

BUILDING INFORMATION MODELLING IN ASSET MANAGEMENT
FOR ASSET TRACKING

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DEDICATION

*To my beloved wife Dr Nik Zuraida Bt Nek Ismail and my two lovely sons;
Muhammad Arif Saifullah and Muhammad Amir Ziqrullah*

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ABSTRACT

Sistem Pemantauan Pengurusan Aset (SPPA) is an application developed for asset management for the use of all Federal Ministries and Departments. It is based on the Federal Treasury Circular about capital property type, its location, the registration card (Kew.PA-2), capital property condition and Kew.PA-14, which is to use for maintenance records of capital assets. However, there are still occur cases of negligence committed by officials responsible for the assets involved, in which assets are managed by inefficient and also ineffective manners. The main objective of this study is to describe the method used in Building Information Modeling (BIM) process to the application in the management of current assets in an interactive Asset Data Management (e-PDA). Asset Data Management (e-PDA) that is produced through the process of BIM is an innovative product that helps the stakeholder involved in the management of government assets such as asset location, description of assets, asset maintenance and etc. It is produced by the using of software like Autodesk Revit, Tekla BIMsight and Microsoft Power Point. The method used is to develop e-PDA application in the form of multimedia (e-PDA) to solve the above problems. The findings show that the e-PDA has shown more interactive, can identify the location of assets and placement easier and the system is easy to use and understandable. This is evidenced by a survey conducted to officials responsible of the aset that the use of e-PDA in managing asset is in high agreement about the newly develop system

ABSTRAK

Sistem Pemantauan Pengurusan Aset (SPPA) adalah aplikasi yang dibangunkan untuk tujuan kawalan dan pemantauan aset bagi semua Kementerian dan Jabatan Persekutuan. Ia adalah berdasarkan Pekeliling Perbendaharaan Malaysia iaitu jenis harta modal, lokasi, daftar (Kew.PA-2), keadaan harta modal dan Kew.PA-14, iaitu rekod penyelenggaraan harta modal terkini. Namun begitu, masih juga berlaku kes-kes kecuaiian yang dilakukan oleh Pegawai bertanggungjawab terhadap asset-asset terbabit, di mana asset-aset ini diuruskan secara tidak efisien dan juga tidak efektif. Tujuan utama kajian ini adalah untuk menerangkan kaedah Informasi Permodelan Bangunan (BIM) yang di aplikasi di dalam pengurusan aset semasa secara interaktif menggunakan e-PDA. Pengurusan Data Aset (e-PDA) yang dihasilkan melalui proses BIM merupakan satu produk inovasi yang membantu pihak-pihak yang terlibat di dalam pengurusan aset kerajaan seperti lokasi aset, deskripsi aset, penyelenggaraan aset dan sebagainya. Ia dihasilkan menggunakan beberapa jenis perisian seperti AutoDesk Revit, Tekla BIMsight dan juga Microsoft Power Point. Kaedah yang digunakan adalah membangunkan aplikasi e-PDA berkenaan dalam bentuk perisian multimedia (e-PDA) bagi menyelesaikan masalah di atas. Dapatan kajian menunjukkan bahawa e-PDA telah menunjukkan lebih interaktif, dapat mengenal pasti aset dan lokasi penempatan dengan lebih mudah dan sistem mudah digunakan serta difahami. Ini dibuktikan dengan soal selidik yang dijalankan kepada pegawai aset dan pemeriksa aset di jabatan kerajaan dimana pencapaian tahap persetujuan adalah amat tinggi apabila menggunakan e-PDA.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter gives the overview of the main topics and highlight the main ideas of this research. Components presented in this chapter including background of study, research problems, research objectives, research questions, scope of study, significance of the study and thesis structure.

1.2 Background of Study

Building Information Modelling (BIM) is a new process that has been practiced in the construction industry. It is a process of digitalizing all of construction data before the real construction work is carried out to make the work efficient. BIM is the process and practice of virtual design and construction throughout its lifecycle (Hergunsel, 2011). BIM also can be used in Asset Management.

According to Oxford Advanced Learner's Dictionary, asset refers to any item of property owned by a person or company which can be used and sold for certain value. Management can be defined as the process of planning, leading, controlling and managing a business, organization or people. Asset management can be concluded and defined as the collection, processing, analysis and maintenance of extensive information about various type of assets such as equipment, facilities and other resources to plan to work to be executed to maintain these assets at an operational level in the most cost-effective fashion possible (Lemer, 1998).

1Pekeliling Perbendaharaan (1PP) has been circulated by Ministry of Finance Malaysia in a letter dated 19th June 2014. On 3rd July 2014, this circular is effectively used for all Ministry, Federal Department, Federal/State Statutory Body and Local Authority. One of the seven main management field in this circular is Asset Management, known as *Pengurusan Aset (KP)*. All of the government officers related to the asset management must follow this circular as it is objective that to make the Asset Management more effective and efficient.

1.3 Problem Statement

Government has issued a new version of 1Pekeliling Perbendaharaan (1PP) on 3rd July 2014. This circular is superseded all the circulars that has been issued before. There are 7 main financial management in this 1PP and one of them is Pengurusan Aset (KP). This circular is issued to all to make the asset management in Government sector more effective and efficient.

