Valkin, the associate professor of the Moscow State University of Construction. This is a pedagogical experiment aimed at immersing future specialists in the history of architecture to work with the techniques, means, details and nuances of architectural shaping inherent in different architectural styles. The students were given the task of restoring the supply ventilation shaft located in the yard of the estate of the merchant Nikolai Vasilievich Igumnov (construction of 1893). As a result students developed facades with use of profiles of fiascos of an initial section and taking into account the style trends in the Russian architecture of that time; door and window openings are placed according to the blueprints of the plans; several versions of functional adaptation of a tower, its interior decision and the organization of artificial lighting were proposed.

In publications devoted to such a priority direction of national development as creating a comfortable urban environment, special attention is paid to projects for the improvement of urban areas that affect the facades of houses, the appearance of infrastructure facilities and the condition of monuments. Specialists who express their views on this issue on the pages of the journal note that in Moscow during the implementation of the program for the creation of comfortable urban spaces, the number of architectural monuments and historical buildings in poor condition has significantly decreased.

The PGS journal (Industrial and civil construction) was established in 1923 as a scientific and technical and production edition. The publications reflect innovative ideas of science and practice, issues of security of buildings, management and organization of construction, problems of urban planning and architecture, etc. On its pages, Leading scientists and practitioners, architects and engineers who made the glory of domestic construction, such as V.G. Shukhov, A.V. Shchusev, N.P. Melnikov, A.A. Gvozdev and many others.

A separate section in the PGS journal is devoted to restoration and reconstruction of historical and architectural heritage.

Publications of this section contain studies aimed at studying of various approaches to preservation and updating the architectural and historical environment of cities: for example, T.V. Vavilonskaya, head of the Department of restoration and reconstruction of the architectural heritage of the Architecture and Construction Institute of Samara State Technical University, in her article compares various mental representations about the architectural and historical environment of Samara and comes to a conclusion that in the field of crossing of various valuable pictures there is a condition of sustainable development of the architectural and historical environment for the benefit of architectural heritage.

Representatives of the Institute T.G. Artemyeva, E.M. Balzannikova and A.K. Leonova in their article devoted to the issue of the apology of highly depreciable non-functioning cultural heritage objects analyse the risks of preservation of cultural heritage objects during the secondary development of the historically developed territories of Samara. The authors note the need to assess cultural and physical value of cultural heritage objects, to analyse existing types of cultural heritage objects taking into account their technical condition and the possibility of further use. Based on the results of the study the authors of the article propose probabilistic models of functional filling of cultural heritage objects in order to preserve the further viability of the historic core of the city.

Besides, publications present in details the methods and ways of modern diagnostics of condition of buildings that analyses the causes of deformation. Thus, V.A. Shashkin and LA. Glybin from PI Georeconstruction LLC (St. Petersburg) using the example of the Exchange building on the Spit of the Vasilievsky Island, one of the significant architectural monuments of the city, note that in order to qualitatively diagnose the technical condition, in addition to analysing the history of the construction and reconstruction of the monument it is necessary to carry out an engineering and geological analysis of its grounds, to address to the data of long-term observations of the development of deformation of the territory, to estimate the accumulated unevenness of the deformations of the building, to perform a retrospective calculation of interaction of base and construction. The authors state that this approach will offer adequate methods of stabilization.

The special attention of publications devoted to the preservation of monuments and objects of cultural heritage and their reconstruction is aimed at the fact that the main idea of reconstruction – the natural and expectable stage of the building's life – is to create local centers of attraction of areas useful to residents and commercially expedient.

5. Conclusion

Scientific and technical editions have a great influence on various fields of economy, industry, on the market participants regarding establishing interaction between them.

Publications on the pages of scientific and technical editions that cover topics of reconstruction, restoration, preservation of monuments, objects of cultural heritage and historical buildings allow us to comprehensively approach the study of this issue, find effective solutions and develop a set of measures to address this issue.

A versatile, integrated approach is a distinctive feature of scientific and technical editions in covering the issues of preservation of cultural heritage objects and historical buildings. Publications pursue not only the aim of informing the audience, but also of achievement of results, therefore, they work for the common good of citizens and the country.

References

Artemyeva T.G., Balzannikova E.M., Leonova A.K. On the issue of the apologia of highly depreciable non-functioning cultural heritage objects on the example of historical development of Samara center // *Industrial and civil construction*. 2017. No. 3. Pp. 33-38.

Bolkhotinova S.M. and others. Composition of publications: Design features of various types of publications: Textbook / Ed. By S.M. Bolhotinova. – M.: MGUP Publishing House, 2000, 166 p. [Electronic resource]. – Access mode: <http://www.hi-edu.ru/e-books/xbook095/01/title>, access date 05.02.2018.

Grabelnikov A.A. Russian journalism at the turn of the millennium: Results and prospects: Monograph / A.A. Grabelnikov. M.: RIP-Holding, 2000. 334 p.

Ignatenko V.V. Dictionary on electoral law / V.V. Ignatenko, A.E. Shturnev. Irkutsk: IGEA Publishing House, 1999. 400 p.

Oleshko V.F. Journalism as creativity: manual for the courses «Fundamentals of journalism» and «Fundamentals of creative activity of a journalist». M.: RIP Holding, 2005. 222 p.

Prokhorov E.P. Introduction to the theory of journalism: Textbook for university students enrolled in the Journalism direction – 6th ed. M.: Moscow State University Publishing House, 2005. 367 p.

Ryabinicheva D.V. Features of information dissemination in periodical scientific and technical editions. IX International Scientific and Practical Conference «Modern concepts of scientific research». The Eurasian Union of Scientists. 2014. Part 5. Pp. 40-41.

Shashkin V.G., Glybin L.A. Diagnostics of the technical condition of the Exchange building on the spit of Vasilievsky Island // *Industrial and civil construction*. 2017. No. 12. Pp. 68-76.

Tulupov V.V. Design and advertising in the system of typological features of Russian newspapers (philological, philosophical, psychological and creative aspects). The author's abstract of the thesis for a doctor's degree. Krasnodar, 2000.

Vavilonskaya T.V. Scientific, philistine and pragmatic pictures of the value of the architectural and historical environment // *Industrial and civil construction*. 2017. No. 1. Pp. 64-69.

Voroshilov V.V. Theory and practice of mass information: Textbook / V.V. Voroshilov. 2nd ed., revised and enlarged. M.: KNORUS, 2014. 464 p.

PECULIARITIES OF ACOUSTIC DESIGNING OF MUSLIM TEMPLES IN ALMATY

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Abstract

The article touches upon the acoustic conditions of the Almaty city mosques, the factors of external conditions, the analysis of influence of the geometric parameters of prayer halls on its acoustic qualities, and the development of recommendations reflecting the complex of measures to correct the acoustic parameters in accordance with the requirements.

Keywords: acoustics, acoustic parameters, reverberation, sound field, sound absorption, sound intelligibility

1. Introduction

When designing Muslim temples, there are a number of features inherent in specific space-planning decisions and functional zoning, the division of internal volumes, peculiar relationships of air volumes of individual parts, which leads to transient processes of post-sound and unsatisfactory intelligibility of sound.

At the moment there are no documents that normalize the volume optimum of reverberation and other parameters of acoustic comfort associated with varying degrees of filling the temple, it is necessary to develop an acoustic calculation method for Muslim mosques and recommendations for choosing sound amplification installations.

It is necessary to ensure the uniformity of the distribution of the sound field in the prayer hall, the correct distribution of the reflected sound, and the prevention of the concentration of reflected sound. It is necessary to combine the requirements by different degrees of dismemberment of individual internal surfaces. The article presents the results of research into design features: internal planning solutions and frequency characteristics of sound fields in interior spaces, significant differentiation of acoustic conditions, depending on the number of parishioners, on the ratio of air volumes and areas of sound absorption, taking into account the specific features of paintings and inscriptions on the walls.

2. The characteristics of object

Urban mosques are the largest groups of new mosques in Kazakhstan. In recent times, new mosques have been built in each large and middle city of Kazakhstan, where apart from the main prayer hall; there are rooms for daily five-time prayings. The mosques are intended for large joint prayings on Fridays, and also for the days of major Muslim holidays such as Kurban Ait and Kurban Bayram. For the most part, this type of mosques differs in its large size and richness of ornamental decoration (1).

From the first appearance of Islam, the cathedral mosque has been considered to be a main reference point, main landmark, the most important and majestic mosque in any city, which is visible from anywhere and other urban mosques have had the status of quarter mosques (*Musallah*).

The essence of superiority of cathedral mosque over other ones is that in this mosque Muslims gathered for the purpose of preserving their unity and solidarity and brought to fulfilment Friday namaz, which is one of the most important things in Islamic city. Stefano Byanka writes: "The basis of such city complex includes the mosque and the market, the connection between them is based on ancient Arab-Islamic tradition, as far as we know Mecca had already been at the same time a place of pilgrimage and also a trade center [2].

This tendency can be traced in the construction of mosques in the cities of Kazakhstan. So, the Central Mosque of Almaty was erected near the central market (3). The tendency also was applied in other mosques in Almaty.

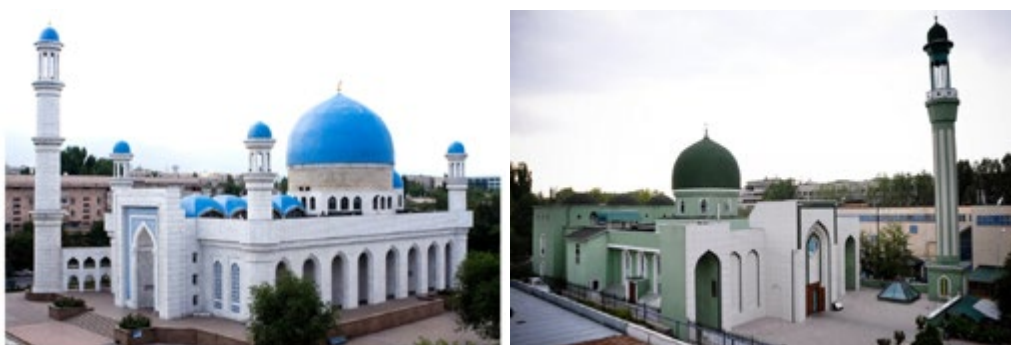


Figure 1 – a) Central Mosque; b) Orbita Mosque



Figure 2 – a) Mosque “Zarya Vostoka”; b) Mosque “Akzhar”

The analysis of space-planning solutions of new mosques in Kazakhstan gives grounds to confirm that traditional and historically developed compositional schemes are used in modern domestic design practice and construction of religious objects, such as longitudinally axial compositions - portal-domed composition of mosques in Southern Kazakhstan (for example, Khoja Ahmed Yasavi mausoleum in Turkestan, 15th century); central-domed compositions of mosques and mausoleums of Southern Kazakhstan; longitudinally axial compositions of “Tatar” type mosques with a protruding part of minaret, which gained widespread in the 19th and at the beginning of 20th centuries, mainly in Northern, Eastern and Central regions of Kazakhstan; longitudinally axial Mosques: a) portal-domed mosques (for example, the central cathedral mosque in Almaty, 1999, Khoja Ahmed Yasavi mosque in Orbita microdistrict in Almaty, 2002 (2)/

The ideas of Islam are transmitted by certain geometric forms: a circle, as a symbol of infinity and a cube, symbolizing integrity and unity. The mosque - the queen of Muslim architecture - is unique, complex and diverse due to the fact that throughout the centuries it was bound by strong ties with Islamic worldview and spiritual needs. Islamic spirituality speaks using the language of architecture, enclothing the stones with the ideas of benefit, beauty and faith in the power and unity of Allah. The above mentioned ethic and aesthetic principles in the phenomenon of mosque are the results of architectural search for the solution which is based on traditions, modernity, aesthetics and especially, the functionality of mosque in urban space.

Indicators of acoustic quality of prayer halls

The necessary condition for good acoustics of temples and mosques is the optimal reverberation time. At the same time, it should be remembered that the optimal values of reverberation time exist in rooms with sufficient sound diffusion

The optimal value of the reverberation time of the temple depends on its air volume, the total area of the internal surfaces and the total equivalent area of sound absorption, depending on the materials of the enclosing structures and the number of decoration elements that cause additional sound absorption. In calculating the reverberation time of the temple, as a rule, is taken filling praying 70% of the total capacity of the temple. Sound absorption of the rest of the space is accepted as a floor material. With a small filling of the temple reverberation time increases. In this case, special attention should be paid to ensuring that the estimated reverberation time is not overstated. When calculating the reverberation time in temples with attached altars separated from the middle of the temple portal with a low iconostasis, the volume and area of the interior surfaces of altars are not taken into account. In this case, the area of the altar opening with the corresponding value of sound absorption is taken into account.

3. Assessment of acoustic parameters of prayer halls

The need for field measurements is the result of the need to evaluate the acoustic parameters of prayer rooms. Acoustic examination of the prayer hall was conducted. The following parameters are measured at the survey in the hall:

1. Reverberation time T_{30} , s. this value determines the time interval, calculated from the moment the source is turned off, during which the received microphone signal is reduced by 60 dB. The reverberation time T_{30} is calculated from the measured pulse response as defined by ISO-3382.
2. RaSTI, (Rapid Speech Transmission Index), the coefficient of the speech intelligibility. Characterizes the intelligibility depends on the background noise level, reverberation time and room dimensions, almost varies from 0 to 1.

4. The results of the measurements

All were selected 5-12 points for placing the measuring microphone. Taking into account the symmetry of the hall relative to the Central longitudinal axis, control points were selected in half of the hall.

Thus, the analysis of the measurements showed that the reverberation time is high, and the intelligibility - low levels. Measurements were carried out in rooms with finishing and there are enough sound-absorbing elements in the form of carpets and interior, it can be argued that the carpet covering of the floor reduces the reverberation time at medium and high frequencies. The floors are made of marble tiles, walls – plaster on concrete.

Table 1 – Acoustic performance of prayer rooms

Title	Volume	Time reverberations	Coefficient intelligibilities
The great hall of the Central mosque	6336	4	0,34
Small hall of the Central mosque	1836	3	0,54
Zarya Vostoka	1261	2,9	0,49
Orbita	3493	2,6	0,38
Kaskelen	1047	2,7	0,45
Akzhar	341	2,3	0,57

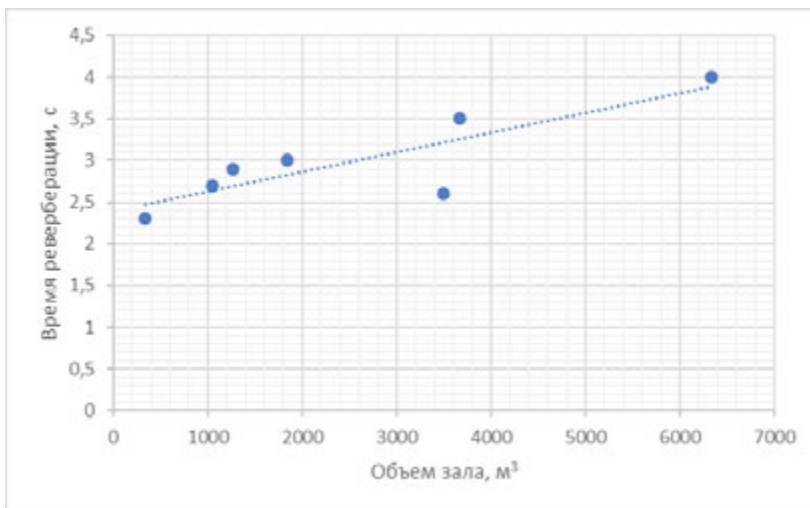


Figure 3 – The measured reverberation time at middle frequencies in data volumes

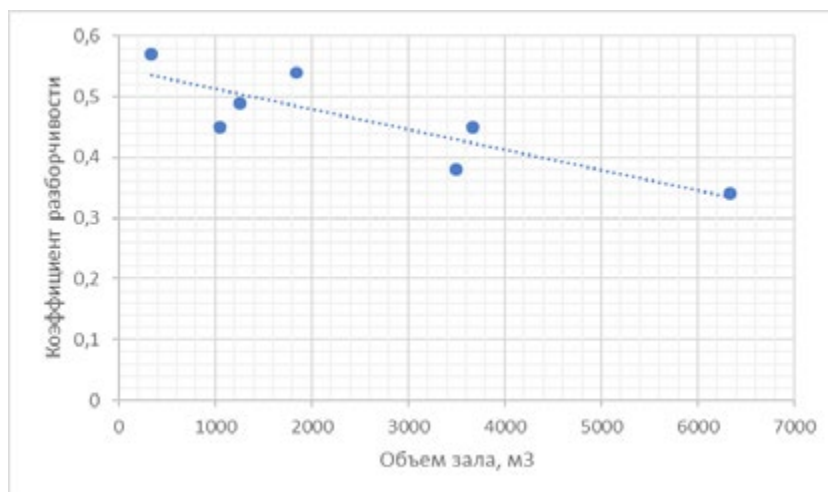


Figure 3 – The measured values of the coefficient of intelligibility in the midrange when the volume

There is a tendency-the use of lighter materials, the predominance of the use of concrete enclosing structures. It follows the need to develop more detailed recommendations in the selection of finishing materials and their placement, the choice of geometric and forming preferences.

5. Conclusions

The analysis of the obtained data showed that it became possible to achieve the parameters of acoustic comfort in religious buildings at the present time in combination with electric sound amplification, only then it is possible to ensure satisfactory speech intelligibility and acceptable sound quality. With increased reverberation times in the low frequency range, you can use existing methods of acoustic correction. There are questions related to the correct coordination of placement of sound-absorbing elements with the interior of the mosque, the decoration of the temple in separate areas that will provide the necessary absorption, dispersion or reflection of sound.

References

Sadykov S. S., the Main current types of contemporary mosques of Kazakhstan. Materials of the international scientific-practical conference "Architecture and urban planning: state and prospects of development" (dedicated to the 10th anniversary of the capital of Kazakhstan – Astana), 5-6 may 2008

Seitakhmetova N. L., Bektenova M. K., "the Harmony of ethics and aesthetics in the phenomenon of the mosque: on the example of Almaty". // Proceedings of the international conference "Almaty - the capital of Islamic culture 2015". Ah, 2015. C. 54-66

Acoustic design of Orthodox churches, the Architect M. J. Kesler. The journal "Church Builder" N°29, 2011

Analysis of acoustics of the Central mosque in Almaty.// Proceedings of the international scientific-methodical conference "Modern concepts of science and education", Almaty, 2018

Mirucki H. A., Borisov L. A. Acoustics of the hall. W-I "Scene", 2002, N°2 (21).

Russia and the Muslim world. Bulleting abstract-analytical information. –M., 1999. - P. 86-100.

Ivanov V., Trofimov Y. Religion In Kazakhstan // The Directory. - Almaty, 1999. C. 21-22. 3. Yusupov Sh.

HISTORICAL MONUMENTS PROTECTION FROM TRANSPORT VIBRATIONS

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Abstract

Transport infrastructure of large cities is impossible without the presence of the most efficient type of mass transport – the underground, with its greatest people-carrying ability. The development of the underground transport network “bites” into the existing planned urban areas together with the decrease of the areas for new construction, not affected by anthropogenic activity from the subway. Besides the underground, the second common type of public transport is the tram. Tram lines in Moscow city center, as well as in other cities in Russia, are being renovated and reconstructed. There are parts, that lies in old part of the city center. Vibration of the railway track travels through the ground to the foundation of buildings adjacent to tram-lines, causing high vibration and structure-borne noise levels inside them. There are several mandatory standards, which states admissible values both for noise and vibration levels inside residential, office or public buildings. When they are exceeded, there is an urgent need in the vibration isolation system development. We present the results of a vibration isolation system analysis and design for a building, located in 37m of the two-lanes tram line. Prior to design procedure, field measurements were made and vibration level inside the building were recorded. The vibration isolation system design included calculation of soil pressure on the isolation pad and subsequent estimation of the elastomeric pad dynamic modulus. Using this data, the eigen frequency of vibration isolation system was derived and its efficiency calculated. After the system maintenance, measurements were made to check the system’s performance. During the measurements acceleration of isolated part of the building and the ground surface were synchronously measured and transfer function derived. Proposed vibration isolation system can be suggested for isolation of historical monuments, located near railways or tram lines where exceedance of the mandatory vibration levels is proved by field measurements or vibration forecast.

Keywords: vibration, frequency, measurement

1. Introduction

Now in Moscow there is a large number of historical buildings, which are monuments of history and architecture, that are located near tram tracks, laid along the streets, to which the facades of these houses face. Vibrations arising from the movement of trams spreads inside those historical buildings, which leads to their gradual destruction.

The purpose of the work was to check the compliance of buildings with the requirements of the Sanitary norms for the vibration conditions created by external sources - the movement of trams, as well as issuing recommendations for reducing vibration levels in historic buildings located on these streets.

2. Research program

Research program included construction site vibration measurements, field investigations of floor and cellar vibration levels and results analysis.

3. Characteristics of the object of research

The historic building is located at the intersection of streets, along which there is a double-tracked line of trams. The minimum distance between the facade wall of the reconstructed building and the tram lines is 7 m. As the building is stretched along the street along which the tramways run, all the rooms of the building are immediately exposed to the influence of trams.



Figure 1 - Location of the house under study and measurement points.

As there is a turn of tram lines and a traffic light at the intersection of streets, the speed of trams on this section changes greatly; when turning tram lines in the ground, in addition to vertical vibrations, the horizontal oscillations are excited; at a distance from the turn, during the dispersal of trams, the vertical vibrational effect increases in comparison with the horizontal one. In connection with this, the following points for measuring the vibration of the ground surface, shown in Fig. 1 in red. Point 1 is located on the asphalt pavement near the corner of the building - the nearest to the turn of tramways and traffic lights. Point 3 is located at the opposite end of the building in a place where the tram has already gained full speed. Points 2 and 4 are located at an equal distance between the points 1 and 3. In addition, measurements of the vibration of the of the third floor and the basement have been made.

3. Equipment and methods for measuring vibration

The floor vibration measurements were performed by the 8-channel SCADASMobile-1 system manufactured by LMS with universal vibrator converters PCB35C04. The recorded frequency range of the measuring path was 2-12000 Hz with a passport error at the edges of the range $\pm 5\%$. The equipment was supplied from autonomous stabilized sources. For the measurements, the following parameters are accepted: the averaging type is linear, the averaging time is 1000 ms. The analyzer's settings corresponded to the standard vibration analyzer, realizing in accordance with GOST 31191.1 - 2004 and GOST ISO 8041-2006 the current linear averaging.

Measurements were carried out on the sidewalk near the outer wall facing the street in the daytime, with the graphical movement of the tram trains synchronously along the three axes of coordinates, with the Z-axis vertical, the X and Y axes perpendicular and along the tramlines, respectively is shown in Fig. 1. The time of each measurement was not less than 15 minutes, while during this time no less than 10 trams were recorded. To measure vibration on three axes of coordinates a special metal pad was used. Also, vibration measurements were made on the interstitial floors of the third floor and in the basement inside the building.

According to the physical factors studied, the criteria of the Federal Sanitary Norms "Industrial vibration, vibration in the premises of residential and public buildings" - SN 2.2.4 / 2.1.8.566-96, apply to the structure under consideration. The permissible levels of vibration, taking into account the corrections for the nature of the fluctuations (unstable) and the time of day (day / night) are given in Table 1.

Table 1 - The permissible (allowable) levels of vibration (vibration acceleration)

Purpose of the room	The average geometric frequencies of octave bands, Hz					
	2	4	8	16	31,5	63
Dwelling area, premises of preschool institutions Administrative and public premises	62	63	65	71	77	83
Premises for the purpose of administration and commercial buildings	70	71	73	79	85	91

4. Results of vibration measurements

Accelerogramm of ground vibrations in octave bands with average geometric frequencies of 16, 31.5, 63, and 125 Hz are shown in Fig. 5 for the entire recording time. The sidewalk at point 1 in octave bands with mean geometric bands below 8 Hz and above 125 Hz is not recorded. The vibration diagrams in Fig. 5 a - r, bursts of vibration acceleration characteristic for the trams are observed both in the duration of the burst (10 - 15 seconds) and in the level of the signal (3 - 3.5 times higher than the background vibration).

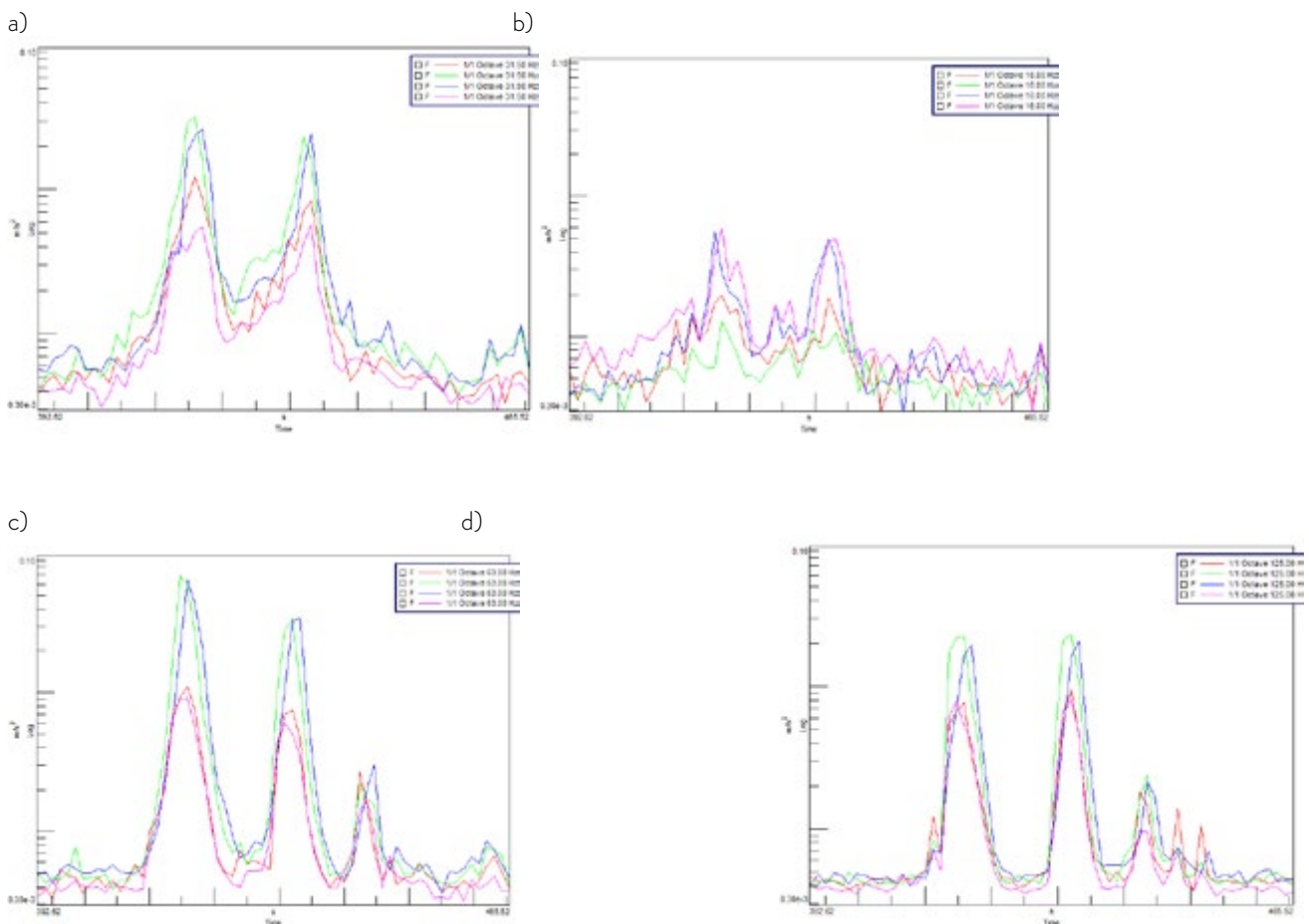


Figure 2 - Accelerogramm of oscillations at point 1 in octave bands with average geometric frequencies of 16, 31.5, 63 and 125 Hz

The summarized measurement results in the form of maximum recorded vibration levels are given in Table 2 for oscillations of points outside the building and in Table 3 for fluctuations of points inside the building.

As the measurement results show, the highest levels of vertical dynamic impact outside the building are recorded at point 2, i.e. in the area of the place where the trams brake at the entrance to the traffic light - point 1. In this case, the levels of vertical impact are the least in the place of acceleration and set of the tram of speed - points 3 and 4.

Table 2 - The maximum recorded vibration levels from the movement of trams, dB

Octave, Hz	Point of measurement outside the building							
	1(X)	1(Y)	1(Z)	2(Z)	3(Z)	4(X)	4(Y)	4(Z)
16	75,14	73,80	79,08	84,49	72,12	74,14	69,28	74,17
31,5	86,22	81,08	94,86	94,15	90,90	81,72	74,47	88,68
63	80,93	79,26	95,56	96,36	91,59	84,21	82,42	91,74
125	83,76	78,86	87,25	90,87	81,66	80,26	74,84	81,22

Table 3. The maximum recorded vibration levels from the movement of trams, dB

Octave, Hz	Point of measurement outside the building							
	5(X)	5(Y)	5(Z)	6(Z)	8(Z)	7(X)	7(Y)	7(Z)
16	65,89	65,14	86,80	85,18	75,24	58,92	70,11	75,80
31,5	76,50	82,29	90,96	88,96	86,20	67,58	81,18	85,03
63	74,36	80,31	86,06	83,66	79,69	76,98	85,32	78,50
125	74,01	73,67	75,99	68,48	79,59	70,81	79,07	71,28

A significant increasing in vibration levels at point 2 also indicates that a rail joint is located near this point. It can also be noted from the processing results that the level of horizontal vibration action along the X axis (across the axis of the tram line) exceeds the level of horizontal impact along the Y axis (along the axis of the tramway line) by about 3-6 dB. This is partly due to the fact that a solid asphalt covering between tram tracks and a reconstructed building has a great deal of rigidity in the direction of propagation compression-compression waves from tramways than in the direction of propagation of shear waves along the line of tram tracks. In addition, point 1 is located near the turn of the tram tracks, so when traveling along the tram there are significant side inertial forces from the loaded rolling stock, which cause in the ground an increase in the amplitude of the horizontal oscillations in the direction of the X axis. Tables 4, 5 show the excess, dB, vibration levels at points 1 to 8 above the allowable sanitary standards in the octave bands regulated by the norms

Table 4 - Exceeding the vibration levels above the normative values

Octave, Hz	Allowable value, dB	Point of measurement outside the building							
		1(X)	1(Y)	1(Z)	2(Z)	3(Z)	4(X)	4(Y)	4(Z)
16	71	4,14	2,80	8,08	13,49	1,12	3,14	+	3,17
31,5	77	9,22	4,08	17,86	17,15	13,90	4,72	+	11,68
63	83	+	+	12,56	13,36	8,59	1,21	+	8,74

Table 5 - Exceeding the vibration levels above the normative values

Octave, Hz	Allowable value, dB	Point of measurement outside the building							
		5(X)	5(Y)	5(Z)	6(Z)	8(Z)	7(X)	7(Y)	7(Z)
16	71	+	+	15,80	14,18	4,24	+	+	4,80
31,5	77	+	5,29	13,96	11,96	9,20	+	4,18	8,03
63	83	+	+	3,06	0,66	+	+	2,32	+

The symbol "+" means compliance with the requirements of CH [2]

The difference between the vibration levels of points outside the building and the points in the basement arises due to significant energy losses (for dissipation, reflection) during the transition of the vibrational wave from the ground to the foundation structures, which are caused by a significant difference in the elastic and rigid parameters (for example, the modulus of elasticity 25 MPa at a ground against 25000 MPa at concrete), and as well as by considerable weight of a construction of a building. On average, this difference can reach 4 times (a decrease of 12 dB).

