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Interactive building environments: A case study university building in UAE

Mahbouba Karima[a,*], Hasim Altan[b]

[a]*Sustainable Design of the Built Environment, Faculty of Engineering & IT, The British University in Dubai, UAE*
[b]*Department of Architectural Engineering, College of Engineering, University of Sharjah, Sharjah, UAE*

Abstract

Microprocessor-based technologies are fast becoming a key instrument in building intelligent facilities. Educational sectors are sought to be one of the critical segment in the society, an environment that has a massive impact on the learning process on the growing generations. Hence, an intelligent building with integrated advanced digital technologies becomes an exemplar for the modern existing building. This paper discusses the state of intelligence levels of an existing university building in the United Arab Emirates; the building is ESTIDAMA certified. In this study, several intelligent building system indicators have been evaluated. Building structure and in the relation between interior facilities and exterior construction will be studied. Furthermore, surveys including questionnaires and interviews have been undertaken among the building management staff, the university academics and students. After identifying weaknesses in the building system through a framework adopted using eight intelligent building indicators, recommendations are proposed enhancing the existing systems and the intelligent strategies in the case study university campus to also improve both the users' performance and productivity.

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Keywords: Intelligent buildings systems; interactive buidling environments; intelligent university campus; UAE.

1. Introduction

The role of digital technology in the creation of energy-efficient buildings is ahead today than it than 10 years ago. The rapid growth of technological advances and its role in the communication of human's social and living

* Corresponding author. Tel.: +971 55 557 49 39.
E-mail address: mahbooba.karima@gmail.com

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aspects has made it an inseparable part of the present lifestyle. The demand and dependency on intelligent technologies in the modern life have reflected on the complexity of the built environment.

An intelligent smart building system connects various major services in a building. Fig. 1 illustrates the key components of a connected building system (Fire/Life safety, Security, Lift/Elevators, building access, Lighting, Energy Management, HVAC, Communications). However, it is necessary to point out that not every claimed intelligent building can be classified as smart/ intelligent without corresponding to the functionality of the system and operational efficiency of the installed intelligent system.

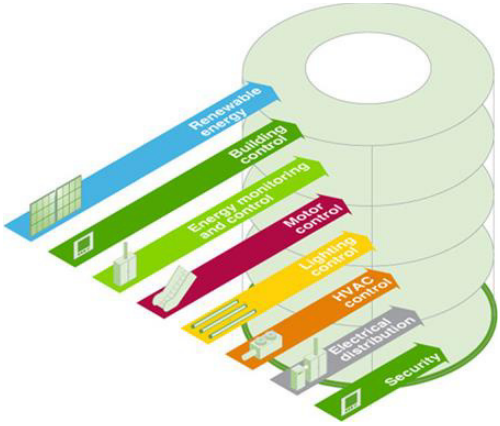

Fig. 1. Integrated Building System [4].

Until the present day, the term "intelligent building" has been in a constant change as a technological breakthrough, and are progressing and developing day by day. Manufacturers of technological systems are in competition to present intelligent innovations that cope with the needs of the society.

Wong et al. (2008) have conducted a research based on the system intelligence model using findings of Bien et al. [1,3]. The study introduced a holistic set of criteria to evaluate the performance of intelligent buildings. The proposed system is called key performance indicators (KPIs), and these indicators target eight main areas depending on the selected building:

- Integrated Building Management System, IBMS.
- Telecom and Data System, TDS.
- Heating, Ventilation and Air-conditioning Control System, HVAC.
- Addressable Fire Protection and Alarm System, AFA.
- Security Monitoring and Access Control System, SEC.
- Digital Addressable Lighting Control System, DALI.
- Smart/Energy Efficiency Lift Control System, LS.
- Computerized Maintenance Management System, CMMS.

The paper is an extract from a research completed in 2015 as part of Master's coursework at the British University in Dubai (BUiD) within the 'Sustainable Design of the Built Environment' programme.

2. Methodology

New York University Abu Dhabi (NYUAD) is distinguished to be one of the most sustainable and contemporary built campuses in Abu Dhabi. The aim of this study is to investigate three points in the overall university environment: