

A Building's Refurbishment Knowledge and Device Based Decision Support System

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Abstract. The integration of knowledge-based, devices-based and decision support systems have a very promising future in scientific research. The authors of this paper participated in the project Framework 6, 'Bringing Retrofit Innovation to the Application of Public Buildings' (BRITA in PuBs). One of the project's goals was to develop a Building's Refurbishment Knowledge and Device Based Decision Support System (BR-KDDSS), which consists of a Decision Support Subsystem, Knowledge Subsystem and Device Subsystem. In order to demonstrate the integration of knowledge, device and decision support systems, the BR-KDDSS will be considered as an example.

1 Introduction

The major players in a building's refurbishment can use neural networks, genetic algorithms, fuzzy, knowledge-based and decision support systems, etc.

The major players in a building's refurbishment can use various purpose decision support systems (EPIQR, TOBUS, INVESTIMMO, etc.). EPIQR is a decision tool that combines financial, technical, energy, and comfort analysis [5]. EPIQR has been developed to act as an assisting tool for surveyors, architects or building owners in selecting the most suitable refurbishment actions for an apartment block by enabling them to upgrade the physical and functional state of the building, to improve tenant's indoor conditions and to reduce energy consumption [2].

Knowledge systems today generally serve to relieve a 'human' professional of some of the difficult but clearly formulated tasks. For example, Mazouz et al. [9] have presented a description and analysis of various knowledge systems in architectural design for such purposes.

Recent research in building and related artificial intelligence areas have shown that 'smart control techniques' such as fuzzy systems and neural networks can contribute to the reduction of energy consumption while maintaining indoor comfort within acceptable margins [7]. Chow et al. [3] introduced a new concept of integrating neural networks and genetic algorithms in the optimal control of an absorption chilling system. Based on a commercial absorption unit, neural networks were used to model the system's characteristics and the genetic algorithm as a global optimization tool. Many questions are raised during the integration of building's refurbishment automation systems. In Kusuda's opinion [8], the integrated system should be capable of

representing and analyzing details in as much as the user wants to pursue his/her purpose. With this program, one can determine the cause of unwanted moisture condensation, noise, odour, and glare, the malfunction of mechanical, electrical and plumbing systems [8]. According to Dorer and Weber [4], only a few computer programs allow for the evaluation of comfort and integrated aspects such as air quality, thermal, visual and acoustic comfort.

Integration of neural networks, multimedia, knowledge-based, decision support and other systems have a very promising future in scientific research.

When the authors of this paper participated in the project Framework 6, 'Bringing Retrofit Innovation to the Application of Public Buildings' (BRITA in PuBs), one of the project's goals was to develop the Building's Refurbishment Knowledge and Device Based Decision Support System (BR-KDDSS) which is presented in Section 2. The implementation of the System is described in Section 3. Finally, some concluding remarks are provided in Section 4.

2 Building's Refurbishment Knowledge and Device Based Decision Support System

Based on an analysis of the existing information systems, neural networks, genetic algorithms, fuzzy, knowledge-based and decision support systems and in order to determine the most efficient versions of building refurbishment, a Building's Refurbishment Knowledge and Device Based Decision Support System (http://dss.vtu.lt/renovacija/index_educational.asp) was developed. The results obtained in these initial [1, 6, 10, 11, 12] studies may be found in the authors' publications. The architecture of BR-KDDSS system consists of the Decision Support, Knowledge and Device Subsystems. Below we shall briefly analyse these subsystems.

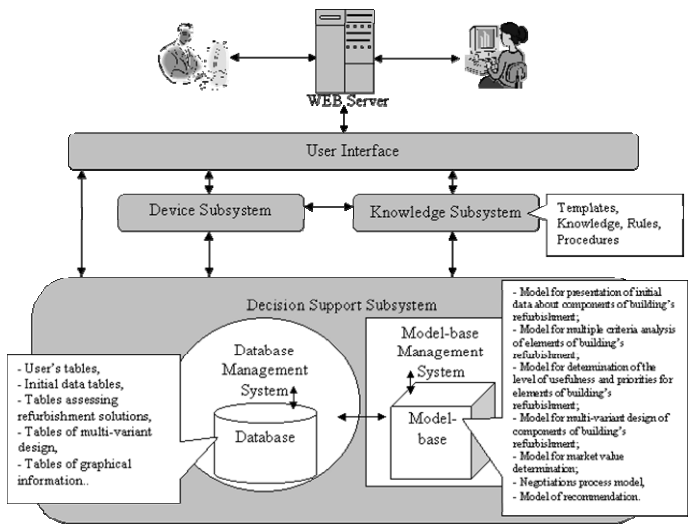


Fig. 1. The architecture of BR-KDDSS system