

## **General Aspects Of Sustainable Re-Use Of Buildings**

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### **Abstract**

The key element to good space management is awareness of its historical development throughout history in particular that of his physical structure. Contemporary issues of less energy and economy expenses but greater ecology benefits, lead to greater involvement of the existing historic and abandoned structures in the process of city structure planning.

The buildings were examined showing methods for achieving sustainability of the built environment by their re-use in the future. The paper analyses the historic, functional, structural and other aspects within revitalization of existing buildings for the purpose of student housing. The case study indicates potential for adaptation and strongly examines the idea of refurbishment rather than re-development of the existing buildings on the site and in its surroundings.

The results indicate the re-use of existing building fund to accomplish various reimbursements, which promote cultural and historic sustainability and help in promoting architectural values along with practical extension of building life.

**Keywords:** *architecture, re-use, sustainabilty, student housing*

### **INTRODUCTION**

Sustainability is about achieving a greener or more environmentally friendly approach to adaptation and maintenance as well as to new build work. The aftercare and re use of old buildings is one of the key goals of sustainable construction. It obviates if not minimizes the need for wholesale demolition, which is a dangerous, polluting and waste producing and energy-consuming process. (2)

It is common truth that built object in time lose their ability to function properly. Various types of materials which were implemented during the construction mean different life cycles. Moreover, buildings may no longer respond to the actual needs of the contemporary society. New owners or change of lifestyle and needs may inflict the need for adaptation and re use. Whenever there is a possibility to adapt an old building, one should analyze all aspects and reasons for keeping the object rather than deciding to re develop.

## **IMPORTANCE OF RE USE FROM THE ASPECT OF ENERGY EFFICIENCY**

Building and demolishing of objects is energetically speaking irrational and unsustainable. During the course of demolishing objects, energy is consumed. Moreover, great amounts of waste are produced, which is not recycled. Energy and materials that were one used for development of old buildings tend to lose their purpose when re developing takes place. Finally, new materials and energy is used for developing new construction elements and other parts of the new building. Moreover, adapting the existing stock presents an ideal possibility to implement different new systems and materials not to have existed in the past, which further help the building to become more sustainable and to improve its performance in many ways for the future exploitation. Improving energy efficiency is of utter importance in the adaptation process, since it allows to cut down on energy the building consumes for heating, cooling and ventilation. In the existing building stock, the use of prime energy is low and considered to be at the value of 40-45 %.(3) use of renewable energy sources may a problem when considering initial costs, however, it is shown that by 10 percent more investment at the start of development, these elements in the design , if present, overlap the initial costs many times soon in the future exploitation period. (3)

Finally, by focusing on allowing only the re development to take advantage of energy efficient measures in their design, one would affect equals only 2 percent of the existing built fund. It is therefore better to address both adaptation and redevelopment regarding energy efficient measures.

## **IMPORTANCE OF RE USE FROM THE OTHER ASPECT OF HISTORICAL AND ARCHITECTURAL ISSUES**

Cultural issues and technical reasons may inflict the decision to adapt the building rather than redevelop. Sometimes architectural or historical importance the building has may be substantial to determine its need for adaptation. Nevertheless, the prime aspect in this context is that by adapting buildings, one is engaged into continuity of the built space and development of the city structures to be considered as a process. There is also the need to preserve the ambient wholes. Finally, regarding the property ownership, the legal owner may not be entitled to re develop the existing building due to the legal documents and law, nevertheless adaptation or refurbishment may be seen as a chance to achieve compromise and achieve a sustainable solution.

All in all, a careful adaptation scheme may economically enhance building life, because the building is after the process of adaptation, with more value than before the adaptation, which enhances its service life for a certain period.

## **TECHNICAL ISSUES OF ADAPTATION**

Regarding the technical issues, such as acoustic, thermal, life prolongation of the construction and static performances of the existing stock, are considered to be a trigger for possible adaptation. It is important to be careful with adaptation schemes, since the change of use may be good for new functions to be developed from the previous states, however the new structural demands must be taken into account, since it is not the same if the building is used as an office after the adaptation process of an old housing stock, since it changes the structural loads it bears in the new form.

Functional changes in the adaptation scheme can be hard to achieve with complete sustaining of the surface areas used in the previous function. It is sometimes the case that building has more space than needed; therefore it can be the case that without compromising

the whole of the building, extra space for new functions can be achieved. Moreover, the existing infrastructure, even though sometimes not completely convenient for the new use, is considered to be beneficial since it cuts down on costs that would have been needed for re developing, since reuse is more economically convenient.

Empty buildings that remained such for a long period of time, may not be convenient to re engage into the same process after adaptation. This sort of building is considered to be abandoned. Re use is necessary in order to maintain continual and useful exploitation.

## **AIMS AND METHODS**

The paper examines the use of historic buildings for the purpose of student housing. By case study method used, an area of abandoned historical building was examined, which shows potential for the adaptation process. The goal is to determine the architectural instance that may help to promote architectural heritage as an important part of the development of the city area.

## **THE RESULTS OF THE ANALYSIS**

The analysis showed good potential in the existing military buildings that could be used for student housing. The level of their exploitation differs and it is important to say that buildings in Nis technical campus surrounding area can be easily transformed to the campus architecture. There are various examples throughout the world which can serve as good examples of refurbishment. One of these buildings is the Gasometer object in Vienna, by Coop Himmelblau architects, which uses the existing tissue to accommodate student life among other functions.

## **CONCLUSION**



Using the existing fabric is beneficial for many reasons, including energy, ecology, economy as well as architectural and cultural continuity of the space. A thorough analysis of the costs is necessary in order to compare the costs of adaptation with the cost of re development. As is the case with buildings in Balkan area, adaptation may lead to various benefits, since it is more economy fruitful in general and can lead to recognizing of the contemporary issues of sustainability by following examples of good practice form the rich experience in the world. Regarding student housing, since an elementary need for placing students in local buildings is apparent and is continuing to be the problem, use of military objects is a potential that needs to be further examined in the future. We hope the paper helps in drawing attention to the problem of sustainability of these structures in the future.

*Figure 1, Gasometer in Vienna by Coop Himmelblau, a good example of refurbishment of industrial heritage in contemporary manne, source [www.arcspace.com](http://www.arcspace.com)*

*Figure 2, Old industrial complex in Nis, a possibility for refurbishment in the future, source [www.panoramio.com](http://www.panoramio.com)*

## **REFERENCES**

- [1] Cekic N, Lectures at the doctoral studies course in Theory of form, Nis, Faculty of Civil Engineering and architecture, Nis 2009
- [2] Douglas, J. Building adaptation, 2006. Elsevier int.
- [3] Pucar M, Lectures at the doctoral studies course in Bioclimatic architecture, Nis, Faculty of Civil Engineering and architecture, Nis 2009