

IMPLEMENTATION OF FACILITY
MANAGEMENT IN BUILDING
INFORMATION MODELLING (BIM) FOR
POST CONSTRUCTION

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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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ABSTRAK

Pengurusan Kemudahan (PK) adalah perkhidmatan dan aktiviti pelbagai disiplin yang mempunyai integrasi antara orang, tempat, proses dan teknologi. Dari segi bangunan atau kemudahan, satu sistem yang komprehensif dan tergabung aspek pengurusan kemudahan harus dihasilkan secara sistematik supaya pengurusan penyelenggaraan, aset dan jangka hayat dilaksanakan dengan baik. Building Information Modelling (BIM) dengan sistem pengurusan kemudahan menawarkan sistem platform standard yang lebih tinggi, yang berfungsi untuk menguruskan bangunan, kemudahan dan aset tetap lain boleh diintegrasikan sebagai repositori digital bagi setiap komponen bangunan. BIM juga boleh meningkatkan kerjasama antara pelbagai disiplin kerja, keupayaan untuk menguruskan perubahan dan keupayaan untuk menyediakan sokongan dan pengurusan maklumat penuh sepanjang kitaran hidup bangunan. Building Information Modelling (BIM) merupakan salah satu perkembangan terbaru dalam industri seni bina, kejuruteraan, dan pembinaan. Menggunakan teknologi BIM, 3D maya yang tepat dari sebuah bangunan dibina secara digital. Model ini lebih dikenali sebagai model maklumat bangunan dan boleh digunakan untuk perancangan, reka bentuk, pembinaan, dan pengendalian kemudahan itu. Ia membantu arkitek, jurutera, dan pembina memvisualisasikan apa yang akan dibina dalam persekitaran simulasi untuk mengenal pasti sebarang reka bentuk, pembinaan, atau isu operasi yang berpotensi. Kajian ini menggunakan metodologi berdasarkan mengumpul data daripada UMP Holdings dan mereka parameter dalam pirisian Revit untuk mengenal pasti rekod data manual dengan mengaplikasikan rekod baru dalam bentuk data berjadual tentang pengurusan kemudahan dalam BIM. Oleh itu, tujuan kertas ini adalah untuk membincangkan konsep dan definisi FM dengan BIM dan pelaksanaan antara FM dan BIM.

ABSTRACT

Facilities management (FM) is a multi-disciplinary services and activities that have integration between people, place, process and technology. In terms of a building or facility, a system of comprehensive and incorporated aspects FM should be generated systematically so that the maintenance, asset and life span management are implemented properly. An integration of Building Information Modelling (BIM) with FM system offers a higher standard platform of system, which functionality of managing buildings, facilities and other fixed assets can be integrated as a digital repository for each building component. BIM can also enhance the cooperation between the various disciplines of work, the ability to manage change and capability to provide full information support and management throughout the life cycle of the building. Building information modelling (BIM) is one of the most promising recent developments in the architecture, engineering, and construction (AEC) industry. In order we used BIM technology, an accurate virtual model of a building is digitally constructed. This model, known as a building information model, can be used for planning, design, construction, and operation of the facility. It helps architects, engineers, and constructors visualize what is to be built in a simulated environment to identify any potential design, construction, or operational issues. Research methodology used in this research is by collecting data from UMP Holdings and create a parameter in Revit Software to identified manual data record with new schedule data application of facility management in BIM. Hence, the purpose of this paper is to discuss the concept and definition of FM with BIM and the implementation between FM and BIM.

