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Sustainable Development in Public Investments

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Abstract. Sustainable development in public investments is the crucial assumption for the sustainable development of the whole society. The paper is focused on both economic and risk evaluation of revitalization projects of constructions owned by public institutions. The evaluation methodology is based on the output of the detailed analysis of approaches, methods and indicators suitable for the economic and risk analyses. The Cost-Benefit Analysis, which includes both economic and risk analyses and fits the solved problem, was chosen as a crucial approach. The solved problem consists in both economic and risk evaluation of the public investment revitalization project of an existing construction in order to adapt it for its next utilization carried out by public investor. The results have been presented on the case study showing possible efficiency of the project and key risk factors and their possible impacts.

1. Introduction

Investment projects carried out within the public sector should fulfil requirements put not only on the economic efficiency with accepted risk rate, but also on the long-term sustainability and efficient utilization of available public resources. This paper focuses on the issue of sustainable development in the frame of public construction investments, especially on utilization of available fund of unused buildings for the sustainable development of the public sector. Emphasis is put mainly on the issue of both economic evaluation and the evaluation of key risk factors of investment projects. In the current practice a lot of public investors have buildings in their ownership, which are currently not in the operation and use and which are associated only with the costs of maintenance or loss caused by their degradation. There arises the need to use these objects better, in the most efficient way possible.

The objective of this paper is to determine the way of economic evaluation of public revitalization projects of decaying buildings in the ownership of public investor and identification and evaluation of key risks connected to the revitalization. The suggested process is applied on the case study of the project of the state enterprise the Czech Post, which consists in revitalization of the existing decaying object in the ownership of the investor and changing it into the building for the new printing machine operation. The results of the economic analysis, conclusions and recommendations following the risk analysis form part of the case study.

2. Literature review

The issue of evaluation of efficiency and risks of revitalization projects of decaying constructions is the subject of interest within research activities. General approaches to the economic analysis of investment projects are formulated in many publications. The brief overview is presented e.g. in the source [1]. The source [2] consequently develops the issue of the evaluation of the project efficiency



within the business sphere and more interest is given also to the risk analysis of these projects. The complex issue of risk analysis in the evaluation of investment projects is the subject of the publication [3] which deals with theoretical approaches to the sensitivity analysis and both qualitative and quantitative analyses. The issue of the risk analysis is dealt with from a little bit different point of view in the source [4]. This article is focused on the risk management mainly from the point of view of the company or institution. One of the key documents for the evaluation of efficiency and risk of public investment projects is the Guide to Cost-Benefit Analysis of Investment Project [5]. The European Commission defines the basic framework for the economic evaluation and risk assessment of projects financed from European funds within this document. The issue of the revitalization of decaying constructions and areas and their economic impact is the subject of the considerations solved within the source [6]. General view on the practical utilization of the risk analysis is solved within the paper [7]. The issue of risks connected to investment projects in the area of sustainable revitalization and their environmental impacts is consequently subject to the study published within the sources [8] and [9]. Impact of some kinds of investments on the regional development is subject to the paper [10]. The source [11] then reveals the issue of economic evaluation and risk assessment of revitalization projects of constructions in the dimension of protection of immovable cultural monuments. The issue of risks connected with the revitalization of the constructions in the ownership of the investor for a purpose of its new utilization is in detail presented on the case study carried out in the frame of the source [12].

3. Methodology

The paper is focused mainly on the economic evaluation of the revitalization project of an existing building in the ownership of public investor. The subject of the economic evaluation is the assessment of economic efficiency and risks connected with the evaluated project variant. The research question is defined as follows: Does economic and risk evaluation of the revitalization project of the building in the ownership of public investor require specific approaches compared to standard approaches used for the evaluation of public investments?

The answer is important for many public investors owning old and unused buildings who try to renovate them for their future usage. The reason associated with this importance is the possibility to do the economic and risk evaluation in the most efficient way.

The methodology of the research is based on the case study of the revitalization of the existing old building in the ownership of public investor, which should be used for finding solution to the research question. The subject of the case study is described in Chapter 4.

The issue of economic and risk evaluation has already been solved in many publications which can serve as a basis for the case study elaboration (solved within the literature review in Chapter 2). Economic and risk evaluation concentrating specifically on the revitalization of old object in the ownership of public investor is not a common topic of research papers. Following the references, the economic and risk analysis has been carried out based on the principles defined in the following paragraph.

Economic evaluation was based on assessment of evaluated impacts of the project. Evaluated impacts are considered in the following points:

- Investment costs,
- Savings in costs of transport– the new production situated directly in the logistic centre,
- Energy savings,
- Savings in rentals,
- Savings in payments of consequent contractual duties (the building security, the snow clearance etc.).

