

The Role of Intelligent Systems in Traditional Courtyard Houses In Baghdad, Iraq 2016

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Abstract

Intelligent systems (IS) are seen as a vital component in improving building performance. The research reported in this thesis explored the potential role of such systems in improving the performance of courtyard house types in Baghdad, Iraq.

The Iraqi government's intention to refurbish those courtyard houses that possess significant historical architectural values was based on modifying the ambient social and environmental condition to protect the occupants. The potential of intelligent systems is generally to: enhance the life-cycle of the building, promote built heritage conservation, reduce running costs, improve operational effectiveness and energy efficiency, enhance cost effectiveness, increase user comfort and productivity, and improve safety and reliability. However, the majority of IS research and development has been in commercial and office buildings, and although there have been applications in dwelling houses, their potential benefit for certain house types, eg courtyard houses, has not been well understood.

Against the background of the possible refurbishment of the courtyard house, the aim of this research is to explore the potential role of intelligent systems in improving the performance of the courtyard house type in Baghdad, Iraq. The main objectives of this research were to: 1. Investigate the characteristics and features of the traditional courtyard house in Iraq; 2. Investigate the meaning, nature and application of intelligent systems in buildings; 3. Investigate the lifestyle of current users of traditional courtyard houses and how these buildings support their needs; 4. Examine the potential role of IS in improving the performance of courtyard houses; and 5. Make recommendations on the possible applications of IS to courtyard houses.

Various research methods and strategies were adopted to achieve the defined aim of this research. These methods include an extensive literature review in both the areas of the courtyard house and intelligent building, and a case study. The qualitative method was used, and data were collected from two main sources through: 1. Semi-structured interviews with architects and occupants, and 2. Physical survey and observation of the traditional courtyard house in the Al-Kadhimiya historic area, which was used as a case study.

The findings from the study identified the following themes which provide the basis for exploring the research question: 1. Control of the environment; 2. Environmental challenges and struggles. The previous themes and issues revealed new issues, including: 1. Passive systems; 2. Lifestyle; and 3. House performance.

It is concluded that the key features of the traditional courtyard house are passive systems which support the lifestyle due to the partial control of the environment by creating a microclimate that enhances energy conservation. The potential need for IS is dependent on the lifestyle of the current user. When these houses are fully occupied, IS may help the occupants to maximise the use of these spaces, which is very important for them to achieve living stability, for partial occupancy, as adding these systems will clash with some family movement. Therefore, there is a limited need for IS such as energy use environmental control and a communications network. Adding IS will support the response to the environment; these systems achieve full control of the environment, and reduce the environmental challenges and struggles. All these enhance the level of intelligence and as a result will assist the house performance and therefore the TCH will be a container of IS. Future users are likely to have a different lifestyle and accordingly the level of intelligence may change; therefore, the potential need of IS might change too due to the type of IS and its operation.

This study contributes to the role of intelligent systems in enhancing the performance of the TCH. A clean air recirculation module is one application to be used in the courtyard house, which can be selected to enhance the house's performance.