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Determining the Increase in a Building's Appreciation Rate Due to a Reconstruction

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Abstract: The reconstruction of buildings generally prolongs their useful life, increases their utility value, and last but not least, leads to an increase in their value. These assumptions only apply if an independent third party reaches the same conclusion together with the owner. However, the undesirable effect of the reconstruction of a building may be a decrease in its value. The aim of this contribution is to determine the change in value of an older sample building assessed in the included case study as a result of its reconstruction. Valuation methods are applied, which, as it turns out, reveal the inaccuracy of the subjective view of the person who reconstructed the building. The resulting change in the value of the sample building is discussed from the point of view of the applied valuation methods and other value-creating aspects (subjective view of the owner on the value of the building, historical value of the building, etc.). The contribution concludes with recommendations for maximizing the increase in value of a property through its reconstruction so as to eliminate the risk of a decrease in its value.

Keywords: property value; reconstruction; historical value

1. Introduction

The reconstruction of property is one of the most common forms of construction and development works. It is topical and the need is constantly growing. The first reason for this is the necessity to address the need for public spaces and housing in already built-up areas, which is growing, especially in countries that are experiencing rapid population growth and where land is in limited supply or unaffordable. India is a prime example, which is, according to Gokarakonda et al. [1], already at a critical juncture. The second reason for the growing interest in the reconstruction of buildings is the combined problem of tackling climate change and rising energy prices. For example, the decision of owners or other stakeholders to choose reconstruction over demolition within the context of protecting the environment is current and actual [2]. From the point of view of the owners, systemic economic support for these solutions may be decisive, as Vrbka et al. [3] proved. A separate issue within the field of reconstruction is that of sustainability and the increase in property value through own energy production, whereby the advantages and disadvantages of such solutions must always, according to Penizzotto, Pringles, and Olsina [4], be considered. According to Escandón, Suárez, and Sendra [5], for example, most of the housing stock in southern Europe is energy-obsolete and the solution to this problem is often unsystematic and dependent on users who differ significantly socio-economically. Sommerfeldt and Madani [6] focus on the profitability of photovoltaic power plants, using the Monte Carlo method. According to them, the current situation in Sweden is positive, even when taking into account the market conditions for these investments. The need to address such efforts, which usually

take on the form of government initiatives to save energy, often run into resistance from, or leads to conflicts with owners because of the high costs, low benefits, and long return periods for green retrofits. This is a global problem, as demonstrated by Pimonenko et al. [7] and Kasych and Vochozka [8].

Another reason in favor of the reconstruction of buildings is damage caused by natural events, the impact of which, according to Döhrmann, Gürtler, and Hibbeln [9], is reflected in significant increases in prices for construction works, which are usually not taken into account in insurance contracts. Probably the most common reason for reconstructions is simple wear and tear, the need to adapt a building´s functionality to current needs, or the need to save buildings from demolition. The question is which of these reasons applies, whereby the impact on the environment, especially in the case of historic buildings, must be, according to [10], part of the assessment.

Investments in residential real estate are extensive and have a wide reach. Beck and Goldstein [11] show that there is a direct link between the volume of real estate investments and the effort to comply with the law and the emphasis on safety in individual locations. This fact is also confirmed within the North American context by Korver-Glenn [12] in the form of extensive qualitative research into the real estate market in Houston.

All these factors therefore contribute to determining the value of a particular property. This is crucial for owners, potential buyers, and institutions. The determined or expected value of a reconstructed property is a decisive factor for extending a loan or mortgage, determining tax assessments, resolving disputes, and for insolvency. Alternatively, it may provide entry into broader economic models and may form part of a number of financial processes. At the same time, it should be stated that increasing the value of one´s property through reconstruction is not easy from an investor's point of view.

There is a significant discrepancy between the concept of individually perceived value and the actual market price of improvements (modifications/reconstruction). Riyanto and Zhanga [13] point out the contradiction between standard economic theories, which emphasize the perception of material well-being in a strictly individual conception. According to them, self-knowledge is based on the perception of others. They experimentally prove that ordinary buyers are willing to accept significant financial losses in order to avoid the negative perception of others. The creation of value aspects depends on the generally set level for a specific target group, while their added value, for example in the form of the valuation of luxury goods, must be declared throughout the whole chain and supported through marketing [14]. From this point of view, Watson and Whitley [15] use social value in an interesting way, as determined, among other things, by qualitative research identifying the social return on investment.

