Modelling of the architectural monuments protection system in the conditions of uncertainty and multiplicity of solutions

Abstract. The relevance of the study is determined by the fact that architectural monuments in most cases are understood as objects of historical value and are considered to be cultural and historical objects. The costs of maintaining and operating cultural monuments are defined in the budget legislation and economic practice as expenses intended to reduce costs. The authors show that this approach of management and accounting is not only contrary to the objectives of economic development and social balance, but also is a form of economic pressure on regional authorities.

The novelty of the study is determined by the fact that the authors use the example of regional architectural monuments (namely, the mansion of the city estate of O. N. Chizhova in Moscow) to use a model that takes into account both the destruction of the monuments and social losses. It is shown that the cost of restoring an architectural monument can be reduced by 10-15% if each monument is viewed as a socio-cultural unit and, accordingly, more frequent monitoring of the state of the object is carried out. The authors developed and tested a multi-criteria model of cost estimation for the historic building restoration.

The practical significance of the study is determined by the fact that the calculation of models will reduce the degree of destruction of historical monuments and increase public attention to this problem.

Keywords: Cultural and Historical Object; Monument; Economy of Culture; Historical Site; Support; Solution; System; Building; Model

JEL Classification: C42; C51

Acknowledgements and Funding: The authors received no direct funding for this research.

Contribution: The authors contributed equally to this work.

DOI: https://doi.org/10.21003/ea.V179-12
скоротити на 10-15%, якщо кожну пам’ятку розглядати як соціально-культурну одиницю й, відповідно, проводити більш частий моніторинг стану об’єкта. Авторами статті розроблено й апробовано багатокритеріальну модель. Практична значимість дослідження визначається тим, що розрахунок моделей дозволить скоротити ступінь руйнування історичних пам’яток і підвищити увагу до даної проблеми з боку громадськості. Ключові слова: культурно-історичний об’єкт; пам’ятник; пам’ятка; економіка культури; історичне місце; підтримка; рішення; система; будівля; модель.

Новопашіна Е. І.
кандидат економічних наук, доцент, кафедра будівельного машиностроения і матеріаловедення, Пермський національний індустріальний політехнічний університет, Пермь, Росія

Дмитрюков М. С.
аспірант, старший преподаватель, кафедра будівельного інженерия і матеріаловедення, Пермський національний індустріальний політехнічний університет, Пермь, Росія

Моделювання системи охорони памятників архітектури в умовах необхідності і множинністі рішень

Аннотація. Пам’ятники архітектури в більшості випадків понимаються як об’єкти історичної цінності і розглядаються як культурно-історичний об’єкт. Затрати на підтримку і функціонування пам’ятників культури в бюджетному законодавстві і взаємодії із арендаючим в собствеників із стабільними витратами. В цей процес вкладається, що цей підхід є не лише протидією, але також формою економічного притискання до регіональних органів влади. Новизна дослідження полягає в тому, що авторами колодія регіонального пам’ятника архітектури пропонується економічна модель, яка враховує не тільки знос пам’ятника, але й втрати соціального характеру. Показано, що затрати на відновлення пам’ятника архітектури можуть сократитись на 10-15%, якщо кожен пам’ятник розглядається як соціально-культурну одиницю і, відповідно, проводиться більш частий моніторинг стану об’єкта. Авторами розроблена і апробована багатокритеріальна модель.

Практична значимість дослідження полягає в тому, що розрахунок моделей дозволить скоротити степень руйнування історичних пам’ятників і підвищити увагу до даної проблеми з боку громадськості.

Ключові слова: культурно-історичний об’єкт; пам’ятник; пам’ятка; економіка культури; історичне місце; підтримка; рішення; система; будівля; модель.

1. Introduction

The situation with architectural monuments in Russia is currently poorly studied and the related field of research has many problems. One of the problems is a lack of a concept for managing and branding architectural monuments. The second problem is a lack of understanding of the need for permanent funding required for the restoration and reconstruction of monuments.

What is the expression of this uncertainty and what can be the whole complex of multi-solutions? Based on the study, it is proposed to build a solution model, with a detailed analysis of each specific structure.

The research will be conducted in the field of studying Russian architectural monuments, and the practical part of the model used for studying the state of architectural monuments is based on the example of a building in Moscow.