The increase in the amplitude of the oscillations of the slabs - points 5 and 6 - in comparison with the amplitude of the basement vibration is due to the fact that broadband oscillatory action from trams (in octave bands of 16 - 63 Hz) excites oscillation plates at their resonant frequencies in overlap plates. The resonant increase in the amplitude of the vertical oscillations of the overlapping, as compared to the oscillations of the foundation (support contour), reaches 5-7 times (13.5-17 dB) in octave bands of 16-63 Hz, taking into account the energy losses due to internal friction, dry friction on supports and structural Damping of the material of the bearing elements of the building.

The indicated values of the vibration amplitude reduction values during the transition to the foundation and the resonant increase in the transition to the building's overlap are indicative, averaged over several similar objects for many years of experience in the assessment of the vibration impact from transport. In this case, the constructive solution of each building is unique and must be taken into account in detail when predicting vibration levels in the reconstructed building premises, especially if there are changes in its load-bearing elements.

Based on the results of the measurements carried out, the exceeding of the levels of oscillations of the interfloor overlapping over the permissible values will be: - 15.8 dB in the octave band of 16 Hz; 13.9 dB in the octave band of 31.5 Hz; 3.1 dB in the octave band of 63 Hz.

At such values of excesses, vibration protection of load-bearing structures of a building is necessary.

5. Recommendations for vibration protection

To ensure that the projected building complies with the requirements of regulatory documents for noise and vibration levels, it is recommended that the device be fitted with vibration protection measures. There are two principal approaches to reduce vibration levels to the required values.

The first approach concerns the horizontal "cutting" of a building with the separation of the above-ground part and its "suspension" on vibration isolators. As a vibration isolator, it is possible to use metal springs (for example, GERB) or rubber-metal vibration isolators (for example, the domestic company Vibroseismozashchita LLC or MasonIndustries, etc.).

The second approach consists in laying under the foundation slab and on the external side surfaces of the foundation walls of special roll-on vibration-proof mats Sylomer (producer of "GetznerwerkstoffeGmbH") or their analogues, manufactured by Fabreka companies or the domestic NTZ Rezina-Podolsk.

Both options allow from the stocks to ensure compliance in the reconstructed building with the requirements for vibration standards, as well as for structural noise. The offered variants of vibration isolation of the building allow not only to effectively reduce vibration levels in the frequency range of 16 - 63 Hz, but also the levels of structural noise that are excited by it throughout the normalized frequency range.

However, the drawbacks of the first approach include the need to change the structural design of the building, the device of a horizontal seam in the level of the first floor and the upper part of the structure being overmanned by vibration isolators. The drawbacks of the second approach are the extremely high complexity of replacing the vibration isolation layer upon its failure, the degradation of its characteristics with time or changes in the loads on the building.

The most effective is to reduce vibration due to the device of a vertical vibration isolating seam over the surface of the underground part of the building (from the side of the facade, and also from the institution on the side walls), as well as an additional screen. The essence of the screen in the ground is the introduction into the soil massif of a significant heterogeneity, providing reflection of waves, including Rayleigh ones, propagating from a shallow or shallow transport source. To effectively reduce vibrations, the depth of the trench should be approximately equal to the length of the Rayleigh wave, and the internal space between the walls of the trench should be empty or filled with low-modulus material. The base of the trench should not have a rigid transfer link, the so-called acoustic bridge.

At the stage of preliminary studies, including when calculating the cost, the approximate thickness of the Sylomer material on the external surface of the basement wall (from the side of the facade, and also to the building on the side walls of the building) can be adopted 37.5 - 50 mm. At the same time, due to the change in soil pressure along the height of the basement wall, it is recommended to use materials of two brands, for example, SR11 and SR18.

6. Conclusions

1. Vibration protection of historic buildings from the movement of tram trains is necessary;
2. In order to ensure the requirements of the Sanitary Standards in the historical building in terms of noise and vibration levels created by the movement of tramway trains, it is recommended that a vertical vibration isolation seam be installed along the outer surface of the foundation wall.

References

CH 2.2.4 / 2.1.8.566-96. Industrial vibration, vibration in the premises of residential and public buildings: Sanitary standards .- M.: Information Publishing Center of the Ministry of Health of Russia, 1997.

SP 23-105-2004. Assessment of vibration in the design, construction and operation of metro facilities. - Moscow: Metrogiprotans, 2004.

NORMATIVE AND TECHNICAL DOCUMENTS IN THE FIELD OF NOISE PROTECTION DEVELOPED BY NIISF RAACS WITHIN THE CLEVER CITY CREATION PROGRAM

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Abstract

State of the art in the field of national rationing for designing of protection against noise is described. The scopes, substantive provisions and features of the normative and technical documents developed by Research Institute of Building Physics is given. These are two national standards established the methods for evaluation of single-number quantities of airborne and impact sound insulation in building and building elements, which were entered in 2016, and four codes of rules set the rules for designing of industrial sound protection, the rules for designing of sound reduction of air heating, ventilating and air conditioning systems, the rules for designing of sound insulation of enclosing structures of residential and public buildings and the rules for designing of protection from traffic noise, which were entered in 2017.

Keywords: noise, protection, designing, noise decrease

1. Introduction

Increased noise is one of the most dangerous and harmful factors influencing the person. The effect of noise not only creates discomfort, but also leads to serious diseases. Mental disorders, cardiovascular diseases, hearing impairment and auditory nerve neuritis, memory easing, and also so-called “noise illness” are far from a complete list of the effects of high noise on the body. Noise as harmful production factor, is responsible for 15 % of all occupational diseases on manufacture. Currently in various regions of the Russian Federation, 30 to 50% of the population is affected by excessive acoustic impact, which significantly affects the life expectancy of citizens. About 45% of the population is constantly experiencing a feeling of discomfort from the effects of increased noise (Tsukernikov et al 2014). As a result, the protection of residents of cities and populated areas against noise created by various sources of anthropogenic nature is a very acute problem.

Within the limits of the program of clever city creation normative and technical documents for designing of protection against noise on residential territories and in industrial, public and dwelling buildings were developed by Research Institute of Building Physics of Russian Academy of Architecture and Construction Science. The documents are two national standards (GOST R): GOST R 56769-2015 and GOST R 56769-2015, which establish the methods for evaluation of single-number quantities of airborne and impact sound insulation in building and building elements, and also four codes of rules (SP): SP 254.1325800.2016, SP 271.1325800.2016, SP 275.1325800.2016 and SP 276.1325800.2016, which set the rules for designing of industrial sound protection, the rules for designing of sound reduction of air heating, ventilating and air conditioning systems, the rules for designing of sound insulation of enclosing structures of residential and public buildings and the rules for designing of protection from traffic noise. The standards were entered in the Russian Federation by GOSSTANDARD of Russia in 2016; the codes of rules were entered by MINSTROY of Russia in 2017. The documents to be developed give rules and measures to ensure safe and comfortable conditions for working and living of residents and visitors arriving to relax and get acquainted with local sights, national monuments of heritage. SP 275.1325800, GOST R 56769 and GOST R 56770 give also the possibility to select and, if necessary, design new contemporary technologies and construction materials for noise reduction. In the paper the historical inquiry on national normative and technical documents operating since 1977 in the field of designing the protection against noise is given and scopes, substantive provisions and features of the developed documents are described.

2. Historical Enquire

The first basic national normative and technical document establishing the mandatory requirements that should be observed when designing noise protection to ensure the standard noise levels at workplaces and in residential and public buildings was the building norms and rules (SNIp) SNIp II-12-77 “Sound protection”. Prior to its introduction, only isolated normative documents were in effect, at separate paragraphs of which there were established requirements for noise limitation only in various concrete objects. Examples are the Sanitarian Norms SN 245-71 “Sanitary norms for the design of industrial enterprises” paragraphs 13.3-13.7 and SNIp II-L.1-71 “Residential buildings. Design standard”, paragraphs 3.20, 3.24, annex 1.

In 2004, this document was replaced by SNIp 23-03-2003 with the same title, which expanded the scope of the document by including not only design, but also the construction and operation of buildings for various purposes. In accordance with the accumulated practical experience, the list of construction and acoustic methods for providing noise standard parameters was supplemented and sound protection measures that should be provided in various sections of the project documentation were indicated. The requirement to perform acoustic calculation of expected sound pressure levels and, if necessary, evaluation and

designing of construction and acoustic measures for noise protection have been introduced. The sequence of carrying out acoustic calculation was established; the requirements to noise characteristics of technological and engineering equipment were specified. The normalized values were supplemented by the limitations of the maximum sound pressure level at workplaces in rooms of different purposes. The category of high-standard conditions (category A) for offices, workplaces and offices of administrative buildings, design and research organizations with toughening of noise norms by 5 dB was introduced in comparison with the maximum permissible sound pressure levels regulated by federal Sanitarian Norms SN 2.2.2/2.1.8.562-96 "Noise at workplaces, in residential, public buildings and on the territory of housing estate". The method of acoustic calculation of expected sound pressure levels at workplaces was included in SNIp 23-03-2003 without changing except the evaluation of the room acoustic constant based on the mean sound absorption coefficient in the room and the introduction of the expression for the boundary radius in the case of a room with a single sound source. The graphical representation of the parameters included in the calculation formulas was replaced by their tabular task in order to simplify the implementation of calculations using software. It was excluded the cumbersome procedure for determining the total number of sound which should be taken into account. If necessary, it should be follow the recommendations given in the monograph (Katsnelson et al 1986). The section containing methods for calculating the sound insulation of enclosing structures was excluded, since simultaneously with the implementation of SNIp 23-03-2003, the code of rules SP 23-103-2003 "Design of sound insulation of enclosing structures of residential and public buildings" was introduced, in which these methods were contained. The section containing recommendations on designing of enclosing structures with the purpose of maintenance of their standard sound insulation, and also the section establishing requirements to sound-absorbing designs were actualized. At the same time, recommendations for the evaluation of efficiency of acoustic screens and their appropriate selection were excluded. Relevant recommendations were contained in the textbook published in the same year (Osipov et al 2004). Methods for calculating noise from ventilation, air conditioning and air heating systems, as well as gas-dynamic installations were also excluded. Appropriate methods were contained in the manual (guide 1982). The structure of the SNIp was brought into compliance with the requirements of the system of state standardization GOST R 1.5-2004 "Standardization in the Russian Federation. National standards. Rules for the construction, presentation, design and designation". The designations of the values were brought into conformity with those used in International and European standards.

With the introduction in July 2003 of the Federal Law No. 184-FZ "On Technical Regulation", the status of SNIps turned out to be uncertain, since they were not included in this list of documents in the field of standardization used on the territory of the Russian Federation. Only in July 2010, with the enactment of Federal Law No. 384-FZ "On the Safety of Buildings and Structures", it was legislatively established that the SNIps approved before the entry into force of this Federal Law are recognized as codes of rules, which were registered in the Federal Information Fund of Technical Regulations and Standards in accordance with GOST R 1.5-2004. At the same time, the Government of the Russian Federation approved a list of SNIps to be updated and introduced in the form of codes of rules, as a result of which, compliance with the requirements of this Federal Law was ensured on a mandatory basis. In pursuance of this decision, in 2010 NIISF RAACS developed the updated version of SNIp 23-03-2003, which was put into effect in May 2011 as code of rules SP 51.13330.2011 "Sound protection".

This code of rules has established mandatory requirements that must be met in the designing, construction and operation of buildings for various purposes, planning and construction of urban and rural settlements in order to protect against noise and ensure regulatory parameters of the acoustic environment in industrial, residential and public buildings, adjacent to them territories and in recreational areas. It regulates the regulatory sound pressure levels of penetrating noise in premises for various purposes and on the territory of residential buildings, the procedure for performing acoustic calculations to assess the noise regime in these rooms and territories, the procedure for selecting and applying various methods and means to reduce the calculated or actual noise levels to the requirements of sanitary norms. Requirements established in SP 51.13330.2011 basically conform to the provisions of SNIp 23-03-2003. However, given the mandatory nature of the main provisions, it does not include the methods for acoustic calculation of expected sound pressure levels which were contained in SNIp 23-03-2003 and also the methods for evaluating the effectiveness of recommended construction and acoustic measures to reduce noise. In paragraph 4.6 it is stated that acoustic calculations should be performed according to the methods set forth in the relevant code of rules. Such SPs were developed by NIISF RAACS in 2015-16 and put into operation in the first half of 2017. These documents are considered in this paper.

It should be noted that SP 51.13330.2011 gives the norms of penetrating sound, which are assumed to be equal to the maximum permissible sound pressure levels at workplaces established by Sanitarian Norms SN 2.2.2/2.1.8.562-96, and for production premises do not take into account that the sound penetrating into production rooms must be added together with the sound created by equipment operated in those rooms. As a result, in order to ensure the requirements of sanitary regulations, the maximum permissible levels of penetrating sound established in the code of rules should be reduced by 5 dB. The corresponding decrease is provided in the amendment 1 to SP 51.13330.2011 prepared in 2016. Finally, the code of rules does not take into account the dependence of normative values on the severity and intensity of the labor process as it is provided for by the Sanitary Norms.

3. Normative and technical documents developed and implemented in 2016-17

Over the past three years, a number of documents developed within the framework of the provisions of paragraphs. 4.3-4.6, sections 5, 7-11 of the basic code of rules SP 51.13330.2011. We list them with the date of introduction, purpose and scope.

3.1. National standards

The first documents are the national standards GOST R 56769-2015 (ISO 717-1: 2013) “Buildings and structures. Rating of airborne sound insulation” and GOST R 56770-2015 (ISO 717-2: 2013) “Buildings and structures. Rating of impact sound insulation”. The date of introduction of the standards is 2017-06-01. The both standards are a partial application to the Russian Federation of the international standards ISO 717-1: 2013 “Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation” and ISO 717-2: 2013 “Acoustics - Rating of sound insulation in buildings and of building elements - Part 2: Impact sound insulation”.

