

## MEASURING THE VALUE OF THE ASSETS OF THE MONUMENT BUILDING WHEN ASSESSING THE INSURED VALUE OF AN OBJECT

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**Abstract.** The forthcoming transfer of St. Isaac's Cathedral in St. Petersburg being a UNESCO World Heritage Site to the Russian Orthodox Church ignites a heated debate within the Russian society. The cathedral being part of the State Museum Complex stands out as a pearl of the world's iconic architecture. Furthermore, it is the second most visited museum after the Hermitage, boasts an outstanding exhibition potential, and it regularly hosts church services and ritual events. Museum collections exceed twenty-four thousand items of storage, and they continue to be replenished with found rarities and newly restored objects with the status of a relic to be protected. The aim of the article is to measure the value of the assets of the monument building, assessing the insured value of the object. Uncertainty of the future use of the disputed object, however, allows us to consider the calculation capabilities and methodical tools of valuation activities to measure the market and insurance value of such a real estate object and land plot, for example, in order to practice damage compensation and transfer the object from the balance sheet of one owner to balance of another owner. The latter circumstance determines the main discourse of this study. The present article is devoted to questions of an expert estimation of the insured value of the object of research in the form of St. Isaac's Cathedral. The article is a continuation of a series of previously published works by the author.

**Keywords:** *Building monument, improvement, insurance value, land plot, objects of history and national culture, real estate, real estate value.*

### INTRODUCTION

Lucius Annaeus Seneca, a Roman philosopher, poet and politician said that „Money should be managed, not somebody should be served by them” (Seneca, 2015). It should be emphasised though that the protection of museum collections and the preservation of monument buildings in the country is extremely unsatisfactory (Lukov, Vladimirova, & Holshchevnikov, 2006). In this case, there are not even approximate estimates of the market value of the object of research in the form of a monument-building St. Isaac's Cathedral with the occupied land plot, not to mention the reliable insured value of the assessed object, so necessary for compensation of damage and losses in the event of a catastrophe, fire and other spontaneous insurance of cases. The article continues the discussion of the urban

problem related to the transfer of the religious buildings of St. Petersburg to the Russian Orthodox Church (ROC). The discussion was presented in the following papers: "Herald of NAT", No. 4 (36), 2015, No. 4 (40), 2016, No. 3, 2017, as well as in the foreign monographs (Tsatsulin, 2016). On 25 May 2018, the police of the city of Moscow detained a vandal who, in the evening, broke a glass of the famous painting of Ilya Repin, "Ivan the Terrible and his son Ivan on November 16, 1581" (1883–1885) in the Tretyakov Gallery. According to the official representative of the Ministry of Internal Affairs, a criminal case was instituted on damage to cultural heritage sites. According to the Telegramm Channel 112, the detainee is an unemployed person named Igor (Telegram-store.ru, 2012). He said that he intentionally cut the picture with glass, because he considered the historical fact, represented by the artist, to be unreliable<sup>1</sup>. The agency Interfax in the press service of the Tretyakov Gallery reported that the picture is seriously damaged. "The canvas is broken in three places in the central part of the work on the figure of the prince. The author's art frame was badly damaged from the fall of the glass," they said (Interfax, 2018). The attacker seriously damaged the canvas, only the restoration of which, according to experts, will cost the museum more than 10 million rubles. But simultaneously it turned out that not a single picture from the collection of the Tretyakov Gallery is insured. Moreover, there is no insurance for any work of art in any museum of the Russian Federation, including the Hermitage. In the territory of Russia, all monuments of architecture are also not insured.

But monuments of architecture, history of culture and the world heritage burn in fires suffer from natural disasters, anthropogenic pressure of tourists and visitors and so on. And these monuments are not insured because no one knows their insurance value. Their market value or intrinsic value is also unknown.

The fire destroyed the Church of the Assumption of the Blessed Virgin in Kondopoga of the 18th century (Fig. 1). The need arises for closer cooperation between the church and the museum community to prevent such tragedies. The church was in joint use and was transferred to the balance of the diocese. However, the maintenance was entrusted to the museum. Undoubtedly, the church was ready to bear a part of its responsibility. Another thing is that there was no real possibility to carry out any security functions at the church.



**Fig. 1.** This is all that remains of the monument of architecture of federal significance; the object is not subject to full restoration (the author's opinion).

<sup>1</sup> That is, the very fact of the cruel murder of Tsarevich – Prince Ivan Ivanovich – by Tsar Ivan IV in the next fit of rage, which is discussed in the domestic historical science.

The Assumption Church was built in 1774 and was one of the tallest wooden churches in the Russian North. The church was an object of cultural heritage of federal significance (Fig. 2). The fire occurred on the morning of 10 August; according to preliminary data of the Ministry of Emergency Situations, the church was set on fire. The main frame was a four-cornered structure (quadrangular structure), on which two expanding eight-metrics were installed, topped with a tent. The total height of the temple was 42 m, length – 24 m, width – 14.6 m. Inside, until the fire, the iconostasis in the Baroque style was preserved, the ceiling with unique paintings (“Sky”). The 15-year-old teenager poured gasoline at the temple in Kondopoga and set fire to it, firemen came without water, the church, the iconostasis and icons were instantly burnt, the boy was detained; he called himself a Satanist.



**Fig. 2.** Church of the Assumption of the Blessed Virgin in Kondopoga  
(Photo: Sergey Sverdlov from Wikimedia Commons).

