

CHAPTER I

INTRODUCTION

1.1. Research Background and Overview

Cost management has become one of the most crucial task in construction industry. Cost management is concerned about the process of planning and controlling the budget of a project. This process is developed to help deliver the project successfully.

Construction industry is unlike any other industry, the unique nature of each project tends to make cost planning process takes time in analyzing every information required from the project. Even in the actual practice, cost engineers still have to manually estimate the quantity and other informations from the drawing. Manual cost management works which is time consuming, lack of efficiency and prone to errors due to its dependency of estimator's knowledge subjectivity couldn't be whole time reliable towards the results accuracy (Liu, Li & Jiang 2016).

As technology are evolving rapidly nowadays, there has been a lot of tools and programs developed to help engineer in planning and controlling the cost of a project. Graphic based construction software are now able to provide informations of each item listed within, even a simulation of project progress could also be shown in a detailed terms.

BIM (Building Information Modeling) is a breakthrough in AEC (Architecture, Engineering, Construction) industry. BIM as defined by US Building Information Standard Project Committee is *"a digital representation of physical and functional characteristics of a facility. A BIM is a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle; defined as existing from earliest conception to demolition"*. BIM is essentially an approach that allows project manager to work with 3D design and information model that contains parametric object and related geometric/non-geometric informations.

The basic principles of BIM which are 3D modeling, interoperability, parametric object and advanced information management features, hold a lot of potential to improve the current state of cost management practice by overcoming the drawbacks of manual cost management as previously mentioned (Sunil et al, 2015).

There has been numerous study that utilizes BIM as a tool for cost management process. However, considering the complexity and many other aspects during construction process, informations extracted from BIM model couldn't be directly used as a baseline for cost management purpose.

Ontology modeling and representation is a knowledge based analysis which breakdown components into hierarchical sub-classes along with shared conceptualization between classes and individuals (*Nicola Guarino, 1995*). Construction process involves a wide variety of building sections and work items. All of this components during construction phase are bonded into specific conditions and interrelated concepts. An ontology based analysis could help to manage all of this complexity and refracts how the construction process is carried out and measured in a very detailed terms.

To create a reliable, accurate and practical cost management, BIM model as the digital representation of building has to be able to provide the detailed informations of construction process. Therefore, an ontology framework to provide information requirements for BIM model development is necessary to create an improved BIM-based cost management process.

2. Research Motivation

From the planning up to the execution phase of construction project, cost management implementation is vital to provide accurate forecast on how much the project will cost and how to control it. It is important for cost estimation and control process to cover the whole terms and conditions in construction project.

On the other hand, a standalone BIM model development isn't mature enough to provide all of the informations required. Thus, the capability of BIM model to provide accurate and complete informations is important to perform an accurate cost management process.

In accordance with the condition above, a detailed terms and specifications to accommodate the development of BIM model for cost management purpose is necessary. The development of this framework is based on ontology approach to represent building sections along with its related cot items. Finally, an ontology framework that provides a detailed information requirements in developing BIM model for cost management purpose is proposed.

3. Research Proposed Objectives

Examine the existing building measurement standards to classify building sections and the related construction cost items under a specific terms.

Identify the complete information requirements for cost management process, in order to figure out what informations should the BIM model provides.

Create an ontology framework of the proposed concepts for BIM model development that could be applied generally.

Create a BIM model which ables to satisfy the information requirements from ontology framework.

Use a case study to verify the process that ontology framework analysis could provide a complete and detailed information requirements for the development of BIM model under cost management purpose.