2. Brief Literature Review

The development of the subject of protection represents complex historical and cultural researches on the object (the ensemble, an element of building) with the subsequent submission of materials for consideration by experts in history and culture in the department of cultural heritage of the city or a special commission created by the public authority of the subject of the Russian Federation in the field of protection of cultural heritage (Baxter, 2001).

The concept of the subject of protection is also key in determining the boundaries of permissible interference in the repair and adaptation of the monument to modern use. In both cases, work on the monument is allowed «without changing its features, constituting the subject of protection» (Blaško et al., 2012; Brooks et al., 2013). The same condition determines the right to use the monument by legal entities and individuals. The content of the subject of protection determines the duties that the state imposes on the tenant or owner (Milja et al., 2015). Thus, it is the content of the subject of protection in each case that serves as a guarantee of preservation of the monument (Sandholz, 2017).
In recent years, many descriptive contributions have been made to analyze the prevailing policies, strategies and measures marked by conflicts regarding development and conservation (Nijkamp, 1991).

The task of determining the subject of protection poses to experts not only moral, but also quite complex methodological problems relating the issues of how we determine the subject of protection of the memorial value of monuments or what we are supposed to guard (Zezza, 2018), and whether it is possible to define as a subject of protection stylistic features of a monument or its place in history of architecture as a product of a certain master.

The main concept characterizing the stages of the formation of modern views on architectural monuments are presented in the research by Vicente et al. (2018), who generalized the basic principles of restoration of monuments of architecture and their adaptation to modern use, considered the main types of restoration works and their field of application, and covered in detail the issues of research of architecture monuments and projects of restoration development.

Nowadays, one more aspect related to application of new technology and the paradigm of energy efficiency in residential and public housing has occurred (Kaklauskas et al., 2012). Hence, a complicated aspect of combination historic building (HB) protection and introducing of energy saving technology becomes a new problematics in regard of HB protection and restoration from legislative, cultural, social, safety and technological points of view (Murgul, 2016).

3. The purpose of the paper is To work out and approbate a multi-criteria model of cost estimation for the historic building restoration taking into account the costs

4. Results

Historic building (HB) is a kind of real estate itself, and has the features and functions related to any real estate as an economic good, a commodity and a financial asset. For the purposes of the complex economic model formation, let us consider each feature of the HB as real estate more detailed.

Real estate as an economic good performs the functions of:

- item of consumption (non-profit), a resource for personal or public use;
- residential real estate, including homestead lands or gardens;
- lands and buildings associated with institutions providing defense or medical, educational and other socially significant services (Shaban, 2004);
- real assets, resources for the production of goods and services for profit, i.e. commercial real estate, including enterprises, agricultural land, fish ponds, property complexes of enterprises, etc. (Yates, Drdácký, Pospíšil, & Grøntoft, 2009);
- financial (investment) assets;
- goods purchased for subsequent resale to obtain profit;
- capital in real form, making a profit from renting and profitable resale (commercial real estate);
- collateral for financial instruments (securities, including mortgages).

The features of real estate as a commodity include:

- non-relocation of the object in space, which limits the possibility of implementing the transaction only according to the parameters of the regional market;
- uniqueness of objects due to the uniqueness of the combination of a very large number of parameters (absolute analogues are unavailable), which means the uniqueness of each transaction in the real estate market (Van der Auwera & Schramme, 2014);
- the durability of the object ensures its presence on the market as part of the proposal (hidden or explicit) for a long time regardless of any fluctuations in the market;
- a limited number of land resources and durable improvements, which leads to a relatively low elasticity of supply of the product and the corresponding features of market pricing;
- the complexity of the structure of the object with the possibility of variations in the set of physical and legal properties, combined with the high complexity of market processes forces participants to bear high transaction costs in the preparation and implementation of transactions (Sonkoly, 2017);
- the complexity of market processes, accompanied by difficulties in acquiring information, which complicates the task of determining, verifying, securing rights, concluding a contract of sale, organizing settlements between the buyer and the seller and forcing the use of intermediaries (Vicente et al., 2018);
• low liquidity, which leads to a significant lengthening of exposure time when selling real estate at market prices (Warren, 1998).