GOST R 56769-2015 defines single-number quantities for airborne sound insulation in buildings and of building elements such as walls, floors, doors, and windows; takes into consideration the different sound level spectra of various noise sources such as noise sources inside a building and traffic outside a building; gives rules for determining these quantities from the results of measurements carried out in one-third-octave or octave bands. The standard recommends the rating procedure for measurements carried out over an enlarged frequency range including the low frequency one-third-octave bands with central frequencies 50, 63, 80 Hz or octave band with central frequency 63 Hz and high frequency one-third-octave bands with central frequencies 4000, 5000 Hz or octave band with central frequency 4000 Hz.

GOST R 56770-2015 defines single-number quantities for impact sound insulation in buildings and of floors; gives rules for determining these quantities from the results of measurements carried out in one-third-octave bands and in octave bands (for field measurements only); defines single-number quantities for the impact sound reduction of floor coverings and floating floors calculated from the results of measurements; specifies a procedure for evaluating the weighted reduction in impact sound pressure level by floor coverings on lightweight floors.

The single-number quantities in accordance with the both standards are intended for rating airborne and impact sound insulation and for simplifying the formulation of acoustical requirements in building codes. An additional single-number evaluation in steps of 0,1 dB is indicated for the expression of uncertainty (except for spectrum adaptation terms).

3.2. Codes of rules

The first of the developed code of rules is SP 254.1325800.2016 “Buildings and territories. Rules for designing of industrial sound protection”. The date of its introduction is 2017-02-18. The code of rules set the rules for performance of acoustic calculations, for selection and placement of low-noise equipment, as well as for design of noise reduction measures at workplaces in premises and on the territory of industrial enterprises and organizations by means of construction acoustics (using sound-absorbing structures and facings, soundproofing structures, etc.). This code applies to the design of protection against noise from technological.

In the code of rules concepts are introduced and provisions are made on the following issues included in the content of the document: indoor sound performances; procedure for calculating of the required noise reduction in the room; selection of measures to ensure the required noise reduction; determination of the required sound insulation of the enclosing structures of buildings and building elements; sound reduction by soundproofing cabins; sound reduction by soundproof enclosures; sound reduction by sound absorbing linings and structures and sound reduction by acoustic screens.

The code of rules SP 271.1325800.2016 “Noise reduction systems of air heating, ventilation and air conditioning. Rules of design” (with the introduction date 2017-06-17) is applied to heating, ventilation and air conditioning (HVAC) systems used in buildings for various purposes and set the procedure for designing of sound attenuation systems for HVAC for optimal protection against noise and for ensuring acoustic parameters in the premises of production, residential and public buildings, as well as in the adjacent areas and recreational areas.

In the code the concepts are introduced and provisions are made on the following issues included in the content: rated noise parameters; sound sources and their acoustic characteristics; calculation of the reduction of sound power levels along the propagation path of noise; calculation of sound pressure levels in rooms and on adjacent territories; evaluation of structural noise; determination of the required sound reduction; basic sound reduction techniques and measures.

The code of rules SP 275.1325800.2016 “Enclosing constructions of residential and public buildings. Rules of sound insulation design” (with the date of introduction 2017-06-17) set the requirements for the calculation and design of enclosing structures of residential and public buildings and is applied to methods for calculating the sound insulation of air and impact noise by internal and external enclosing structures of residential and public buildings and their elements (windows, doors, gates, etc.), to methods for assessing the adequacy of soundproofing of building structures to the building standard values given in SP 51.13330.2011. The code of rules is also applied to methods for designing enclosing structures of buildings that provide the required sound insulation of air and impact noise and allow increasing the acoustic comfort of living, rest and work of the population in premises for various purposes. The code of rules does not apply to methods for calculating non-standard constructions,

the sound insulation of which can be determined solely from the results of investigations in special acoustic chambers.

In the code the concepts are introduced and provisions are made on the following issues included in the content: normative requirements for sound insulation of air and impact noise by enclosing structures of buildings; methods for determining the airborne noise insulation index R_w and the index of reduced noise level L_{nw} by internal fences of buildings; method for determining the estimated parameter of sound insulation of external fences R_{Atran} ; methods for calculating the required sound insulation of walls, partitions and inter-floored floors of buildings; calculations of frequency characteristics of sound insulation of internal enclosing structures of residential and public buildings; design of enclosing structures that provide a standard soundproofing.

Code of rules SP 276.1325800.2016 “Buildings and territories. Protection design rules from traffic noise” (with the introduction date 2017-06-04) set the rules for calculating the acoustic characteristics of motor and rail transport streams; the rules for assessing and forecasting the distribution of transport noise levels in the territories and in the premises of residential and public buildings, adjacent to transport roads; the rules for designing the measures to reduce the traffic noise levels on residential, public, business and recreational areas and in premises of buildings located on them; the rules for the development of operational noise maps of individual territories (build-up area in general). The code of rules is not applied to methods for evaluating and designing protection against aircraft noise, motorcycle noise, and noise from trains on high-speed highways.

In the code the concepts are introduced and provisions are made on the following issues included in the content: sanitary regulations of sound pressure levels in the premises of residential and public buildings and on the territories adjacent to them; methods for calculating the acoustic characteristics of transport streams of various types; methods for calculating expected sound pressure levels in residential, public-business and recreational areas and in residential and public buildings adjacent to transport highways; determination of the required reduction of transport noise levels; reduction of transport noise by organizational and planning activities and soundproof structures; roadside sound protection screens; calculation of parameters and acoustic efficiency of sound protection screens; calculation of the required reduction of traffic noise with soundproof windows in residential and public buildings and recommendations for their choice; technique of compilation of operational noise maps (zones of acoustic discomfort) of cities.

4. Conclusions

The developed documents are the basic normative and technical guidelines that establish the requirements and rules for designing noise protection from various noise sources of technogenic nature, corresponding to the current technological level. Their application will provide an opportunity to determine, on a unified methodical basis, the expected sound pressure levels in the designing, construction and operation of various urban development facilities and, if necessary, develop and apply effective construction acoustic measures for noise reduction to ensure the regulatory requirements in industrial, residential and public buildings and residential areas and comfortable conditions for living and cultural recreation for people.

References

- Tsukernikov I.E., Tikhomirov L.A., Solomatin E.O., Saltykov I.P., Kochkin N.A. (2014) *Solution of the construction acoustics tasks as a factor ensuring the safety and comfort of living in buildings*, in “Zhilishchnoe Stroitelstvo”, 2014, 6, pp. 49-52;
- Katsnelson M.U., Seliverstov B.A., Tsukernikov I.E. (1986) *Reducing the noise of food production machines*, Agropromizdat, Moscow, 1986;
- Osipov G.L., Bobylev V.N., Borisov L.A. et al (2004) *Sound insulation and sound absorption: Proc. manual for university students*, ed. by G.L. Osipov, V.N. Bobylev, OOO “AST Publishing House”, OOO “Astrel Publishing House”, Moscow, 2004;
- Guide to the calculation and design of sound attenuation of ventilation systems* (1982), Research Institute of Building Physics, GPI “Santekhproekt”, Stroyizdat, Moscow, 1982.

FEATURES OF CONSTRUCTIVE SOLUTIONS OF EXTERNAL WALLS THAT ENSURE THE PRESERVATION OF WOODEN MONUMENTS OF RUSSIAN ARCHITECTURE.

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Abstract

Wooden walls made of logs are constantly exposed to the effects of weather and unfavorable climatic factors that cause accelerated aging and various types of wood destruction. Therefore, since ancient times wooden houses with external walls of logs, boarding from the outside with wooden siding were wide- spread in Russia.

In this work constructive solutions of the external walls of log houses with wooden siding are considered, which protects the load-bearing part of the building (log walls) from active exposure to rain, snow, wind, alternating temperatures, solar radiation and other negative climatic influences. In the ventilated air interlayer between logs of the log house and the cladding, favorable moisture conditions were created, ensuring the removal of vaporous moisture from the wall structure. Due to such a constructive solution, the durability of the wooden bearing walls increased. Such constructive solutions of timber walls with board cladding, applied in Russian wooden architecture in the 16th-19th centuries, became a prototype for modern exterior wall designs with hinged ventilated facades, which are now widely distributed around the world.

Keywords: wooden wall, wooden siding, lag

1. Introduction

Wood (timber) was one of the most common building materials in Russia over the centuries. Forests covered most of the lands of Ancient Russia and all the lands of Veliky Novgorod, Vladimir-Suzdal, Tver and Moscow principalities. This predetermined the dominant role of the tree as a building material, which was easily processed as well as it was accessible to all layers of population of Russia. Therefore, in the most parts of territories of Ancient Russia, houses, temples, fortresses, bridges and other structures were constructed from wood, as the most accessible building material.

2. Characteristic of a problem

The problems of heat saving in Russia were very important: Russian log huts were compact and have a square shape in plan, ensuring a minimum ratio of the surface area of the outside walls of the hut to its volume, in order to reduce heat loss through external walls to a minimum in severe cold climates. The walls were chopped from logs, and they watched that the logs were facing upward with the side that looked at the north by a living tree. From this side the annual layers are denser and smaller, which ensure better the protection of logs from the penetration of moisture into it (Fig. 1). Also, various ways of processing logs contributed to the protection of the log from moisture: carpentry only with an ax, as water will not fall into the log cut by the ax, because under the blows of the ax, wooden vessels and pores were hammered. And even when a saw came to the Slavic people from the Germanic tribes, allowing a faster cutting of the tree and making boards out of it, in most cases in ancient Russia it was preferred to use axes: the Slavs noticed that the fact that sawed boards for external wall cladding and saw logs absorb moisture more easily than hewn and chopped workpieces (billets). In addition, the ax was taken to work along the wood fibers, that kept their natural state. The saw did not give such an effect, and the sawn log sucked the water, the sawed logs cracked much faster and were destroyed. That is why in Ancient Russia was used chopped logs and hewn timber, but not sawed boards. The grooves between the logs were tightened by marsh moss, which has the antiseptic properties and kills bacteria, and often smeared with clay.



Figure 1 - Annual rings on a felled tree. The thickness of the annual rings on the north side is less than from the southern one.

It is known, the walls of the log houses are constantly exposed to rain, snow, wind, freeze-thaw temperatures, solar radiation and other negative climatic influences. These cause aging of the wood, its splitting and destruction. Therefore, to save the log walls from destruction, caused by severe climate, beginning from XVI century log huts and log houses began to be covered from outside with wooden boards. At that time, the hew boards were considered an expensive material, because their manufacture was quite expensive: a straight, knotless log in several places was cut along the fibers and then the plugs (wedges) were driven into appeared cracks (shakes), resulting in a log splitting. The log, which was cut in this way, was splitted several times. The unevenness of these wide boards was grooved by a special ax with a very wide blade. The hew boards, obtained in this way, could be used for covering the outer surface of walls of a log house. But because of their high cost, hew boards could be used in the XVI-XVII centuries only by wealthy homeowners.

3. The analysis of constructions

In particular, the covering of the walls with hew boards is mentioned in the reconstruction of the buildings of the Palace of Tsar Alexey Mikhailovich in the territory of the Kolomenskoe State Museum-Reserve (Fig. 2). Scientific staff of the museum in the preserved archival and project documentation [1] found that a part of the wooden walls from the outside had the vertical wooden bars; wooden boards were attached to the bars so, that a ventilated air layer was sprung up between logs and wooden siding. The restored palace now represents a perfect example of a combination of a unique landscape and a Russian medieval palatial homestead. The wooden palace made such a strong impression that contemporaries, who visited it more than three centuries ago, spoke of it as the “eighth wonder of the world” [2] (Fig. 2). External hew walls, recreated according to ancient drawings, were sheathed with boards with air ventilated interlayer. Thus, even in the 16th century, wooden walls, made of round hewn timber, sheathed with batten boards along bars or round logs of small diameter (5-10 cm), with an air layer between the logs and the boards were erected in Russia. This construction was the prototype of modern cladding façade systems with air gap.



Figure 2 - Wooden palace of Russian Tsar Alexey Mikhailovich in Kolomenskoe

Constructions of wooden cladding facades with air gap were widely used throughout ancient Russia at construction of houses, churches, palaces and significant buildings. They were cut from logs and often were faced with boards of inch thickness or hewn boards so that an air layer was formed between the wooden log and the cladding boards, which was ventilated through loopholes and cracks between walling pieces.

Many of the wooden log buildings with prototypes of cladding facades with air gap have survived till the present day in the European part of Russia and in the cities of Siberia.

In Tomsk there are many two-storied log-houses which walls are sheathed from the outside by wide boards (fig. 3). The board facing protects log wall from negative influence of severer climate conditions.



Figure 3 - Wooden log houses with wall paneling boards in Tomsk. Architectural monuments.

In these houses an air layer is formed between the wooden skin and logs. It is ventilated through the leakage of the skin or through special air vent holes (Fig. 4, 5).

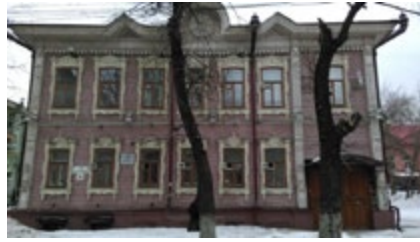


Figure 4 - The wooden log house is a monument of architecture of the XIX century. The log walls has covering with boards with air hole for ventilation of the air layer between the logs and the skin.

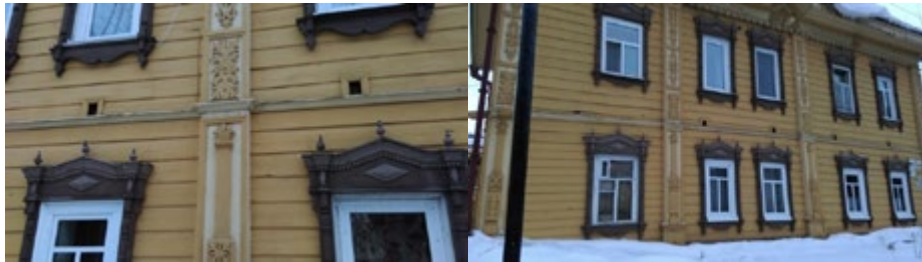


Figure 5 - Residential log house with cladding façade system with wooden siding boards and ventilation holes.

Similar construction of exterior walls are often found in the city of Orel in the pre-revolutionary building block “The Noble Nest” (Fig. 6). In it, the external walls are made of logs with cladding of boards and a ventilated air layer.



Figure 6 - Dwelling house with a wooden cladding on a stone base in Orel at 2-nd Pushkarskaya, 29



Figure 7 - Wooden log house with wooden cladding, built in Vologda.

On the fig. 7 there is well preserved wooden log house in Vologda on Mayakovskogo st., 9, built at the turn of the XIX - XX centuries. Apparently, outside the wooden log walls are lagged with boards and finely finished with wooden carving (Fig. 7). The residential log building for two apartments, built in 1825, is presented in Fig 8. It has a wooden log walls covered with boards and you can see the splendidly preserved genuine carvings that has survived to this day. At present, the Department of Culture of Vologda is located in this house.



Figure 8 - Wooden log house with planking, built in 1825.

Another log house with wood cladding, built in the Art Nouveau style in Vologda is shown on Fig. 9 and the wooden log house also with wood cladding, built in classic style about 140 years ago, which belonged to merchant Levashov.

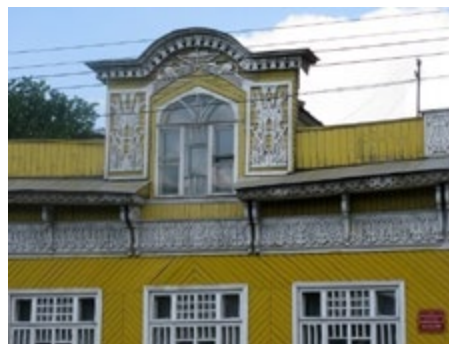


Figure 9 - Wooden log house with wooden cladding, built 1913 in the Art Nouveau style in Vologda on Chernishova street, 15. The facade combines the antique and ancient Egyptian symbols.

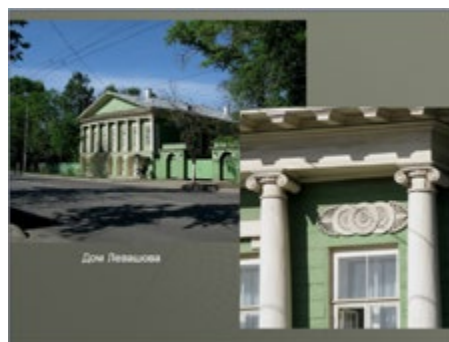


Figure 10 - The wooden log house of the merchant Levashov, built in the classical style in Vologda in 1829. All facade elements- cladding and décor are made of wood.

The log houses and log huts with wood cladding were very popular throughout Russia, including the cities of Siberia and European part of Russia. In fig. 11-13 photos of such wooden houses in Irkutsk and Yakutsk are presented. Wooden one-storied log houses with board cladding, built in Moscow region, are shown on fig.14.



Figure 11 - Wooden house in Irkutsk. The external walls made of logs with board cladding and the facade is decorated with carvings.



Figure 12 - Wooden house with walls with boards cladding in Yakutsk.



Figure 13 - Wooden houses in Yakutsk. The external walls made of logs with board cladding

On fig.15 there is a photo of the recently damaged house from the fire, in which there was a whole charred wooden log house and clearly visible burnt wooden vertical bars (Fig. 15). Before the fire, a planking was installed over them from the wooden boards.



Figure 14 - A modern wooden rural log house with wooden board planking



Figure 15 - Log house with planking of wooden boards after the fire. It is clearly seen in the photograph that there is an air gap between the logs and the wooden boards along the bars

Later, these constructive solutions of the outer walls were published in the building regulatory documents at the end of the XIX century: in 1894 the engineer-architect Count Nikolai Ivanovich de Rochefort published the code of construction practice “URGENT POSITION – Urichnoe poloshchenie – Code of Practice”.

In the chapter “Wooden parts of the building” for its preservation of log houses from the weather it is recommended to arrange board cladding over vertical bars with a ventilated air layer on the outer side of log walls. (Fig. 16)

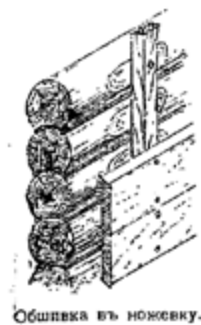


Figure 16 - Sheathing of the log house with wooden boards in a hacksaw.

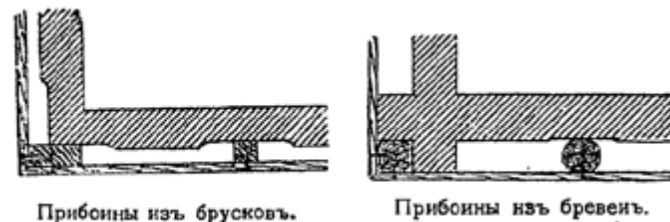


Figure 17 - The wooden cladding boards are nailed to the walls of the log-house along the beams (a) and the bars (a) (picture from the Urgent position)

The cladding boards were planed and as narrow as possible, so that they would shrink less. The sheathing of the wooden walls was made not earlier than the final draft of the building, which lasted from 1 to 2 years. Premature casing, made even partially (base, under the cornice), prevented the draft and such houses, despite the internal plaster and good stoves, were cold. However, due to the cracks and openings between boards the air permeability of the wooden cladding was quite large. The following data for air permeability were obtained for Fokin [3] for wooden cladding of boards with a thickness of 20-25 mm: for edged butt joint boards $12.4 \text{ kg} / (\text{m}^2 \cdot \text{h} \cdot \text{Pa})$, edged shiplap boards $8.2 \text{ kg} / (\text{m}^2 \cdot \text{h} \cdot \text{Pa})$ and for grooved boards $0.71 \text{ kg} / (\text{m}^2 \cdot \text{h} \cdot \text{Pa})$. Thus, the air layer in the log house with planking by wooden boards over wooden bars was ventilated. So, in the case of wooden cladding thanks to the ventilation of the air gap the water vapors move away through the wall outside.

4. The calculations

To calculate the temperature fields two variants of the wooden walls were chosen: log walls 26 cm thick without board cladding, and log walls of the same thickness with board cladding of 2.5 cm thick and with ventilated interlayer. The calculation of three-dimensional temperature fields was carried out in the program “ANSYS”. The calculations showed that at external temperature of minus 28°C and an internal plus of 20°C , in the absence of cladding, the temperature on the inner surface of the wall drops to 14.34°C and rises up to 15.78°C (Fig.18). In case of the presence of wooden cladding, the temperature on the inner surface of the log is increased to 17.46°C (Fig. 19).

As can be seen, the construction of the wall with the cladding made it possible not only to raise the surface temperature by more than 3 °C, but it allowed to reduce the heat losses through the wall and to reduce the consumption of firewood going to the heating of the building. In addition, the wooden cover protected the log from the effects of the sun, precipitation and contributed to an increase in the service life of the walls.

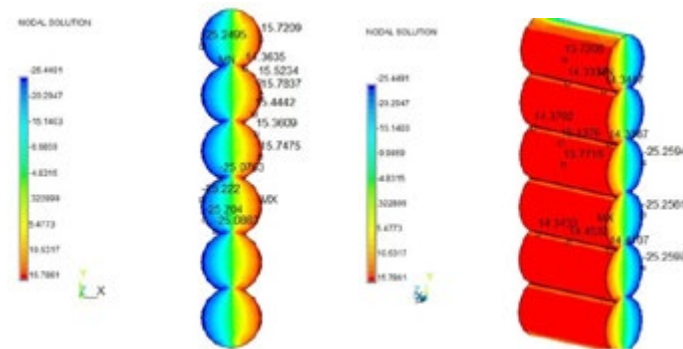


Figure 18 - Distribution of temperatures on the outer and inner surfaces of the wooden wall without board cladding on the outer surface of the wool.

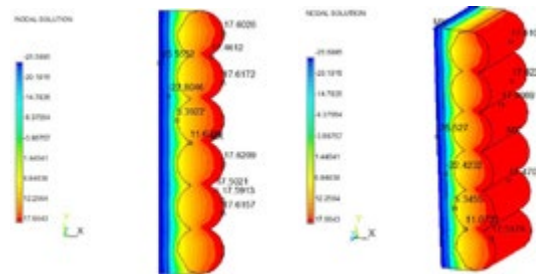


Figure 19 - Distribution of temperatures on the external and internal surfaces of the log wall with wooden sheathing with boards on the outer surface of the wall.

At present, in low-rise construction, the ventilated facades with external walls cladding with wooden boards and various types of siding are widespread. In this case, regardless of the type of cladding, ventilation of the air layer between the load-bearing part of the house and the cladding of the outer walls is provided. Figure 20 shows the designs of modern cladding facade systems used in low-rise wooden construction.

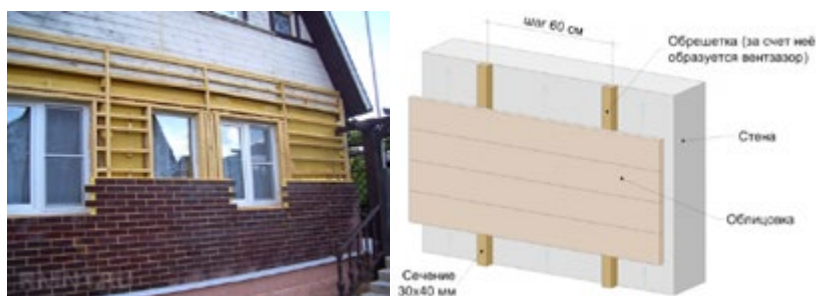


Figure 20 - Modern cladding facade with a board cladding and ventilated air gap. Schematic construction of the wall with cladding(a), and a fragment of the facade of a low-rise building with cladding over wooden bars by tiles, simulating brickwork.

5. Conclusion

The analysis of constructive solutions of the external walls of wooden houses showed that log walls with board cladding and ventilated air gap were wide spread in Russia beginning from the 16th - 17th centuries and survived to this day. These walls with board cladding are the prototypes of modern façade systems with cladding and ventilated air gap, which now are widely used in the construction of buildings all over the world.

HARMONIZATION OF THE INTERACTION OF NATURAL, SOCIAL AND INDUSTRIAL SYSTEMS IN A SMART CITY

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Abstract

The article presents the strategy of the modern smart development of the planet Earth, which should be aimed at harmonizing the interaction of natural, social and production systems, minimizing the development of destructive ecological processes, preserving the material and spiritual heritage through the use of modern information and communication technologies. Formed with the use of new technologies, urban cultural landscapes should emerge as a kind of reflection, the imprint of a transforming society for a long time. It is emphasized that the harmonization of interaction between natural, social and industrial urban systems should be based on the technological, human, institutional and energy frameworks. The connecting element in this process should be the active use of cloud information services, the Internet of things, intelligent intellectual software and hardware technologies, new materials.

Keywords: smart city, cultural landscape, cultural heritage

1. Introduction

The rapid development of modern society, the introduction of new information technologies and building materials make new demands for the formation of urban cultural landscapes and harmonious interaction of natural, social and production systems. The cultural landscape is an integral formation, the unity of which is determined by the spatio-temporal organization of the geographical envelope, the processes of economic and information development. Under the influence of the natural conditions of a particular region, economic and social activities, characteristic features of the material and spiritual heritage are formed, passed from generation to generation in the form of material objects, traditions, language, etc.

The necessity of developing theory and methods of preserving the natural and historical heritage on the basis of the theory of the landscape is dictated by the following circumstances: 1) natural and urban landscapes, with peculiar medium-forming and resource-reproducing properties, largely determine the nature of economic development of the territory, and, resettlement and economic framework of the territory; 2) in the process of centuries-old economic development of landscapes in which different ethnic groups participate, material and spiritual values are formed that make up the cultural heritage - the totality of achievements and historical experience of economic and informational development of the nature of the region; 3) objects of natural and cultural heritage can be a qualitatively new resource of socio-economic development of regions in conditions of partial replacement of traditional industrial and agricultural industries by social sphere branches - recreation and tourism.

2. Cultural landscape as a result of the interaction of natural, social and industrial systems

Recognition of the existence of links between nature and society is the pivot in many scientific studies. Thus, in the Course of Russian History, V.O. Klyuchevskiy notes: "Beginning the study of the history of a people, we meet the force that holds the cradle of each people in its hands - the nature of its country" (Klyuchevskiy 1956). He conducts an in-depth analysis of the influence of the properties of individual components of nature on the processes of economic development of the region. It is necessary to pay special attention to the historian's thought, set out in the section "The Nature of the Country and the History of the People." He notes: "Our thinking is accustomed to dismembering the studied subject into its constituent parts, and nature does not like this dismemberment in itself or in its action on people; she has all the forces of her work, in every action the dominant factor is helped by inconspicuous employees, in every phenomenon involved diverse conditions ... Undoubtedly, that a person every minute and alternately adapts to the surrounding nature, to her forces and ways of acting, then their adapts to himself, to his needs, which he can not or does not want to give up, and on this bilateral struggle with himself and with nature he develops his wit and his character, energy, concepts, feelings and aspirations, and by the part of their relationship to other people. And the more nature gives excitement and food to these abilities of a person, the wider it reveals its internal forces, the more its impact on the history of its surrounding population should be recognized stronger, even if this influence of nature affects the activity of a person, his excited and turned on her itself". In fact, V.O. Klyuchevskiy formulates a provision on the interaction of natural components (factors), which leads to the formation of natural landscapes that are in direct and inverse relations with the societies populating them.

The diversity of nature and differences in the behavior, methods and methods of human activity have determined the high mosaic nature of the ethno-cultural space, which manifests itself in the peculiarities of the structure of cultural landscapes, their influence on the formation of the worldview, the perception of the beauty of the world, etc. Comparative analysis of landscapes in the aspect of their influence on the worldview of people populating them is given in F. Engels's article "Landscapes". He begins

his exposition from the analysis of the Greek landscape. "Hellas was lucky to see how the nature of its landscape was realized in the religion of its inhabitants. Hellas is a country of pantheism. All its landscapes are covered - or, at least, covered - by the framework of harmony. And yet every tree, every source, every mountain is too prominent, its sky is too blue, its sun is too dazzling, its sea is too magnificent, so that they can be satisfied with the harsh spirituality of the glorified Shelley Spirit of nature, somehow all-encompassing Pan; each separate part of nature in its perfect perfection claims to its own god, each river requires its nymphs, each grove its own dryads; thus the religion of the Greeks was created" (Engels and Marks 1970). The landscape of Northern Europe is completely different from F. Engels. "If I tried to determine the religious character inherent in a particular locality, then the Dutch landscapes are essentially Calvinistic. The continuous prose, the impossibility of any spiritualization that gravitates over the Dutch landscape, the gray sky that alone can approach it, all this evokes the same impression that the inimitable decisions of the Dordrecht Synod leave in us. Windmills, the only ones moving in this landscape, remind of the elect of predestination, which are only moved by the breath of divine grace; everything else is in "spiritual death." And the Rhine, like the impetuous, living spirit of Christianity, loses its fertilizing power in this withered orthodoxy and completely becomes shallow!". As follows from the above, the author with great depth reveals the features of the influence of the natural and cultural landscape on the spiritual life of people.

Features of landscapes are unequally perceived by different people. For example, J. Lubbock in this regard notes: "It is very interesting to read the curious opinion of Dr. Beatti in his treatise: "Truth, poetry and music", written at the end of the last century. He writes: "Mountain Scotland produces a very sad impression, there are endless chains of mountains covered with dark heather, the sky is often darkened by clouds, narrow valleys are almost uninhabited by the inhabitants and surrounded on all sides by the cliffs from which noisy streams rush down. The soil of this country is so rude and unpractical that the inhabitants can not graze their livestock or enjoy the fruits of agriculture. The waves of the sea sadly strike there on the shore, the sinister howling of the wind is continually being heard in this lonely country, the echo passes them to the rocks and the cave. These sounds are depressing, especially in the moonlight illuminates the bleakness of this sad area and so on." (Lubbock 1899). A completely different image of this territory arises from D.S. Likhachev: "In the landscapes of Scotland, in Hylande, which many believe (I admit, me too) are the most beautiful, it strikes an extraordinary laconic lyrical sense. This is almost naked poetry. And it is not by chance that one of the world's best poets was born there - the English "lake school". The mountains, raising meadows, pastures, sheep, and after them people, to their powerful slopes, inspire some special confidence. And people entrusted themselves and their cattle to mountainous fields, left their cattle without a stable and shelter "(Likhachev 1983). The cultural landscapes of Scotland, for example, were sung in many of the poetic works of Robert L. Stevenson. Academician D.S. Likhachev repeatedly stressed the unity of nature and society in the space of the cultural landscape. In the work "The Earth's Native," he writes: "The opposition of nature to culture is not at all ... Nature has its own culture. Chaos is not a natural state of nature. On the contrary, chaos (if only it exists at all) is a state of unnaturalness". He convincingly shows that nature is "social" in its own way. This is manifested in the fact that nature "can live side by side with a person, to sit with him, if he in turn is social and intelligent himself". The features of natural landscapes have a significant impact not only on the types of land use, the construction of cities and individual constructions, arrangement of sanctuaries and temples, but also on painting and literature.