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LIST OF ABBREVIATIONS

3D	3 Dimensional
2D	2 Dimensional
FM	Facility Management
AEC	Architectural, Engineering and Construction
BIM	Building Information Modelling
UMPH	University Malaysia Pahang Holdings
CAM	Computer-Aided Machining
SLA	Service Labour Agreement
CMMS	Computerized Maintenance Management System
MEP	Mechanical, Electrical and Plumbing

CHAPTER 1

INTRODUCTION

1.1 Introduction

In an era of increasingly sophisticated and modern technology, BIM is set to offer a new level of functionality for FM of a building as well as physical assets in it. Building Information Modelling (BIM) is a process of creating and managing 3D building data during its development. BIM is a complex multiphase process that gathers input from team members to model the components and tools that will be used during the construction process to create a unique perspective of the building process. Building Information Modelling all began with Dr. Patrick J. Hanratty in year 1957 (Eastman, 2009) to develop the first commercial software CAM (Computer-Aided machining). It took almost 30 years to develop BIM and the Hungarian company Graphisoft, 30 years ago founded in 1982, launched the ArchiCAD in 1984, the first BIM software in the world and its recognized later in 1987 under Virtual Building concept. Therefore, Building Information Modelling is an approach to building design and construction through modelling technology which requires an associated set of processes and people to produce, communicate and analyse Building Information Model.

Facility Management is a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology. Therefore, during post-construction phase we need to maintain building performance throughout the useful life of the facility. By using BIM during the planning and design phases, it is now possible to retain valuable information and relationships about the various components that comprise a building. In digital form, the building information can more readily be shared and analysed during the post-construction phase to improve facility management decision-making. This improved decision-making can in

turn reduce operating costs, improve facility performance, extend building life and improve occupant efficiency. It also help to prevent mission-critical data was not easily accessible or is missing altogether due to manually recorded in facility management stage.

The implementation purpose of facility management in BIM for post construction uses include those uses where facility elements are analysed to ensure their relationship to other elements is effective and in harmony. It is important to have a good facility manager in develop the facility management. By using BIM in facility management, facility manager will get a benefit in terms of communication, energy efficiency, space management, preventive maintenance and building life cycle. BIM's applications and reporting capabilities will only become more sophisticated over time, assisting in all building operations as they relate to construction, maintenance, repairs and energy usage. It is important to note that to truly maximize BIM's benefits, facility professionals need to become familiar with it and take the time to develop proficiency with information management. They need to understand how to assess different types of data and develop procedures for keeping it current. Facility managers who begin to adapt this technology to the management of their assets will see a big return on their investment. Overall this purpose of BIM uses ensures that the facility will fit together as it is planned and that all the various systems have been considered.

Therefore, the adoption of BIM will support the FM system with more successful and excellent. FM can be described in many aspects, from asset management and finance up to the operations, maintenance and also towards the fast track of management and planning measures. With the use of BIM, FM methods can easily be generated in a centralized network database. In this network database, information that is not required can be removed and the data of 3D geometric buildings will be linked through the function and usefulness of FM in supporting the operation of a building and facility.

1.2 Problem Statement

In Malaysia, most of the construction company still used to 2D modelling in their construction site instead of using 3D modelling due to less professional expert in BIM. In order to improve and upgrade the system, 3D modelling should be emphasize. One of the common problems related with 2D-based communication during the design phase is the considerable time and expense required to generate critical assessment information about a proposed design, including cost estimates and structural details. The main purpose of creating 3D model over 2D drawing is to simulate the final construction to ensure there are no conflicts between different services, structural features etc. 3D CAD model to hold comprehensive information about structure, material conflicts and details necessary for automating construction scheduling and costing is limited.

In this research, although BIM system can be integrated with FM, there are still impediments that need to be highlighted, especially by the facilities managers. First in terms of awareness in industries, FM profession had a very small input and less acknowledge into the evolution of BIM. FM has been slow to engage with BIM. As it can relate based on the data provided, there's an inconsistency of data. Interoperability is important to ensure the BIM stability because it will consist all of the tasks associated with building design and production of FM. Somehow, it might cause a crash towards the software or in other words call "model bloat" and all the data will be interrupted. There's a pro and cons by implement FM in BIM depending on how well the data is managed to avoid the model from contains so much data and become unwieldy.

The barriers to BIM implementation are often divided into two categories, process or technological barriers and organizational barriers. (BECERIK-GERBER, 2011) have compiled a list of barriers to BIM implementation within FM.

Process or technological barriers:

- Unclear roles and responsibilities for loading data into the model or databases and maintaining the model
- Diversity in BIM and FM software tools, and interoperability issues

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