In this form, the church stood for almost 250 years; the object was not insured – more than 80 million rubles will be allocated for the creation of the copy. However, not only the wooden churches burn well. The residents of St. Petersburg remember the famous fire of the entirely stone Trinity-Izmailovsky Cathedral (Trinity Cathedral); full name – Cathedral of the Holy Life-Giving Trinity of the Life Guards of the Izmailovsky Regiment. Cathedral was not insured because its value was not known.

### **The Main Goal of the Research**

Over the past three years, the public of St. Petersburg has been anxiously awaiting the end of the story of the donated transfer of St. Isaac’s Cathedral to the Russian Orthodox Church. The last date the Ministry of Culture of the Russian Federation calls 12 July 2018 – the Day of Saints Peter and Paul, which is not the final date. But it remains unclear at what cost the ROC will take the Cathedral on its balance sheet?

Authorities and citizens are also concerned about the future security and safety of this outstanding architectural monument, which has been working as a

remarkable museum in recent years. Uncertainty of the future use of the disputable monument building, however, allows us to consider the accounting capabilities of the methodological tools of valuation activities to measure the market value of such a property and land plot with it, say, for insurance purposes. The latter determines the main goal of the study.

### Background of the Problem

St. Isaac's Cathedral was built in 1818–1858 and designed by O. Montferrand. Its height at the time of completion of the construction exceeded 102 m, and the internal area was more than 4 thousand m<sup>2</sup>. The Government of the Russian Federation transferred St. Isaac's Cathedral to St. Petersburg in October 2012. Three years later the St. Petersburg diocese of the ROC appealed to the city authorities for granting the right of free use of the building of St. Isaac's Cathedral, but the authorities refused. The city government then decided to keep the cathedral in the operational management of the state museum-monument "St. Isaac's Cathedral".

In general, the seriousness of the problem was identified by the vice-governor of St. Petersburg, I. N. Albin (Албин И. Н.), "Once I happened to stand at the origins of the all-Russian Forum "Preservation of Cultural Heritage Monuments". And the numbers that I encountered, they were frightening. Each year Russia loses about 360 architectural monuments. And at the same time, there will not be enough budgetary funds to tidy up our historical and cultural heritage. We need mechanisms to preserve and adapt architectural monuments for modern use" (Fontanka.ru, n.d.).

In the community of real estate valuers, a stereotyped view has emerged that the economic evaluation of *monument buildings* (MB) consists primarily of the valuation of their material condition (Musin, 2006). Such an estimate is obtained by subtracting the physical depreciation of the property from the full replacement value with the addition of the value of the land plot (hereinafter referred to as the *plot*) without assessing the influence of time on the plot and without taking into account the belonging of the MB to the category of historical and cultural heritage, therefore, having historical and cultural value (*utility*), as one of the components of the market value of the MB, and the objectives that are pursued at the time of valuation.

The main goal of the future use of St. Isaac's Cathedral after its likely transfer<sup>2</sup> to ROC and giving it a special status of a patriarchal church (but with a double subordination) is not yet fully clear. Whether the cathedral will preserve museum functions that bring monetary receipts to budgets of different levels or it will be limited to divine services, the proper maintenance of which will require funding from urban sources, is the subject of discussion of the secular and ecclesiastical community of St. Petersburg. Here it should be clarified that the cathedral will be transferred to the gratuitous use of the ROC (despite the disagreement of the

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<sup>2</sup> This probability increased in connection with the dismissal of the director of the State Museum-Monument prof. N. V. Burov – the staunch opponent of the transfer. But this probability did not become critical in connection with the appointment of a new director of the Museum Prof. Yu. V. Mudrov in June this year.

majority of St. Petersburg residents) for a period of 49 years, but without changing the legal status – the city remains its owner.

In 2016, the total income that brought St. Isaac's Cathedral as a museum, was, according to RBC, 466 million 813 thousand rubles. This is 60 % of the total income of the museum complex, consisting of Isaac, *the Church of the Savior on the Blood* and *Sampsonievsky Cathedral* (now already transferred to the ROC, previously transferred to *the Smolny Cathedral*). Expenditures of the same complex in 2016 amounted to more than 744 million rubles. To calculate expenses for Isaac property solely is difficult, since the directorate serves all the remaining temples of the museum complex. The most important item of expenditure is salaries to employees who are all employed in the museum (393). The costs under this item amounted to more than 358 million rubles. Some parameters of the successful, even impressive, economic activities of the cathedral as a museum over the past 10 years are shown in Table 1.

**Table 1.** Indicators of the Museum Activity of St. Isaac's Cathedral for 2008–2018\*

No.	Years	Number of visitors, people	Revenue, rub.
1	2	3	4
1	2008	2 704 120	401 328 243
2	2009	2 525 455	395 972 328
3	2010	2 533 315	420 564 403
4	2011	2 642 039	492 099 076
5	2012	2 820 086	539 880 876
6	2013	3 019 760	584 243 186
7	2014	3 152 897	620 175 284
8	2015	3 686 428	737 574 405
9	2016	3 846 852	783 416 145
10	2017	3 850 996	890 831 401
11	2018 (forecast plan)	3 900 000	895 000 000

\* Note: The data for the years is extracted from the State Statistical Observation Form No. 8-NK (2018) "Information on the Museum's Activities", (the new version of the form was approved by the order of the Federal State Statistics Service / Rosstat No. 584 of September 26, 2018) Section 6. Scientific and educational work (line 42, column 16) and Section 9. Receipt and use of funds (line 45, column 2).