The features of real estate as a financial asset include:

• heterogeneity of the asset associated with the heterogeneity of the economic characteristics of the objects in the aggregate of the latter (due to the uniqueness of each object) significantly complicates the problems of real estate portfolio management;

• the relative stability of revenues from the operation of the facility, provided by the long-term lease agreements and the following of income changes for inflationary price changes, facilitates economic forecasts and management of economic risks;

• inexhaustibility of land and durability of buildings together with the enduring consumer value of real estate provide a high level of guarantees of safety of invested funds in comparison with other types of financial assets;

• the need for a high level of start-up investments for the acquisition or (and) development of the object-with the required level of independence in profitable operation-significantly narrows the circle of potential users of this type of asset;

• the need for highly professional management of objects due to the high degree of complexity of their structure and system of ensuring their functioning leads to the need to involve in the process of profit not only brokerage, but also management companies;

• traditionally low liquidity and high transaction costs for this asset in comparison with securities reduce its attractiveness in the implementation of speculative operations, however, nowadays institutional investors have found new forms of effective operations with it at financial markets (van Loon & Aalbers, 2017).

Interpolating the current situation to other regions of the Russian Federation, we can say that the problem of preservation and development of the historic buildings is quite important for the cities of Russia, because most of them have come to our times with traces of restoration, sometimes very significant, when they were taken out of the ruined state or had the impact of the Soviet era, when most of the temples, for instance, were destroyed and all the signs of their belonging to a certain (imperial) type of state, culture and religion were erased (Murgul, 2016). Accordingly, the amount of money aimed at restoring of the historic buildings is considered to be significant for the state budget.

Interest in the preservation of historical heritage has increased not only in the Russian Federation, but also around the world. Monuments of the past, and in particular works of architecture, are designed to resist the trends of dehumanization, which sometimes arise as a side effect of accelerated industrial development. All this increases the importance of works on preservation of monuments of architecture and restoration profession (Warren, 1998).

Issues of evaluation of buildings – monuments of history and architecture - were dealt with by E. E. Yaskevich, a practicing appraiser, scientific director of the Scientific and Practical Centre of Professional Appraisers (SPCPA, 2019), leading appraiser of the historic and architecture real estate and the author of numerous methodologies, seminars and publications on valuation and management of real estate, business and intellectual property. In his work, he claims that the historical importance of the monument building is that it is an object of importance to society (cited by Sonkoly, 2017).

Since the carrier of all the values of the monument building, both physical (material) and spiritual (immaterial) are its material structures and forms, the level of their preservation should be the basis for determining the index (coefficient) of preservation. At the same time, it should be taken into account that the method and the law require not only the preservation of the physical body of the monument or its elements as such, but also the preservation of their original (authentic) appearance (Van der Auwera & Schramme, 2014). The concept of the monument appearance as an object of assessment, taking into account our interpretation the law on protection and assessment methodology, includes spatial composition, architectural forms, material and structures of a building, as well as its structure and complex (ensemble), including the landscape and finishing of exteriors (facades) and interiors (Sandholz, 2017a, 2017b). Building requirements for functional suitability and technical reliability are presented in Table 1.

The specifics of determining the total for maintaining increased safety of the monument can be interpreted as a rate of change in the process of long existence of object forms, composition and material of its structure (Zezza, 2018).
Creating a formula for calculating the residual value of the restoration (replacement) of the historic monument building \((K)\) taking into account its different features as an object of real estate as well as the component that takes into account its perception as an intangible asset, we designate the following model:

\[
K = 1 + K_h + K_t + K_{ug} + K_e + K_{in} + K_u,
\]

where:
- \(K_h\) - the coefficient that takes into account the historical value;
- \(K_t\) - the coefficient that takes into account the town-planning value;
- \(K_{ug}\) - the coefficient that takes into account the uniqueness of the overall composite solution;
- \(K_e\) - the coefficient that takes into account the expressiveness of the exterior;
- \(K_{in}\) - the coefficient that takes into account the expressiveness of the interior;
- \(K_u\) - the coefficient that takes into account the utilitarian value.