In practice, this means that the investor may choose elements that are not generally perceived by other potential buyers (the market) as added value and therefore not increase the value of their property through reconstruction. On the contrary, they may even cause the property to decrease in value.

The aim of this contribution is to determine and evaluate the change in a property´s value as a result of the reconstruction thereof. This will be demonstrated on the basis of a model case study.

In the valuation process, the valuer represents the opinion of a third rational independent person who views the object of the valuation from the market perspective [16]. From this point of view, it is therefore possible to determine the open market value of the object of the valuation, i.e., the amount that best corresponds to the state of the market. In this case, the real property market.

2. Literary Research

The reconstruction of buildings, their valuation, and general acceptability has been and is the subject of extensive research. Within the field of civil construction, this focuses on the various methods of construction that can have a major impact on value creation. In economic terms, this focuses on the valuation methods themselves and on other forms of increasing asset value. Interestingly, a number of areas of research are linked by sustainability, both in terms of property value and in terms of modifications and reconstructions, which is due to the importance of meeting social and climate

policy goals, and also because buildings are responsible for 30–40% of total energy consumption [17]. The term "megatrend" is even used to refer to the consideration of sustainability in relation to the construction, reconstruction, and valuation of buildings in the work of Toppinen et al. [18]. The impact of rising ocean levels on rising property prices is also well described by Bañas et al. [19], who also address the psychological impact on value using the Likert scale. The research also confirms the theory of "climate gentrification", whereby the rates of increase in property prices correlates with the altitude hypothesis, as stated by Keenan, Hill, and Gumber [20]; with climate change—rising sea levels—increasingly affecting marketability and the valuation of real estate subject to different levels of exposure. In Kalfas et al. [21], the Contingent Valuation Method (CVM) is used to evaluate the effect of ecosystem services (ESV) on property prices. Their static value within the ESV is used for urban purposes by Wang and Pan [22]. Madad et al. [23] also focus on sustainability in Iran and the related value of real estate. They analyzed 1195 apartment buildings in Tehran. Only 26% of them can be considered to be more respectful of sustainability. In contrast, the growing number of green roofs in Seoul is analyzed by Shin and Kim [24], who state that the benefit-cost ratio of this measure for buildings is positive at 1.174. At the same time, however, the degradation of modifications must be taken into account when assessing the effectiveness and benefits of sustainable development measures, as pointed out by Zheng and Lai [25].

Tuffell et al. [26] also focus on increasing social cohesion and supporting the transition to sustainable development in relation to urban planning. The importance of the discount rate in connection with projects to reduce the energy performance of buildings is emphasized by Copiello, Gabrielli and Bonifaci [27]; according to them this rate affects the results four times more than the price of energy itself. Ballarini et al. [28] focus on identifying the most effective measures for achieving energy savings and cost reductions within the context of the renovation of the European housing stock. In the case of Hong Kong, Hui, Tse, and Yu [29] found a significant difference in the valuation of so-called "green" buildings between residential real estate and office buildings. The use of life cycle cost analysis in the pre-project planning of building renovations with regards to the technical and financial feasibility of increasing energy savings is recommended by Ruparathna, Hewage, and Sadiq [30]. The same analysis is applied to the transformation of an industrial building (brownfield) into a residential building by Sedláková et al. [31]. Another example is given by Kaewunruen, Sresakoolachai, and Kerinnonta [32], who model the average existing town house and create optional models for improving energy efficiency.

Washizu et al. [33] focus on property buyers' willingness to pay a premium for energy savings, ease of use, and reduced environmental impact, and the differences between Tokyo and New York. A specific example of value decrease due to the loss of the original functions of pastoral property in northern Italy is analyzed by Mazzocchi and Sali [34]. Shao, Tian, and Fan [35] point to an interesting connection between the willingness of property buyers, the level of pollution, and the willingness to pay for more environmentally friendly buildings. The problem of increasing the value of private real estate is tackled by Opačak and Wang [36], who evaluate the economic contribution of property owners in the form of building a city park on a specific model example. In a similar vein, Caputo and Gaterell [37] build on the non-deterministic theory of urban planning to develop an evaluation code for assessing the impact of buildings.