The tabular data from Table 1 form a dynamic series of cash flow, which can be used for assessing the market value of an object using the revenue approach as an independent and significant statistical factor. According to the head of the legal department of the Moscow Patriarchate – Mother Superior Xenia (Chernega), St. Isaac's Cathedral after the transfer to the ROC will gain the status of a patriarchal church (РосБизнесКонсалтинг, n.d.). Since all the key decisions concerning the temple will be taken by the patriarch, the administration of the cathedra will remain

at the level of diocese. Moreover, the ROC will transfer to the St. Isaac's Cathedral an ark with particles of the relics of the Apostles Peter, Paul and Andrew, as informed by a very well-informed source of RIA Novosti (*Russia Today*, n.d.). Representatives of the ROC also claim that the museum's functions of the cathedral will be developed, and the entrance to the cathedral will be free of charge.

There are several cathedrals with the status of patriarchy in Russia, for example, the Naval Cathedral in Kronstadt. The Epiphany Cathedral (Elokhovsky) in Moscow, the Assumption Cathedral in the Moscow Kremlin, the Ascension Cathedral in Novocherkassk (Rostov Region), etc. are among the patriarchal patriarchs. The patriarchal church differs from the others in that it does not have a parish council (Musin, 2010). In the matter of financing patriarchal churches, "there are no rules for the Moscow Patriarchate", Proto-deacon A. Kuraev explained to RBC, "Whatever decision the patriarch wishes to take, it will. But in general, from the point of view of financing, it is not possible to transfer money from the central patriarchal budget to the maintenance of a temple. From there, money can go only for the maintenance of patriarchal palace-residences" ("RPTS reshila sdelat...", n.d.).

## 1. STATEMENT OF THE PROBLEM AND METHODOLOGY OF THE RESEARCH

On the basis of the sources and techniques of financing the future activities of the ROC Cathedral (modestly silent for obvious reasons), and according to the plan for the transfer of the ROC Cathedral, published by the Property Relations Committee of St. Petersburg on 12 January 2017, by 1 March 2017, it was necessary to determine the possibility of removing the cathedral from the museum's operational management without providing the institution with premises. But then, according to the information from the Ministry of Culture of the Russian Federation, the date for the transfer of the cathedral was postponed to July 12 – Saint Peter and Paul's Day. Uncertainty about the future use of the disputed BM (building monument), however, allows us to consider the accounting capabilities of the methodological toolkit for measuring the market value of the *Property Value* assessment, say, for insurance purposes (Afanasyeva & Tsatsulin, 2016).

*Method of intended use.* The method is used for valuation of built-up and undeveloped plots. The condition of applicability of the method is the possibility of using the land plot in a way that guarantees the extraction of profit. The method involves determining the amount and time structure of the following characteristics: a) the costs necessary to include the site in commercial circulation in accordance with the option of its *highest and best use* (H&BU); b) income from the H&BU of the site (for example, shown in Table 1) and the operating expenses necessary to extract the proper profit; c) determination of the discount rate corresponding to the level of investment risk in this assessed area and, finally, d) determination of the market value of the site by discounting all revenues and expenses associated with the current use of the land.

The current Russian appraisal practice prefers the method of comparing sales

(one of the methods of the comparative/market approach) and the residual method or the method of the intended use (from the group of methods of income approach) (Tsatsulin & Afanasyeva, 2016). In the case of subject evaluation of real estate objects in the form of historical and cultural monuments, the valuation of sites is carried out according to a traditional procedure, with the exception of two significant points that should be clarified.

*Legislative permission.* When analysing the H&BU of the site as conditionally free, it is necessary to pay attention to additional restrictions and encumbrances imposed by law and related, first of all, to the location of the site within the status of historical building. Usually, in this case, the use of the site as conditionally free is limited by the construction of objects in the same constructive solutions and volumes as the existing object. However, most often this is due not so much to regulatory provisions-restrictions (only the high-level regulations of buildings in such zones are defined), but rather to the physical parameters of the site itself. Here we must understand that the security obligations imposed on improvements (*betterments*) cannot be taken into account in the procedural analysis of the free land plot (*the land plot*)<sup>3</sup>.

Security obligations are taken into account only when analysing a land plot with existing improvements. In each specific case, the object of protection can be separate elements of decor (grilles, facade, stucco, etc.), or part of the building-monument, including the layout and interior decoration. In some cases, even the colour of the interior walls, not to mention the mosaics of the nave and the dome of the temple, as in the case with St. Isaac's Cathedral, can be agreed upon. And here the objects of museum funds in the form of property (*estate*) are inseparable from the BM itself as well as columns, mosaic icons, marble recesses, etc.

Based on the certificate submitted by the authorities of the cathedral to the Union of Museums in Russia, there are 26 459 items declared. The works are dated to the 18th–21st centuries<sup>4</sup>. The collection consists of paintings, icon paintings, graphics, sculptures, arts and crafts, numismatics, documents, and rare books.

The section painting / icon painting includes, in the main, a collection of icons from the 18th–19th centuries. The icons of Sampsonievsky Cathedral, some of

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<sup>3</sup> The procedure for the owner to use the land plot belonging to him directly depends on his ownership of this or that category of land, which is established by Art. 7 of the Civil Code of the Russian Federation. These include agricultural land; land settlements; special-purpose land (including industrial, energy, transport, communication, radio broadcasting, television, informatics, land for space activities, defence, security and others); land of specially protected territories (including land of specially protected natural areas, including health resorts and resorts, nature protection purposes, recreational purposes, historical and cultural purposes and other especially valuable land); land of forest fund; land of the water fund; reserve land (Zemelnny kodeks Rossiyskoy Federatsii, 2016).