The cultural landscape should be seen as a kind of reflection, a reflection that transforms it over a long time of society. Very vividly this thesis is revealed by the professor of the Moscow University V.A. Nikolaev, who writes: "The law is established: what is the society, its culture, mentality and historical destinies, such is the landscape created by it." He further notes: "The cultural national landscape is the" relay race "of generations" (Nikolaev 2000). Arguing this situation, he quotes the following quotation from work A. M. Gorkiy: "The man of the West in his early childhood, having just got up on his hind legs, sees everywhere around him the monumental results of the work of his ancestors. From the channels of Holland to the tunnels of the Italian Riviera and the vineyards of Vesuvius, from the great work of England to the powerful Silesian factories - the whole land of Europe is closely covered with grandiose incarnations of the organized will of people ... This impression is absorbed by the child of the West and educates in it the consciousness of value rights, respect for his work and a sense of his personal significance as heir to the miracles of work and the creativity of his ancestors ". The multifaceted aspects of the interaction of nature and man at the regional and local levels are reflected in many - the nature of other observations, while the feeling of a living connection between man and his natural environment is preached, the inseparable unity of practical, religious and aesthetic demands of people.

The given points of view on the interaction of nature and society in the aspect of preserving the natural and cultural heritage in ethnocultural space show that apart from individual individual objects, certain sets of objects and phenomena in their mutual relations should be distinguished, reflecting in aggregate the features of the enclosing natural landscape, the nature of the material and spiritual activity. For a truly cultural landscape there must be a definite unity between the natural environment and the material objects created by man, which are collectively reflected in the spiritual culture of the population. The general program on the allocation of cultural landscapes and the study of the natural and cultural heritage should include the following stages: landscape analysis of the territory and assessment of the natural resource potential; determination of the nature and extent of economic development of the territory: the existing system of dispersion, land use and infrastructure, analysis of ethnographic features of localities and their manifestations in the material heritage, determination of the aesthetic qualities of landscapes. Integral characteristics of the cultural landscape, assessment of natural and historical heritage can be obtained through close interaction of natural and scientific and humanitarian studies, on the basis of a comprehensive analysis of geographic, ecological, historical archeological, ethnographic, toponymic, cultural-logical information.

3. Formation of smart cities and conservation of the cultural landscape

Today, with the development of modern information technologies, the introduction of new building materials radically changes the appearance of the urban cultural landscape. As a part of the formation of smart cities, the harmonization of the interaction of natural, social and industrial urban systems should be based on the technological, human, institutional and energy frameworks. The strategy of modern smart urban development should focus on harmonizing the interaction of natural, social and production systems, minimizing the development of destructive ecological processes, preserving the material and spiritual heritage through the use of modern information and communication technologies. Formed with the use of new technologies, urban cultural landscapes should act as a kind of reflection, the imprint of a transforming society for a long time.

Building materials and minimization of the development of destructive ecological processes. Eco-friendly houses are an important element of the cultural urban landscape. At the same time, the problem of reducing energy costs occupies an important place. However, an eco-friendly house that really conforms to all the regulations and regulations can be much more suitable for tenants than a house with good energy indicators. "Freedom of Healthy Construction" should provide all the opportunities for the implementation of ideas about the house or apartment, corresponding to individual preferences and at the same time preserving all the necessary values.

The natural and technogenic environment under the conditions of information development has acquired and continues to acquire attributes and properties that justify its naming by the environment of risk. The reason and justification for such naming is the underreceipt of the processes that occur in nature, first, regardless of human activity; secondly, depending on the activity of a person; third, as a result of mutual influence and interaction of events, independent and dependent on human deeds. The analysis and assessment of the interconnection of ecological, social and anthropogenic systems in architecture and construction make them define their role in the formation and restoration of a healthy environment.

The natural system, consisting of interdependent components belonging to the lithosphere, hydrosphere, atmosphere and the biosphere, functioning and developing in time as a whole, has a significant and multifaceted impact on engineering structures. The destructive effects largely depend on the climate. So, in the physical (mechanical) destruction of building materials, the main role is played by temperature fluctuations, freezing of water in cracks, growth of crystals and vital activity of microorganisms. More complex chemical destructive processes not only destroy, but also change the composition of building materials. The main agents are water, acids, both mineral and organic, alkalis, dissolved in water salts and air.

The building structures, buildings and structures, as a rule, are affected by a set of unfavorable factors. The complexity of studying these processes is due to the fact that the mechanisms of chemical, physical and biological destruction can, firstly, be initiated in all environments (air, water, soil, lithological); second, they are able to move from one environment to another; thirdly, they can be manifested both sequentially and simultaneously in any combination, causing the development of corrosion processes. At the same corrosion of one category, changing the properties and characteristics of the material, contributes to the development of corrosion of another category. The prevention of the destruction of buildings, structures and engineering networks as a result of corrosion is one of the important requirements, the realization of which is necessary to achieve ecological comfort (Erofeev and Korotaev 2017; Environmental ... 2010).

Technologies of intellectual support of the functioning of the national economy. The connecting element of the formation of the urban cultural landscape should be the active use of cloud information services, the Internet of things, intelligent intellectual software and hardware technologies, new materials. At the same time, the active use of modern building materials and intellectual technologies to increase the efficiency of a smart city also carries potential threats, such as the erasure of traditional cultural features and the historical appearance of settlements. For this reason, it is necessary to preserve the objects of cultural heritage in parallel with the development of effective modern smart cities. The formation of a harmonious interaction of natural, social and production systems in a smart city should be based on the application of modern IT technologies and the competent observance of the principles of management - systemic, goal-setting, hierarchy, feedback, and complexity.

Harmonious development is impossible without access to the necessary up-to-date information. Logistics, tax reporting, interaction of legal entities, the functioning of enterprises should be based on multifactor information support. Operational processes must be carried out using ERP-systems, which allow to competently and efficiently build the strategy of production integration, personnel management, financial management, optimization of enterprise resources (Wong et al. 1995). Decision-making in complex technological economic systems should be based on the use of expert systems and intelligent algorithms for analyzing large amounts of data. Modern expert systems are able to partially replace the work of the relevant specialists within the framework of various technological processes.

Web-technologies provide access of the interested persons to the necessary information for effective management of the processes of harmonious and sustainable development of a smart city using the Internet and allow quickly combining different blocks of data and knowledge bases for carrying out an inter-related analysis of various economic, social and environmental problems, development of a set of measures for their solution, informing the population with a view to ensuring its social self-organization. The notion of a cultural landscape as a complex system assumes that its information base should be formed from the information of social and natural sciences: history, archeology, ethnography, cultural studies, sociology, geography, ecology and others. In this context, geographic information systems (GIS) and geographic web portals (geoportals) are relevant as the

main instrument for collecting, analyzing and assessing the state of natural and cultural heritage and landscape planning for their sustainable development (Vdovin et al. 2015; Vdovin et al. 2016). As a basic tool for collecting, analyzing and assessing the state of the natural and cultural heritage and landscape planning for their sustainable development, it is expedient to create a regional geoinformation system (GIS), the design of which should be based on systemic, horological (geoinformation), landscape, historical genetic, nature and social-ecological principles (Yamashkin and Kovalenko 2004).

Information scientific and educational environment. The scientific, educational and innovation spheres in the key to sustainable development should be endowed with the possibility of creating, updating and using specialized data banks. The latest achievements of scientists should be made available to those who need them: for the purpose of training or for further scientific research (Kinshuk et al. 2016). The results of the experiments, new innovative methods, the latest scientific articles and defended theses - all of them should be effectively disseminated and useful, becoming the basis for the creation of new technical solutions and scientific discoveries. Practice shows that information web technologies can greatly facilitate the communication of scientists and specialists and, consequently, accelerate the development of knowledge.

Internet of things. Huge prospects in the field of information support for the strategy of harmonious development of smart cities are played by the technology of Internet Things (Internet of Things, IoT). This concept, formulated at the end of the last century at the Massachusetts Institute of Technology (MIT) is becoming very popular these days. The Internet of things is a computer network, the nodes of which are physical objects (“things”), technologically equipped for interaction with each other without human participation through various data exchange protocols (Gubbi et al. 2013). The Internet is able to change the image of all spheres of society (life, production, health, safety, education) and to support the sustainable development of the region. Within the Internet of things Smart City, includes tools for the effective use of energy-saving automation and monitoring tools, intelligent traffic management systems and traffic violations control. A number of technologies will enter the life of society in the near future, for example, telemedicine. The Internet of things can improve productivity and provide development in all spheres of society’s life, the most important of which are transport and traffic, energy and energy saving, business and entrepreneurship, education and science, ecology and nature management. The Internet of things is able to provide a harmonious interaction of the natural, social and production systems of the region at various hierarchical levels. The widespread introduction of IoT-technologies should be accompanied by grant support of the state for the development of innovations.

Crowdsourcing. In addition to the practical application of web-based GIS and the Internet of things, the question of using crowdsourcing technologies to solve the problem of providing effective information support for the harmonious development of a smart city is of interest. Crowdsourcing (“crowd” and “sourcing” - “use of resources”) involves involving a wide range of people in the solution of various problems of the region’s development to use their knowledge and experience on a voluntary basis using web technologies (Buettner 2015). Crowdsourcing will allow the population of the region to also signal about various communal problems, committed crimes, incidents and so on. Modern smart city, as a complex system, is not deprived of various problems to be solved. Informative support in this area is exactly what is capable of ensuring the stability of the society in its development. Road accidents, crimes, accidents in the field of housing and communal services are problems, the negative consequences of which can be significantly minimized if they are signaled in a timely manner via web portals. Citizens who witnessed different events should be able to talk about them on the Internet in order to attract public attention to problems and implement a mechanism of self-regulation in the system of sustainable development of the region.

The formation of new strategies for the development of smart cities should be based on the successful experience of predecessors. Thus, the patriarchal Moscow, which attracts tourists with the ensembles of the historic Kremlin and modern Moscow City, successfully becomes a smart city, thanks to the introduction of information technologies in the daily life of the city (the Moscow site). Uniform information medical system (EMIA), a single city electronic journal of Moscow schools, a traffic monitoring system and housing and communal services on the basis of GLONASS, crowdsourcing Portals of electronic interaction with Muscovites attract attention.

An interesting strategy is the municipality of Florence, which aims to transform the capital of Tuscany “from the museum city into Italy’s first intelligent city with museums”, which will be comfortable for both locals and tourists (Florence Smart City). Before our eyes, Florence is becoming a modern and smart city, where we respect the environment and the cultural landscape. The city with a new mobility strategy, with new tourist offers and cultural policies harmoniously accommodates the historical heritage of the Cathedral of Santa Maria del Fiore and modern innovative projects such as FURBA (Urban express bus transport of Florence), within the framework of which it is planned to activate the public transport corridor with fully electric buses and electric taxis.

Among the successful cases, one can cite the example of Amsterdam in which Amsterdam Smart City Initiative has been developing for almost 10 years, which currently includes about 200 projects jointly developed by local residents, government, scientists and enterprises (Amsterdam Smart City). These projects operate on an interconnected platform with the help of wireless technologies to increase the possibility of making decisions in real time for the coordination of traffic, saving energy and

improving public safety. For the development of the concept, initiative proposals and developments are annually adopted. On the example of Amsterdam, we see how centuries-old objects of cultural heritage harmoniously coexist in the urban landscape (Damrak street, canal houses, the Royal Palace, medieval towers, chambers and museums) and new buildings of innovative architecture from modern materials of the center of the new architecture of Amsterdam Oosterdoks, the National Center science and technology, the Music Hall on Eee, the Netherlands Film Institute.

Paying attention to the development of certain smart cities, within the framework of which the harmonious interaction of natural, social and production systems is organized, it is necessary to note the importance of network interaction between developing megacities, because only global cooperation of scientists, engineers, humanitarians and managers will contribute to the co-directional progress of the high-tech development and preservation of traditions.

4. Conclusions

The most important object in the study of the cultural heritage of the planet Earth is the ethnocultural space - an integral formation, the unity of which is determined by the spatio-temporal organization of the landscape envelope, the processes of economic and information development. Under the influence of the natural conditions of a specific region, economic and social activities, cultural landscapes, characteristic features of the material and spiritual heritage, are transferred from generation to generation in the form of material objects, traditions, language, etc.

Harmonization of the interaction of natural, social and production systems in smart cities requires the provision of comprehensive information support, which, in turn, must be based on respect for the cultural landscape. The creation of a managed system for the development of a smart city should be based on the following provisions:

- a truly cultural landscape is characterized by the unity of the natural environment and the objects of the material heritage, which are collectively reflected in the spiritual culture of the population;
- the formed cultural landscapes act as a reflection of the transforming society;
- objects of natural and historical heritage represent a resource for the development of cities in conditions of partial replacement of traditional industrial production by social sectors - recreation and tourism;
- harmonization of interaction of natural, social and production systems is based on the technological, human, institutional and energy frameworks and is aimed at minimizing the development of destructive ecological processes, preserving material and spiritual heritage through the use of modern information and communication technologies;
- active use of modern building materials and intellectual technologies to enhance the efficiency of a smart city often carries potential threats: the erasure of traditional cultural features and the historical appearance of settlements; proceeding from this, it is necessary to preserve the objects of cultural heritage in parallel with the development of modern cities;
- the formation of harmonious interaction of natural, social and production systems in a smart city is based on the application of modern IT technologies and the competent observance of the principles of management - systemic, goal-setting, hierarchy, feedback, and complexity; the most important are the technologies of intellectual support of the functioning of the national economy, web technologies, the information scientific and educational environment, the Internet of things and crowdsourcing. Active use of cloud information services, the Internet of things, intelligent intellectual software and hardware technologies, new materials should become a connecting element of harmonious interaction of systems in smart cities;
- the formation of new strategies for the development of smart cities should be based on the successful experience of predecessors; it is important to organize their network interaction, ensuring cooperation of scientists, specialists and managers.

Recreational development of the natural and historical heritage of smart cities is closely linked with the active involvement of local residents in the development of tourism. It is necessary to support the entrepreneurial activity in order to increase the employment of the local population; conduct training and create the conditions necessary for the effective participation of local people in the cultural development of smart cities based on modern information technologies.