Another research area is the choice of construction methods for the reconstruction of buildings, whereby costs can be optimized and value maximized. The use of stochastic networks to model the undetermined structure of projects is applied to Wawel Castle by Radziszewska-Zielina, Śladowski and Sibielak [38]. An in-depth approach to building detection and reconstruction was developed by Alidoost, Arefi, and Tombari [39]. Gokdemir [40] draws attention to the elimination of risks associated with the reconstruction and demolition of neighboring buildings. He systematically assesses the optimal building modifications in this area. The problem of deviations from the original constructions of buildings, which are not well documented, is solved for reconstruction or demolition by a newly developed model, which is presented by Volk et al. [41]. Researchers are also trying to create virtual reality tools for planning work, which can, according to Liu et al. [42], significantly increase the quality

and reduce the prices of reconstruction or construction works. One example is a three-dimensional terrain reconstruction system using stereo cameras [43]; or a three-dimensional reconstruction of the roofs of buildings in larger units, as introduced by Awrangjeb, Gilani, and Siddiquim [44]. Turskis, Morkunaite and Kutut [45] also deal with the restoration of cultural real estate monuments using a hybrid model which sorts buildings according to their value, thereby taking into account the methods of analytical hierarchical processes and multicriteria decision-making.

Valuation methods form a separate area of research. According to Kronenberg and Andersson [46], the simultaneous use of different methods creates a more comprehensive picture of the value of real estate. The binomial valuation model is used by Sun, Wang, and Meng [47], but more for projects in the public interest. The energy and economic performance of a reference residential building in various residential structural forms is directly assessed by Mangan et al. [48]. Bunyan Unel and Yalpir [49] use an objective assessment of the criteria affecting the value of real estate by reproducing the coefficients that serve as the basis for real estate valuation. The trend of sustainability is also relevant for the evaluation of reconstructions. The willingness to pay for energy efficiency improvements according to Encinase et al. [50] is related to education levels and purchasing power. The random sampling method is used by Zhang et al. [51] to ensure the quality of regression results with a limited dataset size by removing stochastic effects in order to analyze the market value of energy efficiency labels. The relatively low effect of only 6% of the price difference on houses in Bolzano, Italy, is revealed in research conducted by Bisselo, Antoniucci, and Marella [52], who looked for the difference between the worst and most energy-efficient buildings. The Mixed Resale (MRS) model is used to assess the price dynamics of real estate by Melser [53], especially to estimate future profit. Peng and Thibodeau [54] use 26 million home sales to measure idiosyncratic risk in property prices, revealing a strong relationship between the degree of risk and the basic characteristics of the housing market. The methodology of vector autoregressive modelling is used to describe the dynamics of real estate investment in China by Liu et al. [55], who found a direct relationship between the volume of loans and house prices.

The evaluation of real options with a jump process, while creating models for valuing investments in attractive tourist locations, were created by Guo, Huang, and Jia [56], who positively evaluate strategic delays. Boudry, Connolly, and Steinerová [57] deal with the valuation of real estate as a relatively safe financial place, pointing to the low performance of investments, which is followed by a negative effect on their valuation. In a multidimensional analysis, Le Goix et al. [58] deal with changes in property prices in the Paris area on the basis of a big sample of 159,000 transactions. According to them, valuation formulae must take into account trends in the internal mobility of property ownership. The direct link between real estate prices and corporate productivity in Chinese companies is pointed out by Lu, Tan, and Zhang [59]. Goldstein [60] analyzes dominant sociological aspects related to, among other things, labor mobility in the US, for real estate investments and valuations. The research conducted by Wang, Dai, and Xu [61] focuses on the direct link between real estate prices (especially hotels) and the increase in the market value of companies in China. The direct link between available land and house prices in the same region is pointed out by Dong [62].