The values of the recommended levels of reducing the \(K\)-coefficients, taking into account the degree of preservation of the authenticity of the building and its elements, are shown in Table 2. The selection of the appropriate indicators for the table is based on the study of the historical certificate or the passport of the monument in comparison with the results of visual inspection of the external and internal appearance of the object and its structures, the landscape and the engineering equipment (Sheuya, 2004). The procedure for expert evaluation of the \(K\) in conjunction with the \(K_t\) is conducted by using a point system.

The Law «On Objects of Cultural Heritage» provides for the restoration of objects under the supervision of the Committee for the Protection of Cultural Heritage.

For urban real estate, as a rule, a favourable location in the historic center of the city and a beautiful view are accompanied by either a lack of parking or significant restrictions and poor transport accessibility. For suburban real estate, the perfect location is accompanied by an urgent need for large-scale investments in reconstruction, repair and restoration (Yates, Drdácký, Pospíšil & Grøntoft, 2009).

The involvement of the relevant objects in the market turnover (purchase and sale, insurance, pledge, etc.) requires their evaluation. However, it should be noted that the corresponding evaluation methods have not been developed yet (Blaško, 2012).

We will calculate the estimate of the replacement cost of the object. The following methods are used to determine the full replacement value in modern valuation practice:
- the method of consolidated summarized indexes of value (the method of comparative units);
- the method of enlarged elementary cost indicators;
- the method of unit prices.

When calculating the cost of work \((R)\), appraisers use the method of enlarged generalized cost indicators (the comparative unit method). This method is one of the most efficient and provides an

---

**Table 1:**

| Physical deterioration, % | to functional fitness | Requirements | to technical reliability |
|---------------------------|-----------------------|--------------|--------------------------|
| 0 – 20                    | Hold true             | Hold true    |                          |
| 21 – 40                   | Hold true, subject to local repairs | Hold true |
| 41 – 60                   | Hold true, subject to local repair work with the replacement or strengthening of individual structural elements. |
| 61 – 80                   | Hold true, subject to significant repair and restoration work, with the replacement of a number of unsuitable structural elements or their strengthening. |
| 81 and more               | Not performed, building is not a subject to repair (impractical), but to the restoration (reconstruction). It can be performed on a special project, using individual structural elements suitable for reuse. |

**Source:** S. Sandholz (2017a)

**Table 2:**

| The level of preservation of the geometric shape, composition, structure and material forming the integral \(K\) and its components | The corresponding value of the safety index \(K_t\), % |
|---------------------------------------------------------------|-------------------------------|
| Fully preserved                                              | 90-100                       |
| Slightly changed or lost                                     | 70-80                         |
| Partially changed or lost                                     | 50-60                         |
| Significantly altered or lost                                 | 20-40                         |
| Completely changed or recreated                               | 0-10                          |

**Source:** Compiled by authors using the approach by Sheuya (2004)
acceptable accuracy of about 15-20%. The method is based on comparison of unit cost of consumer properties (for 1 m³ of the building volume or square meters of the total area) of the evaluated object with the cost of the analogue units:

\[ R = \frac{C_{pp} \times K \times K_{pp}}{O \times \text{TAX}} \]  

where:

- \( C_{pp} \) - the full restoration cost in current prices, USD/m³,
- \( O \) - the volume of the building,
- \( K \) - the coefficient that takes into account the difference between the volume or the area of a similar object and the object of evaluation. It is determined according to the general part of the above-mentioned appraisers' reference books;
- \( K_{pp} \) - the price index for construction and installation work at the moment;
- \( \text{TAX} \) - the tax on the overall working price.

5. In our study, the object of cultural heritage under evaluation is the mansion of the city estate of O. N. Chizhova in Moscow (Figure 1). According to the submitted act of technical condition, the subject of protection is considered to be: town planning characteristics of the building, the spatial composition and the planning structure of the building consisting of office and production buildings described in the edition by F. O. Shechtel in 1907, the planning structure of the 1st (ground floor) and 2nd (1st floor) floors of the office building in the limits of the capital walls, space planning solutions, architectural and artistic design of the main staircase, the space planning structure of the industrial building of the hall type with a rack-and-beam system of structures at the level of the 1st and the 2nd floors, the composition and the architectural solution of the main facade and the courtyard facade and the bas-relief of the 1920s on the street facade.

![Figure 1: The mansion of the city estate of O. N. Chizhova](Source: Open Source)
The calculation of physical wear is done in accordance with the method of dividing into structural elements by specific weights, the results of which are presented in Table 3, with the definition of wear on individual structural elements.