References

- Vdovin S.M., Fedosin S. A., Yamashkin A. A., S. A. Yamashkin (2015) *Reception, storage and distribution of geodata as a single information process* in “Natural hazards: the connection between science and practice” Materials of the II International Scientific and Practical Conference. Editor-in-chief.: S.M .Vdovin, pp. 82-90.
- Vdovin S.M., Yamashkin S. A., Yamashkin A. A., Zarubin O. A. (2016) *Geographic portal as a model of the national landscape* in “Bulletin of the Ryazan State University. S.A. Yesenin, No. 3 (52), pp. 146-154.
- Erofeev V.T., Korotaev S.A. (2016) *Providing a comfortable microclimate in the building when implementing the principles of “green building”* in “Actual issues of architecture and construction: materials of the Fifteenth International. scientific-techn. conf., Saransk, 26-28 December. 2016, ed. col. : B.T. Erofeev (editor-in-chief) [and others]”. Saransk: Publishing House of Mordovia Un-ty, pp. 445-449.
- Klyuchevskij V.O. (1956) *Compositions: In 9 tomes. M. .: State. Publishing house, vol. 1. 427 p.*
- Lubbock J. (1899) *Ideals of life. Joys of life.* St. Petersburg: Publishing House of V.I . Gubinskij. 291 p.
- Likhachev D.S. (1983) *The Earth is native: book. for students.* - M.: Enlightenment, 256 p.
- Nikolaev V.A. (2000) *Landscape science: Seminar and practice classes.* - Moscow: Publishing house of Moscow University, 94 p.
- Engels F., Marx K. (1970) *Landscapes. Compositions. vol. 41.* - M.: Politizdat, pp. 74 - 81.
- Yamashkin A.A., Kovalenko A. K. (2004) *Geoinformation technologies in landscape planning and prediction of destructive geoeological processes* in “Mordovia: Science, Innovations, New Technologies”, No. 2, pp. 16 - 21.
- Buettner R. A. (2015) *Systematic Literature Review of Crowdsourcing Research from a Human Resource Management Perspective* in “Conference: HICSS-48 Proceedings, At Kauai, Hawaii, USA”. vol. 29, i. 7. - pp. 4609-4618. doi:10.13140 / 2.1.2061.1845
- Gubbi J., Buyya R., Marusica S., Palaniswamia M. (2013) *Internet of Things (IoT): A vision, architectural elements, and future directions.* Future Generation Computer Systems. vol. 29, i. 7. - pp. 1645-1660. doi: 10.1016 / j.future.2013.01.010
- Kinshuk S., Cheng N. S., Cheng I. L., Chew S. W. (2016) *Evolution Is Not Enough: Revolutionizing Current Learning Environments to Smart Learning Environments /* in “International Journal of Artificial Intelligence in Education”. vol. 26, i. 2. pp. 561-581. doi: 1007 / s40593-016-0108-x
- Wong B. K., Monaco J. A. (1995) *Expert system in business: a review and analysis of the literature.* Information and Management. vol. 29, i. 3. pp. 141-152. doi: 10.1016 / 0378-7206 (95) 00023-p
- Amsterdam Smart City. “Amsterdam Smart City. Projects”. <https://amsterdamsmartcity.com/projects>
- Florence Smart City, Italy. <http://www.smartecocity.com/eucities/florence/>
- Merging real and virtual: how an intelligent city works. <https://www.mos.ru/news/item/29296073/>

ANALYSIS OF DURABILITY OF BUILDING STRUCTURES USING THE PARAMETER OF TEMPERATURE LOADS

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Abstract

One of the main areas of programs for adaptation to global changes is studying the impact of varying environmental parameters on structural materials durability. This conditions the necessity of developing new methods for calculation of climatic impact on strength and durability of enclosing structures taking into account both the temperature change, and the number of cycles of temperature transitions through zero, as the part of the program on adaptation to the climate change or the buildings and structures durability.

Many old buildings undergo a process of adaptation to modern conditions. One of the most common types of fixtures is the organization of the lofts. Modern requirements determined to increase the resistance to heat transfer of enclosing structures. For buildings with historical value, the insulation may hold only the inner surface of the exterior walls.

The author introduce the parameter of the temperature load on the material of enclosing structures. This parameter allows you to specify the maximum value of heat transfer resistance of enclosing structures wherein the durability of the structures will not be reduced. The calculation is carried out taking into account global climate change.

Keywords: temperature load, enclosing structures, climate change

Climate change on the planet requires the development of adaptation measures to eliminate or reduce the negative consequences of this process ²[1,2]. Global warming, the changing cycles of the transition temperature throw zero humidity have a serious impact on the building envelopes ³. For countries with a cold climate, which include Russia, it is primarily the process polythermal crystallization of moisture. For countries with warm and mild climate, which include Italy, it is processes of the periodic moistening and drying of enclosing structures. While their effects on the material of the building envelopes these processes are very close. Figure 1 shows typical results of the effects of freezing and thawing of masonry for buildings located in Moscow and the process of moistening and drying of enclosing structures in Naples.



Figure 1 - Destruction masonry under plaster layer: a) Moscow, Russia; b) Naples, Italy.

Currently, a large number of historical buildings, which include all buildings built at the beginning of last century and earlier, as well as buildings located in historic districts, are subjects of adjustment. This process includes a complete change of the interior layout of the building, replacement of ventilation systems, air conditioning and heating. Additionally, the building envelope after the processes of renovation must satisfy the modern requirements of thermal resistivity. For Moscow currently, these requirements is about $3.13 \text{ m}^2\text{K/W}$. From an architectural point of view the facades of historical buildings are the most secure part of the building. So, the facade insulation from the outside is impossible. The insulation of the facade on the inner

² Bulygina et al. 2016; Russian hydrometeorological portal <http://meteo.ru/>

³ Katsov and Semenov 2014; IPCC Fifth Assessment Report 2014; LEG. 2012. National Adaptation Plans.

side leads to changing of thermal processes in the building envelope and significantly reduce the durability of the material of the outer wall of the building.

However, it is possible to analyze the thermal impact on the building envelope taking into account global climate change with the aim of obtain characteristics of minimum change of load on the exterior walls.

The process of freezing and thawing goes not only on the surface of the material external wall but in the depth of it, which results in the strength decrease and even material destruction in the external wall cross-sections at a certain distance from the surface. The decrease of structure material strength reduces the strength of enclosing structure in general. That is why knowing the exact number of cycles of temperature transitions through zero in every cross-section of the external enclosing structure is necessary to determine the maximum durability (life cycle) of the external building wall.

To estimate the number of cycles of temperature transitions through zero in various cross-sections parallel to enclosing structure external surface, it is necessary to resolve the matter of temperature waves passing the wall at outdoor air temperature fluctuations, i.e. to calculate the temperature distribution over the wall mass under nonsteady conditions.

However, the task of developing the method for determining the number of freezing and thawing cycles should be stated and resolved at a broader level. In the calculations, it is necessary to consider the global climate change and, therefore, the climatic component should be introduced into the calculation method along with the thermotechnical component.

The problem of temperature distribution over the brickwork cross section is resolved on the basis of the mathematical solution for the one-dimensional problem of nonsteady process, when heat is transferred via the flat wall with indefinite length proposed by authors ⁴. To resolve the set problem of the temperature distribution over the cross section of external enclosing structure it is necessary to solve the Fourier's differential heat equation that defines the one-dimensional heat transfer under nonsteady conditions. For reliable sampling, the graphs were plotted regarding temperature distribution in the given cross sections since October 1966 till April 2011. The reference year was taken since the month, when the outdoor air temperature was below zero degrees, till the month, when no temperature below zero was recorded. Thus, in the period under consideration about 600 000 reference points were obtained, based on which 2450 graphs of temperature distribution over brickwork cross section were plotted.

Field experiment was conducted to verify the accuracy of the developed heat distribution calculation method at a cross-section of the external building wall. For the experiment, the building constructed in 1905 and located in center of Moscow was chosen, with 950 mm thick external walls made of solid loan brick (Figure 2). The wall, on which the experiment was conducted, was oriented to the south orientation and faced a closed yard. The nearest building wall is located 4.7 meters away ⁵.



Figure 2 – Building Kadashevsky baths (1905) in Moscow.

To measure temperature and heat flow density, the device was used for measuring and logging the heat flow rate going through heat exchange surfaces of thermal power facilities as well as temperature of those surfaces and their surrounding gaseous and granular medium. Measurement range for heat flow density is 10 – 999 W/m², for temperature -30 – 100 °C

Device operating principle involves the measurements of thermo-electromotive force of temperature sensitive heat flow switches and temperature switches resistance.

The experiment was performed for over 3.5 months, since early January till mid-April. The interesting feature of this period is that during it the lowest temperatures of outdoor air and the period of active temperature transition through zero were recorded.

4 Vlasov 1927; Fokin 2006; Miller 1938; Carslow and Jaeger 1959; Crank 1975; Buxuan and Zhaohong 1985;

5 Zheldakov et al. 2016; Zheldakov and Frolov 2017

During the field experiment in automatic mode, every twenty minutes outdoor and indoor temperature, temperature of external and internal wall surfaces was measured, as well as heat flow values at three points. The arithmetic average of three readings was taken as the heat flow value.

Real values of material thermal conductivity coefficient of external wall as well as heat transfer coefficient of the internal and external surfaces were calculated on the basis of those values. Further, the calculations of heat transfer coefficient of external and internal walls were made. Due to the massive amount of experiment data, the Figure 3 demonstrates the results of experiment and interim calculated values for 16 days, since 4th till 20th of January 2017.

Considering the interim calculations shown above, the values of temperature in cross sections of the external building wall at the depth of 85, 185 and 280 mm from external surface were calculated with the use of the developed method based on finite differences and compared with actual temperatures in these cross sections measured during the experiment. Figure 6 shows calculated and experimental graphs at the minor time interval of 12 days. During this interval the external temperature grew abruptly after reaching the minimum, after which it was changing more smoothly. The calculated values with the good convergence repeated the experimental curves in all sections at that.

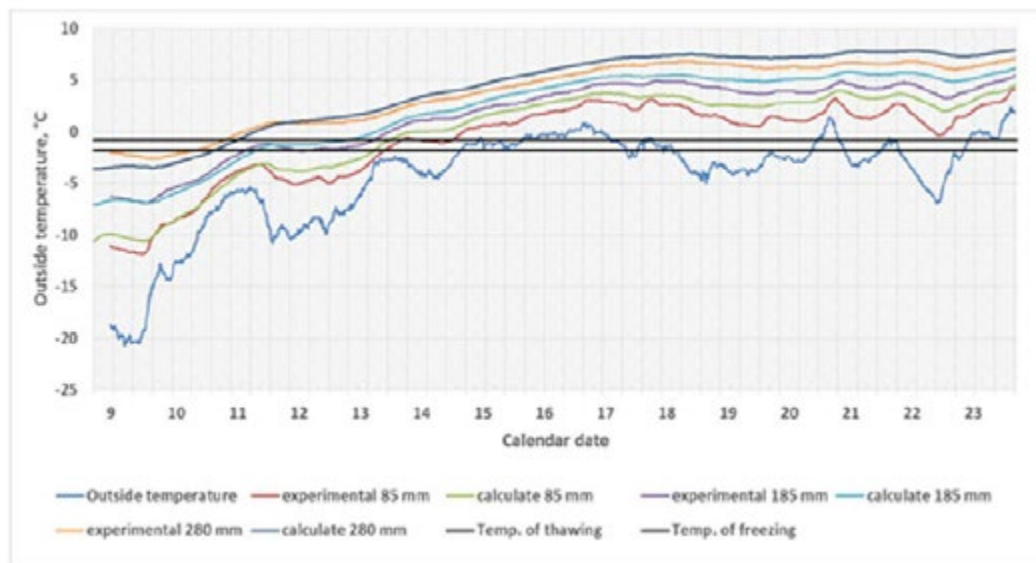


Figure 3 – Comparison of the calculated and experimental values of temperature distribution in various sections of the exterior walls of the building.

Analysis of results on the number of freezing and thawing cycles in various external wall cross-sections in nonsteady process allows to proceed to thermal forces analysis on the studied structure.

Important parameter N_{ji} , which characterizes the thermal impact on enclosing structure of the building taking into account global temperature changes, defines number of freezing and thawing cycles in all external wall sections with same thickness j mm during i -th year. This parameter is called “the temperature load of enclosing structures” for external wall structure and it characterizes the impact on this structure caused by outdoor temperature changes. “Year the temperature load” parameter links outdoor air characteristics: temperature changes caused by climate changes, and changes in the number of cycles of temperature transition through with technical specifications of the enclosing structure: thickness and thermophysical properties of the structure material.

At the moment, the evaluation of possibility to use a particular design of external building wall from the viewpoint of its durability is made on the basis of various parameters, such as thermal conductivity, structure humidifying, freeze-thaw resistance. The conclusion on the structure suitability is made on the basis of these parameters in their totality. However until now there was no numeric parameter used to provide the integral evaluation of the temperature impact on enclosing structure.

Let us consider the efficiency of the developed method for evaluation of temperature impact on external walls of the following structure: bearing external wall of the building is made of red loan brick and has the thickness of 510 mm and 700 mm. It is the other research work for historical building of manufactory “Bolshevik” (1884) in Figure 4. External wall is reinforced with mineral isolation plates with thickness of 100 mm and thermal conductivity of 0.05 W/(m K) on the internal side. This structure is applicable, for example, for reconstruction of old buildings with lofts arrangement.



Figure 4 — Building of manufactory “Bolshevik” (1884).

For each structure, 2450 graphs are plotted, analysis results based on which graphs for each combination are plotted similarly to those shown on Figures 5 and 6.

As it was mentioned before, to analyze the temperature impact on the enclosing structure considering the global climate change, we have introduced the “year the temperature load” parameter. On Figure 5 the year temperature load graphs are shown for the 510 mm external wall structure with thermal insulation on the internal side and without it. It is evident that in case of the wall with no thermal insulation the polythermal load on the wall will reduce in time, and for the structure with inner thermal insulation it will grow. In case of the external wall structure with no thermal insulation the reduction of freezing and thawing cycles is explained with the fact that the global warming influence impacts the external wall more than the certain increase of cycles of outdoor temperature transitions through zero.

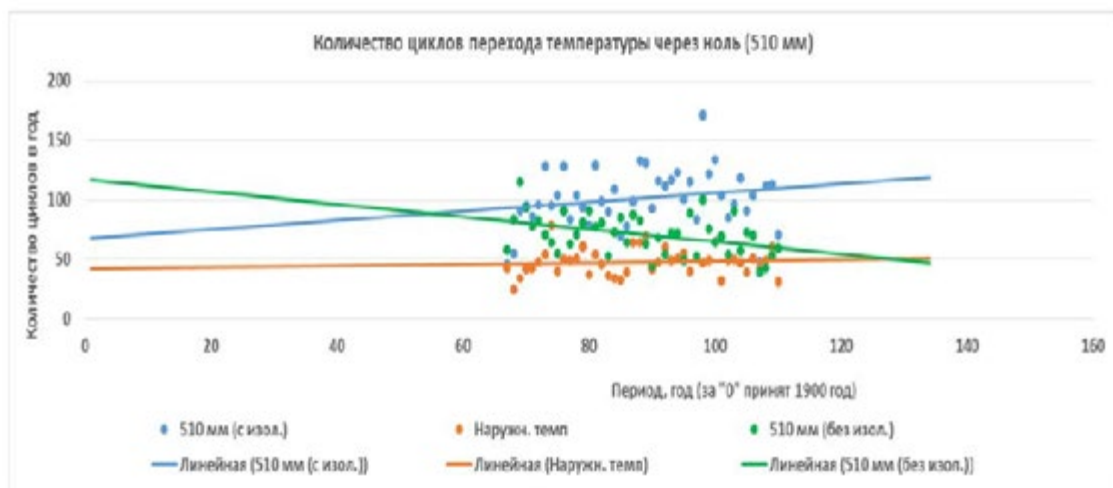


Figure 5 — Graphs of the temperature load of enclosing structures (N_i) for exterior brick walls 510 mm with and without insulation.

The graphs of the year temperature load parameter change for the structure of external wall with 700 mm thick brickwork and without thermal insulation are shown in Figure 6. In terms of pattern, these graphs repeat the graphs for 510 mm brick wall structure, which confirms the correctness of conclusions made concerning the previous structure.