<sup>4</sup> By 1 June 2017, it was required to provide information about all the items in the collection that were part of the Museum Fund of the Russian Federation. The key point concerns the conclusion of an agreement on the transfer to the use of the ROC of some of the artifacts that are included in this fund. It is about the so-called indivisible museum facilities, i.e., those that cannot be removed from the cathedral. The implementation of this paragraph is given 24 months from the date of issuance of the order of the property relations committee.

which are signed (A. Kvashnin, A. Pospelov, T. Bazhenov) chronologically cover the period of 1720–1761. They have great artistic and historical value, since Sampsonievsky Cathedral is one of the few almost completely preserved temple complexes of the first half of the 18th century. The museum's funds hold unique pictorial icons of Timoleon von Neff's brush from the 1st tier of the main iconostasis of St. Isaac's Cathedral with an area of 10.3 m<sup>2</sup> each, which were later replaced by a mosaic.

The icons of St. Isaac's Cathedral in niches of pylons, altar barriers, main and small iconostases were created by such artists K. Shteiben, C. Mussini, H. Douzi, F. Bryullov, K. Moldavsky, K. Dorner, T. Neff, S. Zhivago in the first half of the 19th century. In 2014, the collections were replenished with a collection of drawings by the artist K. Dorner, donated to the museum by the Senate of the city of Bremen. The museum stores sketches and drawings of masters who worked on the decoration of cathedrals – K. Briullov, N. Maykov, E. Plushar, A. Ryabushkin and other authors. The albums of graphics by O. Montferrand are of significant value, including the hand-written dedication of the architect and part of his graphic heritage, reflecting the design and construction stages of St. Isaac's Cathedral. The history of the design of the cathedral is also represented by the works of such architects as A. Voronikhin, A. Melnikov, the brothers Mikhailov, I. Wilster and V. Beretti (Kvyatkovsky, 2005).

An interesting block of materials is dedicated to the Church of the Saviour on the Spilled Blood and its creators: two picturesque and photographic portraits of architect A. Parland, sketches by N. Bruni for the mosaics of the church, the large Coronation album of Emperor Alexander II, etc. The rare collection of drawings by architect A. Aplaxin reflects the stages of restoration of Sampsonievsky Cathedral for the anniversary of 1909. In 1997, the museum acquired the True Little Gospel of Sampsonievsky Cathedral in 1703.

The collection of the museum contains a unique exhibit – *The panorama of Nevsky Prospekt* of V. Sadovnikov in 1835, 15.6 m long, made in lithography technique and illuminated with watercolour. The theme of St. Petersburg is also represented by the graphics of the greatest masters of the 19th century – A. Durand, I.-J. Meyer etc. Along with the mosaics located in the interior of St. Isaac's Cathedral, the funds hold objects of decorative and applied art in the technique of the Florentine and Venetian mosaic.

The museum has an extensive photographic library and a scientific and technical archive containing materials dedicated to restoration and repair work at museum sites and the history of the museum. During the planned inspection of the Ministry of Culture in December 2016, there were no violations of the rules for registering and storing museum valuables. All listed on full grounds can be called a museum encumbrance.

All these encumbrances differently affect the complex market and insurance value of the facility, producing, for example, additional costs that should be taken into account when measuring cash flows, additional types of wear, the transition of corrective wear to the state of incorrigible, etc. The impact of the obligations taken on market and other costs is subject to special economic, technical and technological as well as expert analysis.



Another point is related to the differentiation of the contribution to the total value of the real estate object of the location of the land plot and the return on capital, which this section, say, in the “golden triangle” of the urban territory allows receiving. The delineation of the influence of these factors takes on special significance for historical and cultural monuments with their location within the historical status of the territory. Taking into account most of these moments implies solving independent issues at the discretion of the assessor.

In particular, it is important to define the costs of reconstruction of land improvements. And here the first stage of determining the costs of reconstruction of improvements is to find out which particular value is more appropriate to establish – the restoration or replacement, and maybe even a combination/composition of these values.

## 2. RESULTS

It appears to the author of this article that the cost of restoration is the cost of the estimate for new construction at current prices as of the date<sup>5</sup> of the evaluation of the exact copy of the object under valuation and the use of identical building materials, standards and design solutions (Misovets, 2017).

*The replacement cost* is the estimated cost of construction at current prices as of the valuation date of the object of the same utility as the appraised object, but using modern building materials, machinery, equipment, standards, design, and technological solutions. Obviously, in most cases, for objects that are historical and cultural monuments, it is more expedient to calculate the cost of replacement due to the difficulties in calculating the cost of building materials and technologies that are out-of-date. Substantially and methodologically the cost of substitution is calculated on the principle of the so-called substitution.

*The principle of substitution*, which is widely used in the cost approach to valuation, means that if there is a certain number of homogeneous (in terms of utility or profitability) real estate objects, the objects with the lowest price will boast the highest demand. This principle is based on the possibility of an alternative choice for the acquirer, i.e., the value of the property depends on whether there are similar or substituting facilities on the market.