The reconstruction project is shown in Figure 2.

According to the methodology, we used the method of assessing of the cultural heritage monument in order to further restore it with regard to the algorithm shown in Figure 3.

Monument buildings in the majority are individual, however there are certain criteria allowing to make their conditional associations in certain groups (Sandholz, 2017).

### Table 3: Calculation of physical wear of the object

| Structural element                                       | Specific weight of structural elements, % | Physical wear of structural elements, % | Weighted average of physical wear and tear, % |
|----------------------------------------------------------|------------------------------------------|----------------------------------------|-----------------------------------------------|
| Foundations                                              | 7.19                                     | 7.5                                    | 0.42                                          |
| Frame                                                    | 12.16                                    | 7.5                                    | 1.62                                          |
| Walls                                                    | 7.19                                     | 7.5                                    | 0.42                                          |
| Partitions                                               | 2.55                                     | 7.5                                    | 0.36                                          |
| Overlaps and covering                                    | 6.52                                     | 7.5                                    | 1.05                                          |
| Roofs                                                    | 2.32                                     | 7.5                                    | 0.43                                          |
| Windows and balcony doors                                | 4.62                                     | 5                                      | 0.38                                          |
| Floors                                                   | 5.75                                     | 12.5                                   | 0.11                                          |
| Finishing of the ceilings, internal walls and partitions  | 8.69%                                    | 12.5%                                  | 1.30%                                         |
| Other structures                                         | 2.36%                                    | 12.5%                                  | 0.80%                                         |
| Special elements of design                               | 3.91%                                    | 7.5%                                   | 0.79%                                         |
| Heating, ventilation and air conditioning                 | 14.46%                                   | 7.5%                                   | 1.05%                                         |
| Water supply and Sewerage                               | 3.00%                                    | 7.5%                                   | 0.30%                                         |
| Power supply and lighting                               | 14.97%                                   | 7.5%                                   | 1.50%                                         |
| Low current systems                                      | 1.31%                                    | 5%                                     | 0.02%                                         |
| Other systems and special equipment                       | 1.99%                                    | 5%                                     | 0.55%                                         |
| **Subtotal**                                             | **100.0%**                               | **11.10%**                             |                                               |

Source: Compiled by the authors
All monument buildings can be conventionally divided into six groups:

Group 1. Objects of commercial use (private housing, banks, offices, holiday homes, hotels, retail spaces, etc.).

Group 2. Objects that are partially focused on commercial objectives.

Group 3. Objects of non-commercial use (museums, culture institutions, galleries, children’s institutions, etc.).

Group 4. Facilities for diplomatic, consular, religious, etc. services.

Group 5. Objects aimed at state purposes (placement of the government, officials, law enforcement agencies, fiscal authorities, public servants, etc.).

Group 6. Dilapidated and destroyed objects, the complete reconstruction of which is currently impractical.

Such a division allows for determining the type of value and the set of approaches to evaluation with regard to each of the groups.

Figure 3:
Methodology for facing the accessibility of monuments
Source: A methodology for facing the accessibility of monuments developed and realised in Thessaloniki, Greece by Naniopoulos and Tsalis (2015)
The factors that determine the identification of buildings as monuments are numerous, but they can all be combined into 5 groups by taking into account the following (Baxter, 2001):

- the time of creation;
- the author’s solution;
- the structural embodiment;
- external factors;
- locations.

Consideration of the time factor and its impact on cost is given in the research by Nijkamp (1991).

The factor of structural embodiment can be considered according to the following criteria:

- uniqueness of the monument;
- urban planning;
- historical authenticity (preserved in its original form, has minor changes, partially preserved the original appearance, recreated, completely rebuilt);
- character of the decor of facades and interiors (fully preserved, partially lost, completely lost, initially absent);
- planning structure (fully preserved, partially modified, completely changed) (see, for example, the work by Snethlage, 2014).

The comparative approach is based on three principles of real estate valuation: supply and demand, substitution, and contribution. The market value of a real estate object is estimated through the analysis of market prices of sales of similar real estate objects. We consider a certain segment of the real estate market in view of its compliance with free competition and price changes over time.