Economic analysis was carried out with the Cost-Benefit Analysis (CBA) using standard criteria for evaluation of economic efficiency of investment projects (Net Present Value - NPV, Internal Rate of Return – IRR, Pay-off Period). The discount rate is defined as the economic discount rate normally

used for the evaluation of public investment projects (5%). This discount rate is defined and described in the Guide to CBA [5]. The evaluated period is considered in the duration of ten years.

In the relation to the economic analysis, the key risk factors were evaluated and their possible impact on the investment project was discussed. The risk factors identification follows the common principles of both qualitative and quantitative analyses [3, 5]. Respecting the character of the project, key risk factors of the project were identified mainly in relation to the poorly elaborated project documentation. Regarding this fact, following risks were evaluated:

- Time overrun of the building realization in comparison with the time schedule,
- Increase in costs connected with the project.

The former of the risks was evaluated in the qualitative way, in the case of the latter mentioned risk; its impact was quantified in monetary units.

4. Results and discussion

The solved issue consists in the economic evaluation of revitalization project of building in the ownership of public investor. Besides this investment variant, also two more variants were defined. The zero variant (the variant without a project) is the stay in rented building; the third variant is a new investment. Regarding the orientation of the paper on the revitalization and sustainable investments, the third variant is not considered in the frame of this paper.

The issue of the revitalization project efficiency of the building in the ownership of public investor has been demonstrated on the case study carried out in the project of the “Revitalization of POST SERVICE in Brno”. The investor is the Czech Post and the subject of the project is revitalization of the building for the location of the high capacity printing machine.

The subject of the case study was evaluation of two aspects of the investment

- Efficiency of the investment project,
- Identification of risks connected with the evaluated variant.

4.1. Evaluation of the efficiency of the investment project

The subject of the evaluated investment project is revitalization of the object in the ownership of the investor for the purpose of location of the high capacity printing machine in this building. Originally the printing machine was situated in the rented building.

The economic evaluation of the project is in principle based on the Cost-Benefit Analysis, which is intended for the evaluation of economic efficiency of investment projects using evaluation of relevant impacts of the investment on cash-flow. Cash-flow was consequently analysed using traditional indexes for evaluation of economic efficiency (NPV, IRR and the Pay-off Period).

The impacts displayed in Table 1 have been identified in the frame of the evaluated project.

Table 1. Impact of the evaluated variant and its evaluation.

Impact	Value of Impact
(+) income, (-) expenditure	(1,000€)
Investment cost totally without VAT (-)	1,694
Annual savings in transport (+)	15
Annual energy savings (+)	10
Annual savings in rentals (+)	217
Annual savings in consequent contractual duties (+)	6

Source: Author's own elaboration according to [12]

The economic efficiency was evaluated using standard indicators known from the CBA. The results are shown in Table 2.

Table 2. Results of economic analysis.

Indicator of the economic analysis	Value
Net Present Value – NPV (1,000 €)	221
Internal Rate of Return – IRR (%)	8%
Discounted Pay-off Period (years)	9

Source: Author's own elaboration according to [12]

The results of economic analysis show positive values of indicators, so from the point of view of the economic cash-flow, the project is possible to be considered as efficient.

4.2. Evaluation of key risk factors of the investment project

Regarding the fact that the subject of the paper is revitalization of the construction in the ownership of investor in order to move the printing machine from the rented building into newly reconstructed premises, it is necessary to be aware of the following key conditions:

- Notice period for the rented object is 1 year,
- Missing the term of the object revitalization completion and overrun of the notice period could be connected with important consequent negative impacts in the form of sanctions, not realized savings and loss from not realized production,
- Change of production premises is also connected with changes in work contract of the employees, which is a long term process connected with concluding new contracts with current employees or recruitment of new employees.

The first of key risks of the evaluated project is, according to the consideration, above mentioned risk in the form of the time delay in the realization of the project. This paper is focused mainly on one of the basic causes of the construction delay – the poorly elaborated project documentation. The poorly elaborated project documentation can have, according to the experience from the solved case study, following impacts on the time of the delivery:

- In the case of public investor, the problem can be in the form of prolongation of the tendering period of public order from the aspect of big amount of complicated issues requiring explanation or fulfilment of trading documentation from the side of applicants (the contracting authority had to solve in total 101 issues within the evaluated case study),
- Identification of the need of additional work during the process of the tendering procedure or realization and appearance of induced prolonging of the production process for the reason of necessity of creation of supplementary project documentation and realization of unexpected construction works.