4. Research Procedure

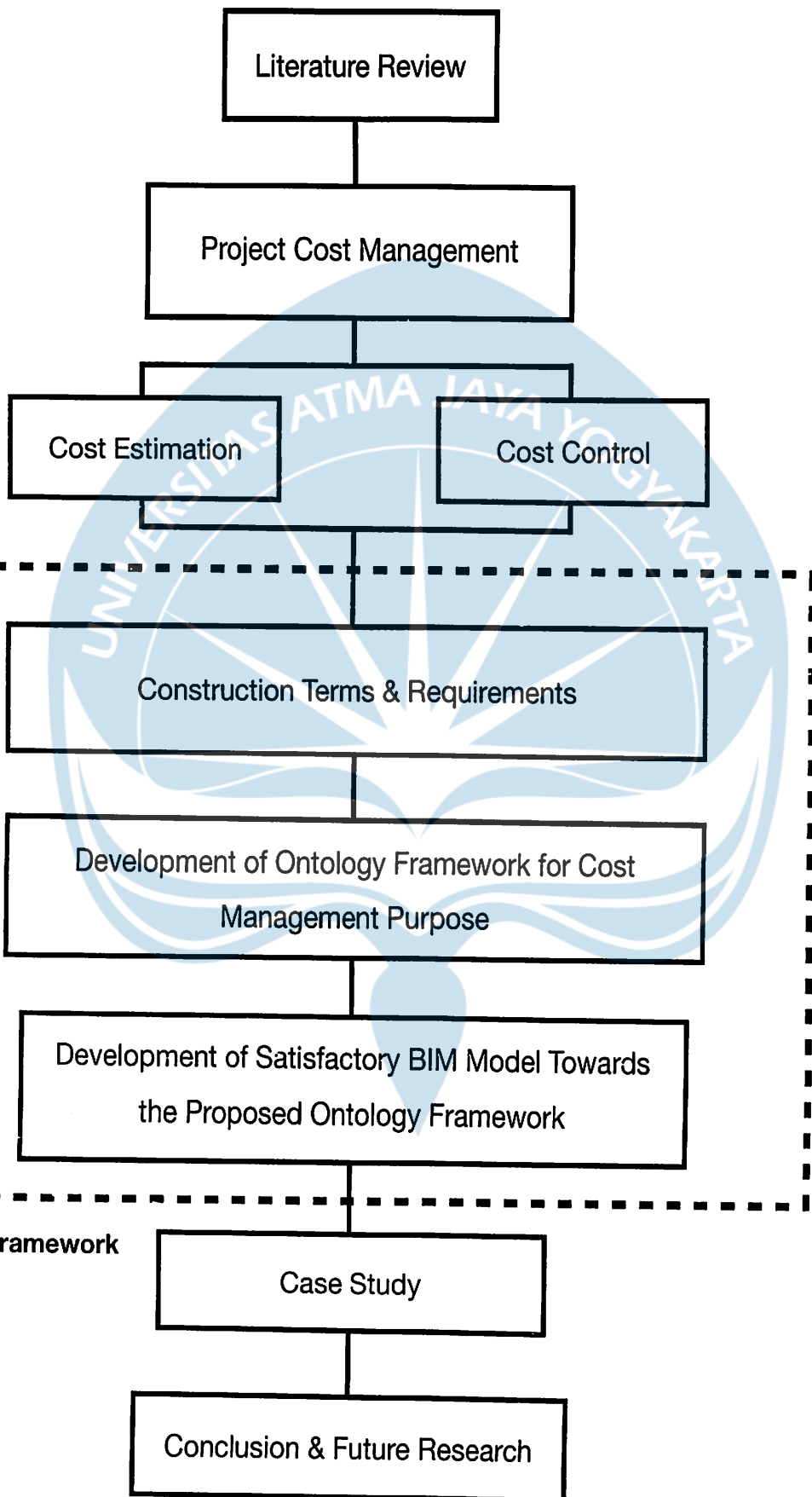
Upon the development of this research, literature review is carried out to explain the concept of cost management in construction project. Later, the breakdown of cost estimation and cost control process is described to understand the terms and requirements of each process.

Several standards and guidance which refracts cost management during construction process is studied to compose an ontology concept for cost management. An ontology software based on semantic web is utilized to build the ontology framework because it could commodate the wide usage of different construction projects.

The BIM development process is explained on how it should provide the required formations. All of the specified requirements within the ontology framework has to be filled by the BIM model in an accurate terms.

In order to verify the proposed ontology framework for developing BIM model, a small scale case study is presented. Finally, a conclusion from the result is drawn and idea for further research is proposed.

Research Procedure



1.5. Research Organization

This research contains 5 chapters as listed below:

- Chapter 1 Introduction, consisted of background and overview, motivation, objectives and research procedure.
- Chapter 2 Literature Review, covering review of researches about construction cost management, BIM roles in cost management and ontology implementation in construction industry. From this review, research idea is proposed to fill the gap between the topics discussed
- Chapter 3 Methodology, describes the development of ontology framework and BIM model so that every required information for construction project management could be satisfied from the model.
- Chapter 4 Results and Verifications, present a small case study covering concrete super structure sections of a 2 story office building in Indonesia. The developed ontology framework will be used upon developing and analyzing the BIM model to provide satisfactory information for cost management purpose.
- Chapter 5 Conclusion and Further Research, consisted of research conclusion and ideas for future research.