Grainger and Stoeckl [63] use non-market valuation methods, thereby taking into account social learning for the Australian environment. The Bayesian non-parametric approach based on the framework of latent factor models for the value of housing in Seattle was used by Ren, Fox, and Bruce [64]. Based on 302 questionnaires and three focus groups, Sun, Phillips, and Wong [65] note affective ties between the age of owners, real estate, and the related valuation. Tanaka and Zabel [66] point to the temporal aspect of one-off negative events in the analysis of the impact of the Fukushima nuclear power plant accident on the prices of real estate. According to them, the negative impact peaked six months after the event and began to dissipate after the first year. Specifically, Voia and Doan [67] focus on the quantification of reconstruction costs. They present a model for the cost of a house reconstruction (HRC) using 16 predictors that include outside materials and the composition of buildings. Farahani, Wallbaum, and Dalenbäck [68] use multi-objective optimization using life cycle cost analysis and the deterioration function to valuate reconstruction and maintenance costs.

The use of hedonic valuation of real estate is also relatively common. It is used by Belcher et al. [69] with an emphasis on suitable (green) surroundings. Park et al. [70] use the same approach again to determine the value of a park, or more precisely its effect on the value of property. Hedonic estimates are also used, this time with respect to transport infrastructure, by Lieske et al. [71].

It is therefore clear that the field of research into the reconstruction of buildings and their valuation is extensive, and that authors are able to approach factors that are difficult to quantify (e.g., visual impact, user psychology), as well as respect different cultures. Researchers most often evaluate the benefits of modifications and reconstructions, or assess their return, and often take into account the effect of their contribution on sustainability. However, practically no one deals with the economic paradox, which does not have to be exceptional and can have implications for a number of disputes or operations, namely the decrease in the value of real estate as a result of a reconstruction. This clear need is solved with a model for determining the open market value on the basis of the comparative method, both before a reconstruction and after a reconstruction, taking into account the costs of the work to be performed. The correction mechanism then includes a calculation for a discount on the asking price, built on the quantification of the costs compensating for the modifications necessary for the sample building to be brought into a state corresponding to current trends.

3. Materials and Methods

The sample building is located in a row of detached family houses on the outskirts of a city and was built in the second half of the 20th century. Young families with small children live in the wider surroundings of the sample property, and no intervention of the municipality or the state is intended that would in any way affect the future market value of all potentially affected buildings. Only minor maintenance was carried out on the building during the period in which it was used. However, more and more repair work was required on the building over time. The necessary reconstruction was extensive and also required structural modifications at the same time. The expectation was that the reconstruction would increase the total value of the sample building and extend its service life.

To determine the increase in value after reconstruction, the open market value of the sample building relative to its technical condition before reconstruction is established using the comparative valuation method. This method consists in finding an array of buildings that most closely match the predefined parameters with the valued building. Usually, when using this method, the bid prices for individual comparable constructions are used. The total price of the reconstruction work is then calculated and the open market value of the sample building after reconstruction established. Finally, the change in value of the sample building after reconstruction is determined.

For the first step, the real estate market is analyzed on the basis of real estate advertising websites [72–74]. Buildings offered for sale with the age and technical condition corresponding to the age and condition of the sample building will be identified. Properties offered for sale of the same proportions, age, and technical condition as the proportions, age, and condition of the sample building are identified. In the event that an insufficient number of comparable offers equivalent to the proportions, age, and technical condition of the sample building are identified, the calculation also includes other real estate offers and their asking prices, which are corrected using the correction coefficients K1–K6, while the main criterion for the selection of buildings for comparison remains the same locality in which the sample building is located. K1 is the price source reducing coefficient, which is used for the asking price. K2 is the location coefficient, which is used to reflect the similarity in location to the sample building under valuation. K3 is the structural and technical condition coefficient, which represents the difference in the technical condition to the sample building. K4 is the floor area coefficient, which reflects the degree of correlation between the floor areas of the compared properties. K5 is the land/garden coefficient, which reflects the characteristics of the land pertaining to the sample building. Finally, K6 is the accessories coefficient, which compares the facilities in the form of ancillary buildings, equipment, or the specific features of the land belonging to the property. Correction coefficients are used to closely match the properties being compared and examined. Their amount

should not exceed 30% on both sides, so the coefficient should be chosen in the range of 0.7–1.3. Properties that are not similar to at least 30% cannot be considered comparable. The amount of the coefficient is chosen on the basis of an objectified assessment of the similarity of the array of real estate. When choosing the amount of the coefficient, the impact of the given criterion on the final price is considered, i.e., the possible necessarily incurred costs of bringing the property to the same condition.

