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Multiple-Criteria Cost Analysis for Simulated Life Cycle of Office Building

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1 Introduction

The definition of the life cycle of an office building can be fully based on the definition of the life cycle of a building as such. According to the definitions in ISO 15686-5: 2008, the life cycle of a building can be described as successive, interrelated periods of time between the selected time and the time of withdrawal or disposal of the building, in which certain criteria are assessed (*e.g.* costs, energy consumption, etc.).This period can be specified in the analysis, e.g. as a period equal to the time of renting or owning, or may cover the entire life cycle of a building, while the life cycle period is subject to the definition of the scope and specificity of operational requirements for a given building component. The definition includes a reference to the criteria of assessing the life cycle of an existing building. In the article, the author approaches the topic through the prism of strategic decisions accompanying the entire period in which an office building project is considered.

2 Strategic Decision Points

The most important points of strategic decisions, according to the author, are listed below. They have also been briefly characterized.

- Location Selection - different types of places: best, good, average, cheap, dedicated office buildings (*e.g.* near/in logistics centers ...).
- Widely understood construction technology that often affects the initial cost of the object. The cost is associated with the standard, which in many cases is the result of the location in which the object is designed.
- Permanent/Short-term tenants. There are various office buildings. In many cases, the assumption is that they are built for long-term tenants who are also strategic tenants and who often attract smaller ones. However, there are more and more advertisements of objects in which space is sublet for short periods of time, sometimes even for days.
- Renovations/Modernizations. The aims of renovation / modernization are an important issue. The existence of an office object is only justifiable when it brings profit. It is known that in time a building ceases to be as attractive as it was at the beginning. The aim of renovation, as it is understood by the author, is mainly to maintain the standard and output functionality.

3 Renovations/Modernizations

According to the author, the scope of renovation and modernization works can be divided into

four basic types, which are listed below. A set of criteria was also developed to evaluate these variants.

- basic renovation - aimed only at maintaining the object in working condition,
- full renovation - aimed at restoring the building to its original condition,
- inexpensive modernization - aimed at making the facility slightly more attractive,
- expensive modernization - aimed at restoring the facility's full attractiveness.

4 Conclusions

The article defines the life cycle of a building object together with the definition of strategic decision points. The assessment of the points regarding the decision on renovation or modernization was mainly considered.

A set of criteria have been developed to make the choice of the right option easier. In addition to the criteria, a weighting scenario was created with the use of Simos method.

During calculation, the expected rental income was established with the use of CrystalBall software.

The calculations made for the presented example show that this approach to the subject, in which various advanced methods are combined in multi-criteria assessment, gives good results and can be used assessing renovation and modernization options for office buildings.

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