Figure 6 — Graphs of intensity of temperature of the year (Ni) for exterior brick walls 700 mm with and without insulation.

The change of parameter of the temperature load of enclosing structures with different thermal resistivity are described by linear equations of the type $N_i = kx + b$. Figure 7 shows the dependence of the coefficient k in the linear equations of parameter of the temperature load from the thermal resistivity of the building envelope.

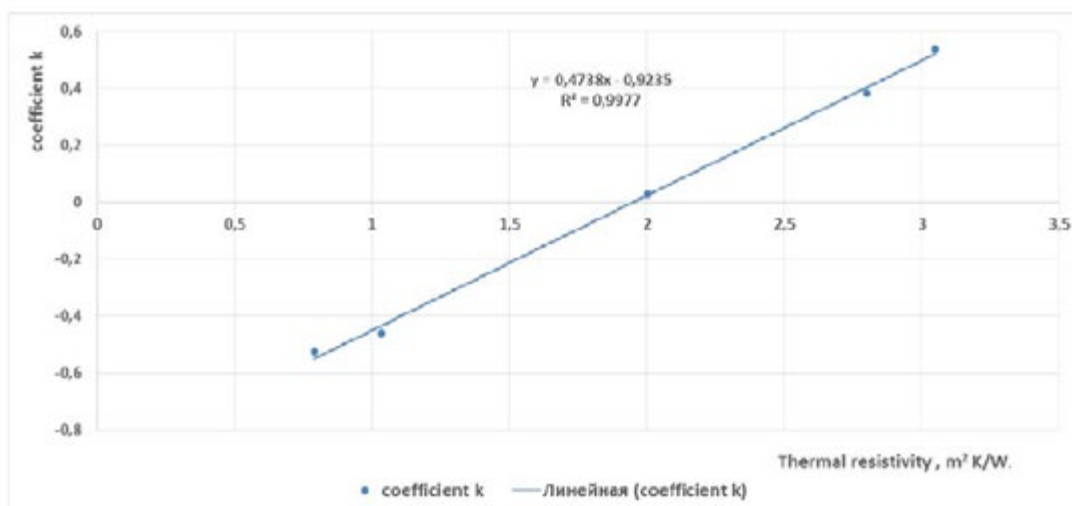


Figure 7 — The dependence of the coefficient k from the thermal resistivity of the building envelope.

Obviously, at a negative value of the coefficient k thermal load on the enclosing structure will be reduced, when $k = 0$ thermal load will increase. Given the fact that $k = 0$ when the value of the thermal resistivity $R = 1.9 \text{ m}^2 \text{ K/W}$ it can be concluded that under climatic conditions of Moscow region for maintaining the durability of historic buildings with masonry walls with the inside insulation total thermal resistivity should not be higher than $1.9 \text{ m}^2 \text{ K/W}$.

Conclusions

The parameter of thermal load on the material of the walling was introduced. “The temperature load parameter links outdoor air characteristics: temperature changes caused by climate changes, and changes in the number of cycles of temperature transition through with technical specifications of the enclosing structure: thickness and thermophysical properties of the structure material. Analysis of changes of the parameter of thermal load on the material of the enclosing structure taking into account global climate change allowed us to obtain the value of the maximum possible from the conditions of durability the thermal resistivity of the inside insulation walls of the historic buildings not more $R = 1.9 \text{ m}^2 \text{ K/W}$.

References

- Bulygina O.N., Razuvaev V.N., Trofimenko L.T., et al (2016) *An array of average monthly air temperature data at Russian stations*, VNIIGMI-WDC, 2016. / [Electronic resource] Access mode: http://www.meteo.ru/climate/sp_clim.php;
- Russian hydrometeorological portal. Hydrometeorological data of the Russian State Data Foundation on the state of the natural environment. <http://meteo.ru>;
- Katsov V.M., Semenov S.N. (2014) *The second assessment report on climate change and their consequences on the territory of the Russian Federation*, Roshydromet, 2014, pp. 58;
- IPCC Fifth Assessment Report. WG II Report “Climate Change 2014: Impacts, Adaptation and Vulnerability”, IPCC, 2014;
- LEG. 2012. National Adaptation Plans. Technical Guidelines for the National Adaptation Plan Process. Vlasov O.E. (1927) *Flat heat waves*, Izvestiya teplotekhnicheskogo institute, 1927, vol. 3 (26);
- Fokin K.F. (2006) *Building thermophysics of enclosing parts of buildings*, ABOK -press, 2006, pp. 256; Miller L.G. (1938) *Calculating Vapor and Heat Transfer Through Walls* in “Heat. Ventil.”, 1938, Vol.35, N° 11, pp. 56-58;
- Carslow H.S., Jaeger J.C. (1959) *Conduction of Heat in Solids*, Oxford, 1959;
- Crank J. (1975) *The Mathematics of Diffusion*, Oxford, 1975, pp. 414;
- Buxuan W., Zhaohong F. (1985) *A theoretical study on the heat and mass transfer in wet porous building materials. II J. Eng. Thermophys*, 1985, Vol. 6, N°1, pp. 60-62;
- Zheldakov, D. Y., Frolov A. A., Ivanov S. Y. (2016) *Investigation of strength of masonry walls in the building Kadashevsky baths II* in “Building materials”, N° 6, 2016, pp. 55-57;
- Zheldakov D.Y., Frolov A.A. (2017) *Segment method for calculating the temperature distribution along the section of the enclosing building structure* in “Housing construction” N° EI 2017, pp. 36.

**TECHNICAL
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THE USE OF NEW TECHNOLOGIES AND MATERIALS TO IMPROVE THE ENERGY EFFICIENCY OF BUILDINGS AND STRUCTURES FOR VARIOUS PURPOSES AS PART OF THE SMART CONSTRUCTION

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Abstract

The questions of the economic efficiency of optimizing the level of heat protection for buildings of various purposes have become very relevant at present and are widely discussed by construction workers, hygienists, operators and workers in a number of other professions. The article deals with the problem of increasing energy efficiency and thermal protection of buildings and structures. The questions of comfort of civil and industrial buildings are revealed. The technique of optimization of the level of energy efficiency is given. The economic and social effect of increasing energy efficiency and thermal protection of buildings and structures is described.

Keywords: energy efficiency, thermal protection of buildings, comfort of buildings, economic effect, social effect

1. Introduction

The questions of the economic efficiency of optimization of the level of heat protection for buildings of various purposes have become very relevant at present and are widely discussed by construction workers, hygienists, operators and workers in a number of other professions. The interest in this problem is explained by the fact that as a result of optimization of the heat protection level of buildings, many of the tasks facing our country can be solved more successfully, such as improving the comfort level of civil buildings, reducing the cost of operating buildings for various purposes, reducing fuel consumption, increasing labor productivity, etc.

2. The characteristics of the object

The improving the energy efficiency of buildings is the process of bringing the total reduced costs for external building envelopes and heating to the smallest possible value during designing.

However, optimizing the level of energy efficiency of buildings brings not only an economic effect. At the same time, it ensures a rise in the level of thermal comfort in the premises and a corresponding social effect, as well as a saving of the top-life. In industrial agricultural buildings, the optimization of the level of their energy efficiency increases the productivity of livestock and poultry farming and ensures the preservation of buildings. Therefore, this event contributes to the solution of a number of problems facing the economy of our country at the present time.

Increasing the level of comfort of civil buildings is not possible when the premises are not provided with a sufficiently high level of thermal comfort. The level of comfort as higher as higher the temperature of the inner surface of the outer enclosing structures (external walls, filling of light apertures, coatings, etc.).

Under specific design conditions, the temperature of the inner surface of the outer enclosing structures depends only on the heat transfer resistance of the inner surface of the enclosing structure, all other factors are constant under these conditions. Consequently, two variants of some external enclosing structure with different values of the heat transfer resistance correlate to the inner surface of the enclosing structure, then not only the total reduced costs for this construction and heating of the building, but also the level of thermal comfort in its premises.

Proceeding from the need to create thermal comfort, hygienists require that the normalized temperature difference between the internal air and the internal surface of the outer envelope should not exceed 3-4 °C. However, at present, this temperature difference is set at 6° C for residential premises, hospitals, schools, polyclinics and kindergartens, and 7° C for other public and administrative buildings. It is obvious that with such a large difference in temperature in the buildings of the listed buildings, proper thermal comfort cannot be ensured.

It should be noted that with a high value of the temperature difference, the second requirement is not applied to the external enclosing structures (and taken into account when setting this value) - a guarantee from the condensation of water vapor on the inner surface of the structure: its humidity, which is often found in construction practice. Humidification of walls and coverings (attic overlapping) leads to acceleration of the process of degassing the wall or overlapping.

At low temperatures of the inner surface of the outer enclosing structures of livestock and poultry houses, there is a sharp decrease in milk yield, egg production and weight gain, with an increase in feed consumption and a decrease in the safety of

animal feed. Often in such cases, the excessive thermal radiation of animals on the cold inner surface of the cover can not be compensated for by the production of additional heat by the animals, and then “combustion” begins in the body of the most scarce nutrients-animal proteins.

3. Apparatus and methods of measuring

Currently, when designing external building envelope structures, often proceed from the minimum allowable resistance to heat transfer, i.e. take the option with the lowest building cost and the maximum operational costs. This practice of projecting completely contradicts the generally accepted requirement - to identify and accept in projects only the option that provides the least expenditure, i.e. the best option.

Obviously, costs can be minimal only when each term is minimal. Reducing the specific resulted costs for external fencing structures is achieved by identifying and implementing the most economically feasible options. Reduction of the total areas of these structures achieve the perfection of architectural and space-planning solutions of the corresponding buildings

The main element of the operating costs for heating the building is the cost of fuel, and when supplying the heating system with heat from the CHP plant - the cost of this heat. Therefore, the optimization of the level of thermal protection of buildings will not only increase the level of energy efficiency and comfort of civil buildings, but will also provide a significant economic effect, the magnitude of which will increase continuously in accordance with the operational lifetime of the building.

If we compare the indicated values of the resistance to the heat transfer of the enclosing structures in Sweden to those required by the SNiP in Moscow, then it turns out that with all other conditions being equal, the heat costs for the heating of Moscow buildings are more than double the same costs in Sweden. The heat saving is additionally increased due to the presence in the “conditions” of the requirements for automatic regulation of the air temperature in the building’s premises and about the equipment of the devices for the regeneration of the heat of the exhaust ventilation systems.

Completely incommensurable volumes of housing construction in our time and 70 years ago. The types of residential buildings, their landscaping, number of floors, used materials and products, technology and organization of construction have changed.

When determining energy efficiency, it is necessary to take into account a number of factors, which include:

- the need to take into account capital investments and operating costs not only for the heating system of buildings, but also for other elements of the heat supply system - boiler houses (or thermal power plants) and thermal external networks;
- a change in the procedure for determining the operating costs for thermal energy; when building a building in a developed settlement, they are usually taken in accordance with the established selling price; in the new city it is not known, and these costs are determined as the sum of the individual elements;
- the cost of fuel should be determined not at the price list, but based on the closing costs of fuel, as a change in the volume of its consumption can be very significant and require the commissioning of new, less economically expedient fuel deposits;
- the cost price of the panels of external walls and coatings is defined differently than small-sized materials, - the cost of the panel increases with its thickness more slowly than the thickness. It should also be taken into account in capital investments additional costs for partial reconstruction of the prefabricated plant;
- it is necessary to take into account the influence of this measure on the prospects of development of related industries - the construction materials industry (the demand for cement, expanded clay, effective heat-insulating materials, etc.) and fuel-extracting industry will increase (fuel consumption for heating buildings decreases) . This account is necessary for the timely introduction of appropriate adjustments to the plans for the long-term development of these sectors of the economy;
- design conditions require the determination of the area of economically expedient use of manufactured building materials, the use of which in panels of external walls and coatings is currently possible in the near future; the identification of the field of application of these materials is necessary to determine the total demand for them, and the cost of construction also depends on it.

In the methodology of optimizing the level of energy efficiency, including thermal protection of buildings, it is necessary to find ways to take into account the additional effect, which currently does not have a quantitative evaluation, of the effect of increasing the level of thermal comfort. It was previously indicated that this issue, especially important for civilian buildings, has not yet been resolved. All the tasks of comparing project solutions in these buildings can be divided into three groups:

- a) providing the same level of comfort (for example, variants of interstitial overlap or partitions, providing the same level of sound insulation);
- b) envisaging for an increased level of comfort (for example, increasing the height of rooms or kitchen areas, etc.); In such cases, usually capital investments and operating costs increase. Therefore, the increase in the level of comfort cannot be quantified, and additional capital investments in advance plan accordingly increase the funds allocated to the construction of non-production facilities;
- c) ensuring an increasing of the level of thermal comfort, both simultaneously reduce the reduced costs, and not taken into account the quantitative social effect. Therefore, their effectiveness is higher than in point a.

4. The results of the measurements

The methodology for optimizing the level of energy efficiency, including thermal protection of buildings for various purposes, should help improve the balance of wall materials and structures in our country so that the output of economically most efficient products increases continuously and accordingly the share in the balance sheet is reduced less economical. As a result of such a restructuring of the building materials industry, a significant economic effect can be obtained.

The social effect in improving the energy efficiency of buildings is the result of an increasing in the level of thermal comfort in their premises. Hygienists define this comfort as a physiological condition in which the central nervous system receives the least amount of external stimuli that indicate changes in the environment, and the mechanisms of thermoregulation (the vascular system) experience the least irritation. With such a physiological state, the organism's forces recovering most violently during the productive activity of people are most fully recovered, which ensures the high productivity of their labor. After the residence of people in the rooms with a low level of thermal comfort, the production of their labor decreases. Doctors-hygienists have established that people living in buildings whose external enclosing structures have relatively little resistance to heat transfer are more likely to suffer from cold and neuralgic diseases and lesions of the peripheral nervous system than those living in buildings that are warmer and moderately glazed. thermal comfort of the wall, the more it reflects in the position of infrared heat rays. With a low temperature wall, it absorbs heat rays intensively and as a result, the heat radiation from the part of the body of the person facing the wall, this radiation is especially dramatic when there is a large area of a window opening with one or two layers of glass in the room. With such windows, a person in a room with a normal temperature of the air, it feels cold currents and can be sick, as with one-sided cooling of the organism its thermal control processes are violated. At the same time the infiltration of the outside air through the inaccessibility in the fillings increases, which contributes to the formation of temperature gradients fields inside the buildings. Calculations showed that in Moscow conditions, with windows with paired binders, thermal comfort at a distance of 1 m from the window is possible only in those cases when its area does not exceed 25-35% of the total area of the outer fences.

5. Conclusions

There is no doubt that there is a connection between the level of thermal comfort of civil and industrial buildings and the growth of labor productivity, a reduction in the number of diseases of workers, a reduction in the corresponding costs of production and health, and, ultimately, an increase in national income. However, at present, the quantitative assessment of the relationship between the level of thermal comfort and the specified results, due to the lack of relevant statistical data, can only be determined in individual cases.

References

SNiP 23-02-20032 "Thermal protection of buildings".

Belyaev V. S., Granik Yu. G., Matrosov Yu. A "Energy Efficiency and Building Heat Protection". Publishing Association of Construction Universities, 2014.

Kornienko S.V. Integrated assessment of energy efficiency and thermal protection of buildings. Construction of unique buildings and structures. 2014. 11 (26), pp. 33-48.



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