The second step is to determine the total costs of the reconstruction of the sample building. As all documents and evidence showing the costs of the materials needed for the reconstruction of the sample building are usually available together with the scope of work, the total costs of the reconstruction are calculated as the sum of all the actual costs. This method eliminates the risk of result distortion, which may happen for various reasons.

To identify the maximum achievable increase in value of the sample building after the reconstruction, the sum of all actual reconstruction costs is added to the open market value of the property before reconstruction.

For the third step, the open market value of the sample building is subsequently determined again using the comparative method. The real estate market is re-analyzed, once again through real estate advertising websites, whereby another set of properties offered for sale is identified whose technical condition is equivalent to the new technical condition of the sample building after the reconstruction work. If necessary, the correction coefficients K1–K6 are re-applied to adjust the asking prices.

Finally, the difference between the open market value of the sample building before and after the reconstruction is calculated according to Formula 1, using the comparative method to determine the increase in value of the sample building.

$$\begin{aligned} \text{Change in value} \quad &= \text{open market value after reconstruction} \\ &- \text{open market value before reconstruction} \end{aligned} \tag{1}$$

The identified change in value is explained in the discussion section.

4. Results

As stated above, the initial open market value of the sample building was determined using the comparative method. A total of five properties were found on the real estate advertising websites, the technical condition of which most closely resembled the sample building. As the comparative method requires, in addition to the greatest possible similarity of the compared buildings, the fulfilment of the requirement for the same location as the valued sample building, in this case, no larger array of comparable buildings was found via real estate advertising servers. Correction coefficients K1–K6 were applied to the asking prices for these properties. Table 1 shows the asking prices for the properties selected for the comparison.

Table 1. (Corrected) asking prices before reconstruction with correction coefficients applied.

Asking Price [EUR]	K_1	K_2	K_3	K_4	K_5	K_6	Asking Price Correction [EUR]
90,000	0.95	1	0.95	0.9	0.95	0.95	65,975
80,000	0.95	1	0.95	1	1	1	72,200
68,000	0.95	1	1	1	1.05	1	67,830
102,000	0.95	1	0.9	0.85	0.9	0.95	63,380
78,000	0.95	1	1	1	1	1	74,100
Total							343,485

Source: Authors.

Based on the results shown in Table 1, the open market value of the sample building, taking into account its original technical condition, was established as EUR 68,697 (EUR 343,485/5 = EUR 68,697).

The total reconstruction costs for the sample building covered the bathroom, toilet, and a completely new facade, including a facelift. Table 2 shows the list of actual investments, which were supported by evidence showing the total costs of the reconstruction works.

Table 2. Reconstruction costs for the sample building.

Reconstruction	Actual Costs [EUR]
Reconstruction of the bathroom and toilet	
Material	2600
Import of material	200
Work	4600
Rubble removal	400
Ecologic waste disposal	200
Subtotal	8000
New facade, including facelift	
Material	3400
Import of material	200
Work	5600
Rubble removal	400
Ecologic waste disposal	400
Subtotal	10,000
Total	18,000

Source: Authors.

As shown in Table 2, the total reconstruction costs for the sample building were calculated to be EUR 18,000. The maximum achievable increase in value for the sample building is the sum of the initial open market value before the reconstruction and the total reconstruction costs, i.e., EUR 76,697 (EUR 68,697 + EUR 18,000 = EUR 76,697). After the reconstruction, its service life was increased due to the intervention in the external perimeter masonry of the building. This modification will also give the sample building better resistance to climatic influences. Overall, lower heat leakage can be expected in the winter months and thus also a reduction in the heating costs of the entire building.

The revised open market value of the sample building was, once again, determined using the comparative method. A total of four properties that had recently undergone similar reconstructions were found on the real estate advertising websites. However, the properties were not identical in all respects to the sample building including its location. It was therefore necessary to re-apply the correlation coefficients K1–K6. Table 3 shows the asking prices for the properties selected for the comparison.