The principle of substitution is most fully realised in new construction, in areas of mass residential or dacha development, when similar types of land prevail and the level of standardisation of architectural and town-planning projects of buildings is high. Its use is difficult when evaluating unique, exclusive objects, in the form of, for example the entire BM of architecture, but it can be useful when evaluating construction and other elements of an object.

And yet, the definition of the cost of substitution does not give an exact value of the costs, because when calculating it, the costs of architectural decoration, for the development of an individual architectural project, for the use of unique

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<sup>5</sup> To assess the cost of new construction by free or so-called contractual prices, as a rule, the base-index and resource (resource-index) methods of estimation that have proved themselves quite positive are applied.

building materials, etc. will not be taken into account. Such accounting problems arose when the cathedral church of Christ the Saviour was being rebuilt in Moscow up to 1990 with the mass use of modern building and finishing materials. To overcome this financial discourse, it is easiest to start from the available methods of calculating the cost of reproduction of improvements, which strictly determine what kind of value will be received when applying the method.

As for methods of calculating the cost of reproduction, one can divide them into the following typological groups:

– *The comparative unit method* assumes the calculation of the construction cost of a comparative unit (1 m<sup>2</sup> of total or useful area, 1 m<sup>3</sup> of construction volume, 1 running metre of the facade, etc.) of a similar facility. The cost of the comparative unit of the analogue in these cases is adjusted to the existing differences in the compared objects.

To determine the value of a comparative unit, information is used in compilations of *enlarged replacement value indicators* (ERVI) of 1970, compiled in 1969 prices (here the indices of the transition from the prices of 1969 to the prices of 1984 and the territorial coefficients to the indices by branches of the national economy, industry and directions in the composition of industries that takes into account the specifics of the changes in the estimated cost of construction and installation works for various regions of the Russian Federation were determined by Annexes 1 and 2 to the USSR Gosstroj Resolution No. 94 of 11 May 1983) or the “stump indicators of the base cost of construction by analogical objects”, i.e. ERVI-2001, the compilation of 2000 prices (Goryachkin, Bashkatov, 2002).

But according to ERVI-2001, only the cost of substitution can be calculated, and, with a significant error, not only because of the “loss” of the above costs, but also because of the significant difference in the quality standards of materials used and planning decisions (often the coefficient of useful areas of the estimated objects in this case is lower than the average market coefficient for new construction). Although Collections ERVI also allow only calculating replacement cost, they give in some cases a more accurate option, especially for monuments of industrial architecture of the 1930s–1940s.

It is most expedient for calculating the replacement cost in the comparative unit method to use the information “Compendium of Enlarged Indicators of the Estimated Cost of Restoration and Restoration Works on Historical and Cultural Monuments (SUPS-87)”, effective from 1 May 1987 to the present. This collection contains estimates of the prices for a list of analogical objects in 1984. Despite the uniqueness of each such object, as well as of the evaluation object, at the moment such a method gives the most accurate result of the calculation, since it takes into account many specific features of such objects.

– *The method of breakdown by components* involves the calculation of the value of the entire building as a sum of the values of its individual components – structural elements. The components can be foundations, walls and partitions, overlapping (roofing), roofing, floors, openings, finishing works, engineering equipment, labour compensation, etc. The enlarged indicators can be calculated for 1 m<sup>2</sup>, 1 m<sup>3</sup>, 1 running m, 1 standard-hour, etc. For the calculation, single quotations are normally used to compile estimates for different regions or on the country level.

Here, depending on the complexity of the architectural execution of BM and the age of the object, you can get a fairly accurate calculation of the cost of restoration. For complex and old objects, the error value will increase.

– *The quantitative survey method* is based on the use of a detailed quantitative calculation of costs for the installation of individual components, equipment and construction of the building as a whole. In addition to calculating direct costs, it is necessary to take into account overhead costs and other costs, i.e., a full estimate of the reconstruction of the evaluated object is compiled. Here, the same considerations are pursued that determine the counting technique of the previous method, namely: depending on the complexity of the architectural execution and the age of the object, a reliable quantitative estimate of the cost of restoration can be obtained.

In St. Petersburg, there is a more or less tolerable methodology for determining the market value of the BM of history and culture. It is given in Appendix 4 to the “Methodology for Assessing the Value of Property and Determining the Level of Rent for Non-residential Premises to Buildings – Monuments of History and Culture” (Sankt-Peterburgskij gorsovet, 1996). This document has lost its validity only with respect to the calculation of rent. With respect to the calculation of the value of historical and cultural monuments, it provides a fairly acceptable methodology for constructing a conversion factor for the residual value of a building as a replacement cost.

For practical measurements, this coefficient can be used with small corrections to recalculate the calculated cost of substitution into replacement cost. The cost of substitution can be calculated by any possible method based on recommendations (Prikaz Ministroya Rossii, 2014; Pismo Ministroya RF, 2015).

On the basis of the table of conversion factors of the residual value into the recovery one taking into account the architectural complexity, the construction time and the results of the author’s correction of the estimated indices up to 2050, conversion parameters presented in Table 2 are achieved. In the table, objects constructed according to the building standards that are closest to the ones applied in modern buildings are accepted as the measurement base.