Basic operations leading to elimination or decrease in the risks connected to the poorly elaborated project documentation is possible to perceive at two levels:

- Operations in the contract for work concluded with the designer,
- Operations in the contract for work concluded with the supplier.

Operations in the contract for work concluded with the designer should be recommended as follows:

- Sanctions for days of the delay when removing particular mistakes in the project documentation,
- After the takeover of the project documentation by investor, the investor becomes its owner and can do anything with it.

Operations in the contract for work concluded with the supplier should be recommended as follows:

- During the interruption of the construction process, the supplier has no possibility to require any costs caused by this situation,
- In the case of additional work, the item budget will be elaborated using software for budgeting with the utilization of the official price database,
- Assessment of the level of the indexation of additional work should be consistent with the relation between the price of the winner of the tender and the price calculated by investor according to the official database of prices of construction works before the tender.

The second from the key risks considered within this paper is the increase in the costs due to the poorly elaborated project documentation. The basic information necessary for the assessment of the increase in the costs due to the poorly elaborated project documentation is the level of indexation assessment. The level of the indexation is assessed as competitive price defined in the contract for work divided by the supposed price based on the calculation according to the official price database. The level of the indexation assessment can be seen from Table 3.

Table 3. Level of indexation assessment.

Price according to the official database before the tender (1,000 €)	1,694
Competitive price (1,000 €)	1,580
Level of indexation	0.93

Source: Author's own elaboration according to [12]

Following the poorly elaborated documentation, it was necessary to carry out certain amount of additional work during the realization of the project. This additional work was mainly related to:

- Demolition of panels of the perimeter wall,
- Demolition of floors and new concrete with the diffused reinforcement,
- Removing of defects in the rainwater drainage.

The total value of additional work was assessed according to the official price database in the amount of 162,285 €. The value of additional work is not only associated with negative impact connected with the poorly elaborated project documentation. If the project documentation is elaborated correctly, additional work would be included in the first version of the project documentation. However, additional work has certain negative economic impact. This impact is caused by the fact that additional work was valued using the official price database (prices there are usually bigger than market prices) and not by the price tendered within the public procurement. For the calculation of the negative impact, it is possible to use the level of indexation provided in Table 3. Calculation of the loss caused by the poorly elaborated project documentation can be seen from Table 4.

Table 4. Assessment of the loss caused by poorly elaborated project documentation.

Additional work according to the official price database (1,000 €)	162
Level of indexation	0.93
Additional work modified by the level of indexation (1,000 €)	151
Total loss (1,000 €)	11

Source: Author's own elaboration according to [12]

Based on the above mentioned calculation, it is possible to conclude that in the case of correctly elaborated project documentation, the cost saving could be nearly 11,000 €. The calculated loss is not too big; however, in the case of bigger difference between the prices assessed using the official price

database and the competitive price, the loss could be more important. The recommendation is mainly to put effort in choosing a correct supplier of the project documentation who is able to provide the guarantee of the quality of his work. This guarantee is suitable to be declared by presentation of already carried out reference orders of the similar character, the range or own experience of the investor.

The research question was defined in Chapter 3 in the following way: Does the economic and risk evaluation of the revitalization project of the building in the ownership of public investor require specific approaches compared to standard approaches used for the evaluation of public investments? Using the methodical steps defined in Chapter 3 and case study introduced in Chapter 4, it is possible to state that utilization of standard methods for the economic and risk evaluation of public investment projects can bring acceptable results for the decision making on the acquisition process of the public investor. However, it is very important to respect individual character and needs of evaluated projects as well as the needs of the public investor.

5. Conclusions

The paper is focused on the issue of sustainable development within the public investing. Special attention is paid to the economic and risk evaluation of revitalization projects of constructions in the ownership of the public investor in order to adapt them for the future new purpose. The paper proposed realization of economic evaluation using the CBA approach, where the basic impacts, which should be taken into account within the evaluation, are defined. In the next step, the way of the risk assessment of the investment project was proposed; the attention is paid mainly to risks connected with the poorly elaborated project documentation. It concerns mainly the risk of the prolongation of the realization process, which can have significant impact on the project from the aspect of its next development and expected consequent activities. The second evaluated risk was consequently the risk of the increase in investment costs due to the poorly elaborated project documentation. Defined steps were verified on the case study of the revitalization of the decaying construction in the ownership of the public investor. Future research should be aimed at deepening the risk analysis of the revitalization projects of the building in the ownership of the public investor, more concerned with analysis of variants and more respecting the uncertainties in the future development of the project.

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