Table 3. (Corrected) asking prices after reconstruction with correction coefficients applied.

Asking Price [EUR]	K_1	K_2	K_3	K_4	K_5	K_6	Asking Price Correction [EUR]
84,000	0.95	0.9	0.9	0.85	1.15	1	63,184
79,600	0.95	1	1	0.95	1	1	71,839
68,800	0.95	1	1	0.95	1.1	1	68,301
82,000	0.95	0.98	1	0.9	0.9	1	61,837
		Total					265,161

Source: Authors.

Based on the results shown in Table 3, the revised open market value of the sample building after reconstruction was determined as EUR 66,290 (EUR 265,161/4 = EUR 66,290).

Finally, the change in value of the sample building was calculated according to Formula 1.

$$\text{Change in value} = 66,290 - 68,697 = -2407 \text{ EUR}. \quad (2)$$

The value of the sample building after reconstruction decreased by EUR −2407.

5. Discussion

The typical benefit expected from the reconstruction of a building is an increase in its value. Such reconstructions usually involve structural modifications, such as the replacement of roofing, including trusses, etc. This type of reconstruction will increase the value of a property because it not only improves the parameters of the building, but also its useful life and the end-use properties thereof. It is with this expectation in mind that the increase in value of the reconstructed sample building was defined.

The question is therefore: Why did the structural modifications to the sample building (reconstruction of the bathroom, toilet, and facade) reduce its open market value?

The first potential reason for the decrease in value of the sample building may be the chosen valuation method. However, the comparative valuation method allows very accurate results to be achieved because the current influence of a specific market is effectively reflected at the moment of valuation. Furthermore, the correction coefficients K1–K6 were applied to make the resulting open market value of the sample building even more accurate. The coefficients applied in the calculation eliminated the differences in the properties found on the websites.

In addition, the same valuation method was used for both valuations (before and after reconstruction) to identify the open market value of the sample building. The procedure cannot therefore be considered to be the cause of the property´s decrease in value.

In calculating the change in value, it is also good to know the cost of all the reconstruction work and structural modifications. All available evidence and documents were used to calculate the total costs of the reconstruction of the sample building. From an independent third-party point of view, the best way to calculate the total reconstruction costs is on the basis of documents and evidence showing actual funds spent because these costs directly take into account the building materials market and the price of work at a given moment. To this end, the calculation of the total reconstruction costs can be considered relevant for the given moment and the valuation. However, the opinion of the owner who is reconstructing a building with the intention to increase its value can play a big role in determining the open market value of a property. That said, a valuer will simulate the objective opinion of an independent buyer, who will, for 99%, identify their preferences in choosing the best offer on the market against the standard in the given market. It is for this reason that we must keep in mind that even if comparable properties with the same type of reconstruction were used in the comparative valuation method to establish the open market value of the sample building after reconstruction, the asking prices for all the comparable properties could be influenced by the subjective opinion of the seller, which can be considered from an objective point of view as a cause for the decrease in value of a property. Unusual facade colors, or unusual decorative/patterned tiles (too striking or extravagant) used for the reconstruction of bathrooms and toilets, in particular those not in line with current trends, or inefficient use of bathroom and toilet space can have a negative effect on the opinion of a potential buyer. The subjective opinion of those owners selling properties found on the real estate websites may also lead to the gradual reduction of the asking price in order to sell the offered property. Eventually, a situation may arise where the asking price is lower than the value of the property prior to reconstruction. Most often, however, such reduced asking prices are set off by personally perceived non-financial benefits realized by the owner of the property up to the moment of sale.

The consequences of decreasing asking prices for properties due to the subjective opinion of an owner may also to some extent influence the objective opinion of the valuer. This subjective view of the owner of a property offered for sale can also affect the results of the valuation methods used. However, this statement is not meant to challenge the use of the comparative method for valuation purposes. In practice, a valuer will always try to simulate the conditions and the properties of the asset to establish the open market value thereof using this specific method.

Where it concerns the purchase of such a reconstructed property, the potential buyer could agree to enter into a purchase and sale contract provided that the asking price for the property is reduced by

the seller relative to the costs required to eliminate the adverse consequences of the reconstruction. This possible course of action by both parties is taken into account by the valuer in the valuation process.