**Table 2.** Indices of Cost Replacement (in the cost of restoration)

No.	Complexity of architectural and decorative design	Periods of erection of BM, years						
		1700–1750	1751–1800	1801–1850	1851–1900	1901–1950	1951–2000	2000–2050
1	2	3	4	5	6	7	8	9
1	<i>Simple design</i>	2.3179	2.0626	1.8440	1.6895	1.5577	1.3912	1.0000
2	<i>Medium difficulty</i>	3.4642	2.8379	2.2958	1.9286	1.5633	1.4672	1.2768
3	<i>Complex design</i>	4.4405	3.6609	2.9591	2.4930	2.0071	1.8925	1.5329

*Data source: authorial adjustment of value indices.*

In view of the technical complexity of verifying the economic validity of these coefficients, the application of the latter is possible only in the absence of other

options for calculating the replacement cost. And then the full replacement cost (the total cost of replacement) is calculated, i.e., the replacement cost taking into account the size of the possible entrepreneurial profit generated.

*Calculation of the depreciation value of improvements to the land plot.* Wear means a decrease in the utility of the property, its consumer properties and is expressed in a decrease in the value of the object. As the operation of the facility progressively deteriorates, the parameters characterising the structural reliability of buildings, structures, the land plot itself (the calculation of the land plot value under the object is shown in Table 3), as well as their functional correspondence to the current use of the facility diminishes. In addition, the value of the property is influenced by external factors caused by changes in the market environment, macroeconomic or even natural conditions. The dynamics of factors is estimated by the corresponding simple and analytical indices.

Depending on the reasons causing a drop in the value of the object, one distinguishes between physical, functional and external wear. Depending on the possibility of eliminating physical and functional wear<sup>6</sup>, removable and unrecoverable wear are distinguished. External wear can only be irremovable.

The sum of the values of all types of wear is the aggregate wear of the object. In value terms, cumulative depreciation represents the difference between the replacement value and the market value (fixed price) of the evaluated object. At the same time, physical wear and tear is understood as the gradual deterioration of the object, originally built during the construction, in the form of a BM.

**Table 3.** Calculation of the Value of Freehold Land (developed by the author)

No.	Indicator name	Indicator unit	Indicator level
1	2	3	4
1	Residual value of BM	\$	1 261 563 562
2	Net operating income (NOI)	\$ per annum	9 326 069
3	Coefficient of capitalization for improvements	%	14.16
4	Coefficient of capitalization for land plot*	%	14.76
5	Income attributable to improvements	\$ per annum	8 184 558
6	Income attributable to land	\$ per annum	1 141 511
7	Cost of the land plot	\$	77 369 335
8	The dollar exchange rate on the valuation date**	\$ 1 / ruble	65.3101
9	The cost of land on the right of ownership	rubles	5 052 999 006

\* As the coefficient of capitalization of income from the land, the rate of return on capital for a single real estate object is used (discount rate)<sup>7</sup>.

\*\* The exchange rate of the Central Bank of the Russian Federation as of 24 October 2018.

<sup>6</sup> Removing wear is understood as such a physically possible correction, in which the costs do not exceed the amount by which the cost of the object will increase as a result.

<sup>7</sup> That is, as a capitalization factor for a land plot, the discount rate calculated in the framework of the income approach to calculating the market value of the valuation object at market rental rates is accepted, and for improvements, the specified rate reduced by the estimated rate of return (Gribovsky, 2009).

There are several methods of calculating physical wear:

– *A normative method* that involves the use of instructions from various inter-industry or departmental organisations. An example of such useful instructions is rather widespread VSN 53-86 “Rules for Assessing the Physical Wear and Tear of Residential Buildings” of the State Committee for Civil Construction and Architecture under Gosstroï (*Госстрой*) USSR. The rules represent a collection of wear tables by types in percentage terms for various structural elements of buildings, depending on the use of building materials and the technical state of such elements (BCH 53-86, 1986).

*The method of life expectancy* involves the definition of physical deterioration as a ratio of the remaining life of the building and the period of its economic life. The economic life of a building means the period of operation of the facility during which it can generate revenue. And the effective age is estimated by the period, which is determined by the time that has elapsed since the construction of the building, taking into account its technical condition and the values of economic factors that have influenced the value at the date of valuation. The remaining lifetime is the difference between the economic life of an object and its effective age, as shown in Fig. 3.

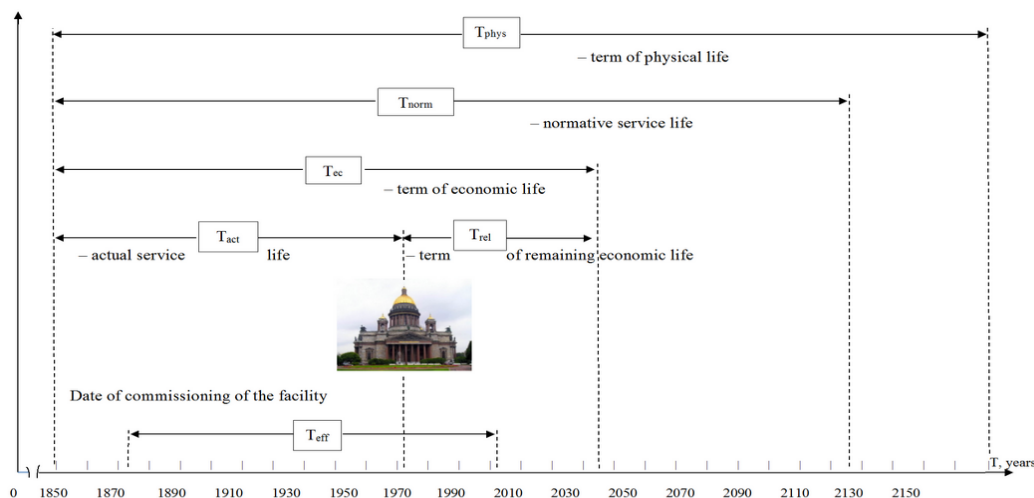
*The method of splitting into components* involves the separation of structural elements of the BM architecture into short-lived and long-lived elements. The values of removable and permanent physical depreciation are calculated for each element type.

Elimination of wear is defined as the costs necessary to bring the object to the “original” state. Unrecoverable depreciation is calculated either by the method of the lifetime for individual groups of elements or as the difference between the replacement cost and the amount of disposable wear, multiplied by the ratio of the chronological age and the lifetime of these elements.

*Functional depreciation* is the loss of value due to the discrepancy between the spatial planning solution, the building structures and the engineering equipment of the building or structure, the quality of the construction and installation works performed by the modern market standards, the norms and rules imposed on this type of buildings and structures. It is usually caused by the appearance of more advanced technologies, unsatisfactory layout, non-compliance with technical and functional requirements for parameters such as size, style, durability, design, etc. Depending on the source of occurrence, functional wear can be of three types<sup>8</sup> (see Fig. 3).

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<sup>8</sup> The following calculated dependencies are used to clarify the value of the object in relation to those capital works that have been conducted since 1979 to the present in the Cathedral – in the foundation of the building, at the colonnade, on the dome.



**Fig. 3.** Approximate time characteristics of the life cycle (LCA) of the real estate object in the form of an analysed BM.  $T_{eff}$  – effective service life before major repairs of structures;  $T_{act}$  – Actual Life of BM (developed by the author).

1. Functional wear ( $FW$ ) caused by the lack of necessary elements, without which the object cannot meet modern operating standards. This type of disposable functional wear is calculated as follows:

For the cost of restoration – for a completely missing item:

$$FW = FRC (K_m K_{tr} - 1). \quad (1)$$

For a partially missing element:

$$FW = FRC \cdot K_{ob} \frac{K_m K_{tr} - 1}{1 - K_{tr}}. \quad (2)$$

For replacement cost – for a completely missing item:

$$FW = TCR \left( K_m - \frac{1}{K_{tr}} + 1 \right). \quad (3)$$

For a partially missing element:

$$FW = TCR \cdot K_{ob} \frac{K_m K_{tr} - 1 + K_{tr}}{1 - K_{tr} + K_{ob} K_{tr}}, \quad (4)$$

where  $FRC$  is the complete replacement cost of the element;  $TCR$  – the total cost of replacing the element;  $K_m$  – the coefficient of transition from the cost of new construction of the element to the cost of its device during the reconstruction (modernization) of the facility;  $K_{tr}$  – the coefficient of transition from the  $FRC$  of the element to the  $TCR$  of the replacement element;  $K_{ob}$  – the specific weight of the volume of the obsolete part of the element in the total volume of the BM.

The unavoidable form of functional wear is calculated as follows:

For the cost of restoring an item – for a completely missing item:

$$FW = FRC \cdot K_{ob} \frac{K_m K_{tr} - 1}{1 - K_{ob}} = NLI - FRC. \quad (5)$$

For a partially missing element:

$$FW = NLI - \frac{FRC \cdot K_{ob}}{1 - K_{ob}}. \quad (6)$$

For replacement cost – for a completely missing item:

$$FW = NLI - FRC \frac{1 - K_{tr}}{K_{tr}}. \quad (7)$$

For a partially missing element:

$$FW = NLI - TCR \cdot K_{ob} \frac{1 - K_{tr}}{1 - K_{ob} + K_{ob} K_{tr}}, \quad (8)$$

where  $NLI$  is the net loss of income due to functional wear and tear.

2. Functional wear caused by the need to replace or upgrade elements. This type of disposable functional wear is calculated as follows:

For the cost of restoring an item – for a fully upgradeable element:

$$FW = FRC \cdot K_{ob} \frac{K_m K_{tr} - 1}{1 - K_{tr}} = RRC + FRC (0.85 K_r + K_m K_{tr}). \quad (9)$$

For a partially modernized element:

$$FW = FRC \cdot K_{ob} \frac{K_m K_{tr} - 1}{1 - K_{tr}} = RRC + FRC \cdot K_y (0.85 K_r + K_m K_{tr}). \quad (10)$$

For the replacement cost of an element – for a fully upgradeable element:

$$FW = RCR + TCR \left( 0.85 \frac{K_r}{K_{tr}} + K_m \right). \quad (11)$$

To assess the partially modernized element:

$$FW = RCR + TCR \cdot K_{ob} \frac{0.85 K_r + K_m K_{tr}}{1 - K_{ob} + K_{ob} K_{tr}}, \quad (12)$$

where  $RRC$  – residual replacement value of the element (minus physical depreciation);  $RCR$  – the residual cost of replacing the element (minus physical depreciation);  $K_r$  – coefficient of transition from the cost of new construction of the element to the cost of its dismantling during the reconstruction (modernization) of the facility.