Over the years, Audit Office has encountered dismay reports on government asset management activities and programmes, which included of acquisition of asset, registration process, maintenance activities, disposal programme and theft cases, which implied to waste of people's money due to lack of management (Mohd Roszaimy M., 2015). According to Buang (2011), Audit Report have reported inefficient and ineffective manners in asset management over the years. Besides, Mahadi and Husin (2007) had pointed out some issues reported in Audit Report, namely, ineffective use of asset procured, improper records of assets and failure of running annual inspection. These issues must be tackle and solve with a new technology that is not necessarily expensive, but efficient and effective as well.

Some organizations often rely on the conventional asset management system which is hard-copy filing system or spreadsheet process system (Panduit Corporation, 2012). The accuracy of data and information can never be guaranteed due to unpredictable human error. In addition to that, there is no central database that can provide instant information. Lacking information and errors within this manual method can render insufficient databases. The current filing management system is less efficient in managing large number of asset records especially when users wish to extract certain information through all the records. This system may cause ineffectiveness to the entire management process (Panduit Corporation, 2012).

Another process in asset management is the descriptive information that is separated with spatial location such as map. In some circumstances, map visualization can play an important role in helping users to gain full understanding about a location

and environment. (Lee S.Y., 2015). Sometimes, the stakeholders involved didn't have a full understanding of the appearance of an asset and the location when they only read from the text information. Apparently, this problem has identified the role of showing location plan in 3D visualization which is very easy to understand and is very helpful to the stakeholders.

All of this issue will continue unless firm measures are taken to improve the process of the asset management so that the competency level of those involved in the asset management will be increased so that the process will be more effective and efficient.

1.4 Objectives of Study

The objective of this research is:

- i. To study the problems in Asset Management in Politeknik Ungku Omar
- ii. To study factors affecting Asset Management in Politeknik Ungku Omar
- iii. To integrate all the digitalize data of assets using Building Information Modelling (BIM)

1.5 Research Questions

The following research questions are addressed and should be answered to fulfil the research objectives:

Table 1.1. Research objectives and research questions

Bil	Research Objectives	Research Questions
1.	To study the problems existed in Asset Management in Politeknik Ungku Omar	<ul style="list-style-type: none"> • How to identify the problems existed in Asset Management in PUO? • What method to choose to get the data?
2.	To study factors affecting Asset Management in Politeknik Ungku Omar	<ul style="list-style-type: none"> • How to identify the factors affecting asset management in PUO?
3.	To integrate all the digitalize data of assets using Building Information Modelling (BIM)	<ul style="list-style-type: none"> • How to digitalize the data? • What kind of data format that can be produced for the 3D model of the asset?
4	Expected Finding?	<ul style="list-style-type: none"> • Kew PA 2 Harta Modal • Prototype system of Asset tracking

1.6 Scope of Study

The scope of the study is specified as below:

- i. Study Area
- ii. Data

- iii. End User
- iv. Software

1.6.1 Study Area

The area of the study is Makmal Ukur Kejuruteraan, Jabatan Kejuruteraan Awam, Politeknik Ungku Omar

1.6.2 Data

The data used in this research is as below:

- i. all the assets in Makmal Ukur Kejuruteraan, Jabatan Kejuruteraan Awam Politeknik Ungku Omar that is registered with Kew PA2
- ii. 2D drawing of Bengkel Jabatan Kejuruteraan Awam, Politeknik Ungku Omar

1.6.3 End User

The end user of this research is Asset Manager from Department or Federal, Audit Officer from Jabatan Audit Negara and all officer related to the asset management.

1.6.4 Software

The software used in this research are listed as below:

- Revit 2017 (To model 3D building and asset models)
- Tekla BIMsight
- Others (to be decided according to technology available)

1.7 Significant of Study

Using Building Information Modelling (BIM) in asset management (7D) will improve its effectiveness and the efficiency. It also saves time to manage the assets. Any Asset Manager can identify the assets easily rather than just read the particular of the assets from Kew PA2 only. They can track the location of the assets easily because of the information provided digitally rather than conventional method. The Audit process of the assets will be easy as all the assets data is digitalized, the description and the location can be track easily. Using BIM in asset management can lead to other management such as safety, maintenance and others.

1.8 Thesis Organization

At the end of this research, a thesis which consists of five chapters will be produced. Each chapter is briefly described as follow:

Chapter 1 gives the introduction of the study including the background of the study, problem statement, aim, objectives, scope and the significant of the study.

Chapter 2 presents literature review of the study. The review of this study includes the introduction to BIM in the construction industry generally and in asset management specifically, the introduction of asset and asset management, 1PP (Pekeliling Perbendaharaan) by Ministry of Finance Malaysia, asset life cycle, and the technology and software used in this study.

Chapter 3 describe the method used to achieve the objective of this study. A workflow also presented in phase. The procedure in each phase will be explained in detail. It includes the process of data collection during field work conducted, the process of 3D model's construction and system development processes. It also explains how GIS can be applied in asset management. The methodology proposed is intended to accomplish research objectives and answer research questions in Chapter 1.

Chapter 4 presents the result and analysis of this study. Results and analysis from this research are discussed to evaluate if the objectives of this research have been achieved or not.

Chapter 5 describes a comprehensive evaluation of this study including the limitation and recommendation of this study. Conclusions of this study also will be presented. Strengths and limitation of this research are highlighted and future implications are discussed for improvement.

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