The open market value of a property can also be increased through its historic value. However, buildings with some kind of historic value must also be reconstructed. For the reconstruction of historic buildings, however, it is very important to preserve their historic value despite the necessary reconstruction work. This can be achieved by simulating the conditions and technological design procedures that were used at the time of construction of these buildings. Historic buildings can lose their value very easily due to modern technology. An example would be the installation of power cables in historic buildings not yet equipped with this structural element at the time of their construction. Incorporating this structural element will undoubtedly destroy the historic value of such buildings when they are valued, and therefore have a negative effect on their open market value. During the reconstruction of historic buildings, it is also necessary to maintain their historic value through the use of building materials equivalent to the original materials used in their construction. An example of the risk of reducing the historic value of buildings would be the use of fired bricks for the restoration of original stone masonry.

Using lower-quality materials to replace original materials during a reconstruction may be another reason for a decrease in value of the real estate in question. It is true that such compromises can significantly reduce the overall reconstruction costs, but that the resulting work would be adversely affected by such adjustments. This involves, for example, the replacement of metal structural elements with "modern" plastic castings. Although these elements may have their advantages, their use will lead to an overall decrease in value of a property. The change in value (decrease) is directly proportional to the value of the removed original element, which may very well be unique and could still fulfil its original purpose. An example of this situation is, for example, the replacement of a wooden floor with linoleum or tiles. It is clear that such a change will undoubtedly increase the utility value of the property. After all, a tiled floor will certainly withstand greater loads and be more damage resistant, but if rare woods were used for the construction of the original wooden floor, the value of the entire property will decrease.

Not every form of reconstruction directly results in an increase or decrease in the value of a property. The indirect impact of a reconstruction can be observed if, for example, water and sewer pipes or electricity cables are replaced. Replacing these structural elements can increase the value of a property. However, the location of these structural elements is critical because changes to their layout can lead to changes in the building and the usability of the space.

Current trends in the construction industry include the demolition of partition walls between rooms, or the building of an extension or outbuilding to increase the usable area. Such modifications can also lead to a reduction in the value of a property. For this reason, it is very necessary to properly assess whether removing a part of a building will not damage structural elements that are unique to a given building, or whether it is impossible to replace structural elements in order for a property to retain at least its original value after such a reconstruction.

Reconstructions may also increase a building´s operational costs. For example, the replacement of radiators with ones with a lower heat output. The operation of less efficient radiators incurs higher costs in terms of the supply of heat required and the time required to achieve the desired room temperature. In other words, the building offers reduced thermal comfort, which may also reduce its value.

These considerations show that for any intended reconstruction of a building, it is very important to take into account all the consequences that could result from such actions in order to eliminate the risk of reducing the value of the property.

In general, to prevent the risk of reducing the value of a property, it is necessary to consider the layout, as well as the materials, colors, and structural elements used, so that it still meets all the required standards after any reconstruction.

6. Conclusions

The aim of this paper was to determine the change in value of a sample building after reconstruction. The open market value of the sample building was established before and after the reconstruction, as were the total costs of the reconstruction, in order to calculate the increase in value of the sample building. Unfortunately, the applied valuation methods produced the opposite result (a decrease in value of the property). The value of the sample building after reconstruction decreased by EUR 60,300. Such a result is very unusual, which was clarified in the discussion section. Recommendations were put forward to eliminate the risk of a decrease in value of a property. The seller's subjective opinion and the risk of period buildings losing their historic value were particularly highlighted in the discussion because they pose the highest risk of perpetuating a decrease in value of a property due to reconstruction. Various other reasons that may cause a decrease in value were also tackled from different perspectives. Within this context, the use of appropriate materials for reconstructions and effective changes to a building´s internal layout are considered to play an important role. Any structural adjustments to a building that leads to an increase in its operating costs was also considered a contributory factor. The aim of the contribution was therefore achieved.

Further research will focus on the issue of what types of reconstructions and structural adjustments can directly contribute to an increase in the value of a property rather than an undesirable decrease. A method of valuation of a building in a similar technical condition requiring reconstruction intervention could also be used employing other valuation methods (P/E ratio, DCF) at the time before and after the reconstruction.

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