The unavoidable form of functional wear is calculated as follows:

For the cost of restoring an item – for a fully upgradeable element:

$$FW = NLI + RRC(1 - K_{tr}). \quad (13)$$

For a partially modernized element:

$$FW = NLI + RRC \cdot K_{ob}(1 - K_{tr}). \quad (14)$$

For the replacement cost of an element – for the evaluation of the fully modernized element:

$$FW = NLI. \quad (15)$$

2. Functional wear caused by *over-amelioration*. The over-amelioration is by the elements of the object, currently interpreted, in accordance with modern standards, as conventionally superfluous (Goryachkin, Bashkatov 2002). This type of disposable functional wear is calculated as follows:

For the cost of restoration of the so-called “extra” element – to evaluate 100 % of the extra element:

$$FW = RRC + 0.85FRC \cdot K_r. \quad (16)$$

To evaluate the part of the extra element:

$$FW = RRC + 0.85FRC \cdot K_{ob}K_r. \quad (17)$$

For replacement cost – to evaluate the part of the extra element:

$$FW = RCR + 0.85TCR \cdot K_r \frac{K_{ob}}{1 - K_{ob}}. \quad (18)$$

The unavoidable form of functional wear is calculated as follows:

For the cost of restoration of the so-called extra element – to evaluate the part of the extra element:

$$FW = RRC + AOC - CIV. \quad (19)$$

For a partially missing element:

$$FW = AOC - CIV. \quad (20)$$

For replacement cost of the so-called extra element – to evaluate the part of the extra element:

$$FW = RRC \cdot K_{ob} + AOC - CIV. \quad (21)$$

For a partially missing element:

$$FW = AOC - CIV, \quad (22)$$

where *AOC* – additional operating costs for extra elements (volumes); *CIV* – contribution to the improvement of the market value of the object.

This type of functional depreciation can also be calculated through economic losses, related, for example, to the inability to rationally use the volumes and areas allocated to such over-amelioration. In the case of historical and cultural monuments, one should take into account the fact that often functional wear, which is removable for a similar object without a security status, becomes irreparable for



an object with a conservation status, depending on what the specified status extends (Burunova & Tsatsulin, 2015).

For example, design flaws that can be easily solved for “ordinary” objects can be unrecoverable for a historical and cultural monument because of the prohibition of redevelopment or the inevitability of damage to architectural or decorative details of an object during such re-planning. In addition, any changes will require a sufficiently long agreement with the Committee of State Control, Use and Protection of Monuments of History and Culture (*Rus.* – *КГИОП*), etc., and may also involve additional costs, for example, because of the need to use a selection of non-standard materials. In this regard, one needs to clearly monitor the transition of removable wear to the unrecoverable, since this will require changes in the very formula for calculating wear.

## CONCLUSION

The calculation formulas given above have allowed the author to carry out various measurements of the value of the evaluated object on elements of different types. The resulting calculations are based on actual empirical material. Such a measurement tool can, to some extent, enrich the methodological basis of professional valuation of an object for insurance purposes.

Paragraph 2 of Art. 947 of the Civil Code of the Russian Federation clearly defines the insurance value as “... the actual value of the property at the place of its location on the day of conclusion of the insurance contract”. According to Art. 7 “The assumption of establishing the market value of the valuation object” of the Federal Law “On Appraisal Activities in the Russian Federation”, in the event that a specific legal act containing a requirement to perform an assessment of an object or a contract for the valuation of an evaluation object does not specify a specific form of the value of the object, the market value of the object is subject to establishment.

This rule is also applicable in the case of the use in the regulatory legal act of terms that are not provided for by this Federal Law or standards to determine the type of value of the valuation object, including the terms *actual value*, *reasonable cost*, *equivalent value*, *real value*, etc. Thus, from the standpoint of the current legislation, the insurance value for property insurance is its *market value*, which is not a fully correct provision of the legislative norm.

The proposed instruments of measurement are necessary for those territories of Russia where the objects of historical and cultural real estate are located in the form of BM. According to the current legislation, the insurance value of cultural heritage objects must be reliably determined and known to the relevant state structures, regardless of the organisational and legal form of ownership of these objects and, naturally, to the owners themselves. In practice, such *insurance value* is simply not established.

**Further perspectives of the research** are related to the indispensable solution of such an important scientific and practical problem as the development of methodological recommendations, the formation of an instrumental basis for measuring and finalizing the insurance value of immovable cultural heritage objects as a BM as a specific and unique object in the real estate market. It should be noted

that in Russia there was a practice of understating the insurance value when concluding real estate insurance contracts.

In addition, the results of the research conducted by the author will make it possible to formulate a set of understandable issues that will allow solving the main problem of assessing monument buildings in the foreseeable future – the development of the Federal Valuation Standard (FVS) of immovable cultural heritage objects on the basis of integration of the International Valuation Standards (IVS) domestic professional appraisal practice and economic life. The nature of the final results of the study assumes their use in the development of normative documents, which determine the validity of assessing different types of value of cultural heritage sites that are monuments of history and culture and in some cases contribute to the preservation of their historical value.

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**Alexander Tsatsulin** received the first higher education at the Leningrad State University named after A. A. Zhdanova, second higher education has been received as a professional retraining at the Higher Administrative School under the Administration of St. Petersburg with a degree in State and Municipal Management. In 1976 was awarded the degree of Candidate of Economic Sciences with a specialization in "Statistics". Later he received a Doctoral Degree in Economics with a specialization in "Pricing". In 1997 he was awarded the academic title of professor in the Department of Management. From 1976 to the present, she has been teaching and researching at various universities in St. Petersburg. He is the author of more than 400 scientific papers, including author's monographs. From 1990-1991 He worked as vice-rector for educational work of the state educational institution of higher education "Higher administrative school under the Administration of St. Petersburg." And from 1991 to 2006 he headed this institute as a rector.

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