Enhancing Public Buildings Maintenance Using Integration Between Knowledge Management and BIM

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ABSTRACT

Building maintenance is gaining increased attention in the various fields of scientific research. Building information modelling (BIM) is used in the maintenance management and has helped facility management to handle a large volume of maintenance information, including drawings, specifications, lists and reports. BIM proved its effectiveness as a repository for various types of data in buildings maintenance and a tool to support decision making in maintenance. Stepping the best decision at the facility is not only based on quantitative data but also on the knowledge and experience acquired by the company and the employees. This experience may be lost forever due to resignation and retirement if they are not documented. In this research work the authors provide a methodology for obtaining knowledge while performing maintenance of public buildings using BIM and DYNAMO applications, where parametric models provide us with a high-central frame for storing information and by adopting of visual programming, which provides great capabilities for processing, extraction, classification and the export of data from the BIM model to organize the knowledge management process extensively. This serves to facilitate decision-making through the BIM dependent knowledge base which helps to obtain and re-use of generated knowledge.

KEYWORDS

BIM, Construction Management, Dynamo, Knowledge Management, Maintenance, Visual Programming

INTRODUCTION

Knowledge management (KM) is the name given to the set of systematic and regimented actions that an organization can take to attain the maximum value from the knowledge available to it (Thampi, 2007). Also, knowledge is seen as one of the most important resources in any organization that is not subject to the law of diminishing returns or scarcity (Sousou, 2014). KM has gained a wide interest among researchers, a survey showing that about 80% of respondents reported that knowledge is
their strategic arm and some even said that losses of up to 6% of annual revenue occurred because of knowledge management failures (Insights from KPMG’s European Knowledge, 2003).

In this research, Researchers will try To Develop a framework that helps generate, process and store the implicit and explicit knowledge of facility maintenance in the BIM environment.

BACKGROUND

Fragmentation of construction information has been challenging in the AEC/FM (architectural, engineering, construction, and facility management) industry for a long time, and caused significant difficulties of information management This fragmentation is also reported to be a major contributing factor to loss of knowledge (Liu et al., 2013). To solve this problem, many workers suggest BIM to manage knowledge in the construction industry (Amireday, 2014; Deshpande et al., 2014; Deshpande & Amireddy, 2014; Charlesraj, 2014; Lin, 2014). These workers gained benefit from the parametric nature of BIM to acquire, store and share knowledge in the construction industry, and share this knowledge in other projects using (Shared Parameter). In another research, KM and BIM was used to manage the maintenance (Almarshad & Motawa, 2012; Almarshed, 2014), The aim of these researches was to facilitate the decision-making process through a knowledge base relying on BIM to obtain the knowledge generated and facilitate reuse by maintenance team. The researcher confirmed that the decision support activity is closely associated with the maintenance experts and their practical expertise which greatly helps in the continuous improvement of the performance and cost of maintenance. The maintenance of the facility provides services ranging from minor repairs to repair and re-operation, complex. The researcher proved that the lack of knowledge and loss can cause re-errors and reinventing the wheel, which leads to wasting time and cost.

Lack of experience and documented of knowledge leads to poor maintenance efficiency. Where it is noted that random maintenance in public buildings, especially in the buildings of the university. There is no benefit from the experience gained from previous activities in determining the optimum maintenance methods and the lowest cost, and therefore unjustified increase in the cost of maintenance and not achieve the best results from this maintenance (Alhassan & Jrad, 2016).

DYNAMO has been addressed in many references (Dynamo: Visual Programming for Design, 2016; Sgambelluri & John, 2014; Jezyk, 2016). It is a BIM application based on the VISUAL PROGRAMING principle. The software interface of this application helps to provide designers with tools for programming rather than writing code from zero. This application relies on ready programmed nodes, which are programmed using python language as shown in the Figure 1.

The articles on DYNAMO focused on the capability of this application to model complex engineering structures that are difficult to model using REVIT, but the capabilities of this application were neglected in organizing the large amounts of data available in REVIT and its ability to organize and arrange these data and to link them before use in decision support.

Research Problem

Absence of a plain approach to acquiring and recording information and knowledge in a BIM file may serve to lose important information and data in the hand of maintenance team. As a result, losing this knowledge due to the departure of their employees to obtain another job or retirement and in some cases, such as the war in Syria, many skilled work forces are lost due to migration and other reasons. Which means losing the experience they possess, beside inflating maintenance costs.

We summarize the search problem in several questions:

1. How data are exchanged during the life cycle of the facility and its impact on the maintenance decision;
2. Is there a benefit from the accumulation of experience in the field of maintenance and how to frame this experience?
Knowledge Management in Virtual Enterprises: Supporting Frameworks and Enabling Web Technologies
www.igi-global.com/chapter/knowledge-management-virtual-enterprises/6013?camid=4v1a