6. Conclusions

The authors have proposed a risk management strategy for the preservation of architectural monuments, the essence of which is determined as follows.

1. The basis of the risk management strategy for the preservation of architectural monuments is management by forecast (and not by the fact of their destruction), i.e. preventive measures concerning irreparable changes in architectural monuments under the impact of negative environmental factors, wear and aging, which is the only possibility of preserving the historical value at a minimal cost.

2. The main task of risk management of preservation of architectural monuments is to identify patterns of impact of various factors on structures in order to be able to predict possible effects and take measures to maintain the condition of structures.

3. For architectural monuments, the ultimate goal of management should be a state no worse than the initial (current) state, i.e. the essence of management of such objects is the exclusion or at least weakening of the influence of the environment, wear and aging of the elements of the historic building itself.

4. The problem of preservation of architectural monuments should be formulated and solved as a stochastic (probabilistic) problem of risk management of changes (going beyond the permissible limits) of the parameters of the basic structural system. Accordingly, the risk classifier should take into account the effects of all major random factors.

5. Risk management of preservation of architectural monuments should be based on the modern theory of management, taking into account all the main features of the current state and patterns of future changes in natural and man-made conditions of existence of these monuments. Today, such a theory is a Fairly General theory of management, developed by authors from St. Petersburg.

6. Management of risks regarding preservation of the monuments of architecture should be based on the functions of management with a detailed formulation of purposes on each significant parameter of the the basis and construction system. From control theory we know that if not provided the predictability of the system behavior according to the forecast, it is practically impossible to control the behavior of such a system. A qualified forecast can be made only on the basis of the reliable integrated monitoring system.

The technogenic processes caused by the activation of human activity in modern conditions negatively affect historical objects, therefore monitoring of the related risks and changes in the condition of such objects during operation is required.
References

1. Baxter, A. (2001). Twentieth-Century Buildings. Journal of Architectural Conservation, 7(2), 27-30. doi: https://doi.org/10.1080/09654313.2001.10785292

2. Blaško, M., Cacciotti, R., Kvremen, P., & Koubi, Z. (2012). Monument Damage Ontology. In M. Ioannides, D. Fritsch, J. Leissner, R. Davies, F. Remondino, & R. Caffo (Eds.), Progress in Cultural Heritage Preservation (pp. 221-230). Berlin, Heidelberg: Springer Berlin Heidelberg. Retrieved from https://link.springer.com/chapter/10.1007/978-3-642-34234-9_22

3. Brooks, J., Waylen, K. A., & Mulder, M. B. (2013). Assessing community-based conservation projects: A systematic review and multilevel analysis of attitudinal, behavioral, ecological, and economic outcomes. Environmental Evidence, 2(1), 1-34. doi: https://doi.org/10.1186/2047-2382-2-2

4. Gosstrow of Russia (2007). Rules for assessing the physical deterioration of residential buildings VSN 53-86 (p). Retrieved from https://files.stroyinf.ru/Data2/1/4294854/4294854825.pdf (in Russ.)

5. Kaklauskas, A., Rute, J., Zavadskas, E. K., Daniunas, A., Pruskus, V., Bivainis, J., Gudauskas, R., & Plakys, V. (2012). Passive House model for quantitative and qualitative analyses and its intelligent system. Energy and Buildings, 50, 7-18. doi: https://doi.org/10.1016/j.enbuild.2012.03.008

6. Milia, P., Golovina, S., & Murgui, V. (2015). Revitalization of Historic Buildings as an Approach to Preserve Cultural and Historical Heritage. Procedia Engineering, 117, 883-890. doi: https://doi.org/10.1016/j.proeng.2015.08.165

7. Murgui, V. (2016). Methodology to Improving Energy Efficiency of Residential Historic Buildings in St. Petersburg. MATEC Web of Conferences, 53, 01046. doi: https://doi.org/10.1051/matecconf/20165301046

8. Naniopoulos, A., & Tsalis, P. (2015). A methodology for facing the accessibility of monuments developed and realised in Thessaloniki, Greece. Journal of Tourism Futures, 3(1), 240-253. doi: https://doi.org/10.1108/JTF-03-2015-0007

9. Nijkamp, P. (1991). Evaluation measurement in conservation planning. Journal of Cultural Economics, 15(1), 1-27. doi: https://doi.org/10.1080/09654313.2016.1277693

10. Sandholz, S. (2017a). Heritage and Conservation in Changing Environments. In S. Sandholz (Ed.), Urban Centres in Asia and Latin America: Heritage and Identities in Changing Urban Landscapes (pp. 53-101). Cham: Springer International Publishing. doi: https://doi.org/10.1007/978-3-319-43735-4_5

11. Sandholz, S. (2017b). Heritage and Identities in Selected Urban Centres. In S. Sandholz (Ed.), Urban Centres in Asia and Latin America: Heritage and Identities in Changing Urban Landscapes (pp. 35-318). Cham: Springer International Publishing. doi: https://doi.org/10.1007/978-3-319-43735-4_5

12. Scientific and Practical Centre of Professional Appraisers (SPCPA) (2019). Official web-site. Retrieved from https://cppca.ru/

13. Sheuya, S. (2004). Housing Transformations and Urban Livelihoods in Informal Settlements. The Case of Dar es Salaam, Tanzania. (Doctoral dissertation thesis). Dortmund: University of Dortmund. https://www.scrip.org/(Si43dyn45teexjx455qlt3d2q)/reference/ReferencesPapers.aspx?ReferenceID=1699474

14. Snethlage, R. (2014). Stone Conservation. In S. Siegesmund & R. Snethlage (Eds.), Stone in Architecture: Properties, Durability (pp. 415-550). Berlin, Heidelberg: Springer Berlin Heidelberg. doi: https://doi.org/10.1007/978-3-642-45155-3_7

15. Sonkoly, G. (2017). The History of Historic Urban Landscape. In Historical Urban Landscape (pp. 9-76). Cham: Springer International Publishing. doi: https://doi.org/10.1007/978-3-319-49166-0_2

16. Van der Auwera, S., & Schramme, A. (2014). Cultural heritage policies as a tool for development: discourse or harmony? ENCATC Journal of Cultural and Policy, 4(1). Retrieved from https://www.encatc.org/media/394-encatc-journal-vol-4-issue-1.pdf

17. van Loon, J., & Aalbers, M. (2017). How real estate became «just another asset class»: the financialization of the investment strategies of Dutch institutional investors. European Planning Studies, 25, 221-240. doi: https://doi.org/10.1080/09654313.2016.1277693

18. Vicente, R., Lagomarsino, S., Ferreira, T. M., Cattari, S., & da Silva, J. A. R. (2018). Cultural Heritage Monuments and Historical Structures: Conservation Works and Structural Retrofitting. In A. Costa, A. Arêde, & H. Varum (Eds.), Strengthening and Retrofitting of Existing Structures (pp. 25-57). Singapore: Springer Singapore. doi: https://doi.org/10.1007/978-981-10-5858-5_2

19. Warren, J., Worthington, J., & Taylor, S. (1998). Context: New Building in Historic Settings. Oxford: Architectural Press.

20. Weisen, M. (2003). «Online access to cultural and educational resources for disabled people: a European challenge», Access to Culture and Sports for People with Disabilities Conference Proceedings. Hellenic Ministry of Culture, Thessaloniki, 30 October-1 November.

21. Yates, T., Drdáčky, M., Pospišil, S., & Granofto, T. (2009). Risk Assessment and Management Strategies at Local Level. In R. Hamilton, V. Kucera, J. Tidblad, & J. Watt (Eds.), The Effects of Air Pollution on Cultural Heritage (pp. 215-267). Boston, MA: Springer US. doi: https://doi.org/10.1007/978-0-387-84893-8_8

22. Zezza, F. (2018). The Monument Stone: An Eternal Link of Past Civilizations. In M. Kou, F. Zezza, & D. Kouis (Eds.), 10th International Symposium on the Conservation of Monuments in the Mediterranean Basin: Natural and Anthropogenic Hazards and Sustainable Preservation (pp. 17-28). Cham: Springer International Publishing. doi: https://doi.org/10.1007/978-3-319-78093-1_3

Received 5.08.2019
Received in revised form 23.08.2019
Accepted 27.08.2019
Available online 11.11.2019

Novopashina, E., & Dmitryukov, M. / Economic Annals-XXI, (2019) 179(9-10), 138-147