CHAPTER 1

INTRODUCTION

1.1 Introduction to the Problem

Construction projects are intricate, time-consuming undertakings. The total development of a project normally consists of several phases requiring a diverse range of specialized services. A number of financial considerations dictate the earliest possible completion date for many construction projects. Traditionally, field construction is not begun until the architect-engineer has completed and finalized the design. This sequence is still predominant in the industry and is referred to as the design-bid-build procedure. It is possible to reduce the total design-bid-build time required for some projects by starting the construction before complete design of the entire project has been accomplished.

The construction process is subject to the influence of highly variable and sometimes unpredictable factors. The construction team, which includes architects, engineers, building tradesmen, subcontractors, material dealers, and others change from one job to the next. All the complexities inherent in different construction sites, such as subsoil conditions, surface topography, weather, transportation, material

supply, utilities and services, local subcontractors, labor conditions and available technologies are an innate part of construction.

As a result, construction project performance needs to be measured. Measurements of performance provide management with invaluable feedback to guide daily decision making. And by regularly using such feedback, management becomes more competent. Measurements help turn even average managers into exemplary performers merely by supplying them with better information. Every contractor wants to have measurements of performance improvement and to know how much was spent to achieve the work. But the problem is how to measure and improve the performance. They want to improve jobsite performance. In other words, judgement of jobsite performance is not only on what was accomplished but also on how it was done and at what cost. On-time completion means that the job finished as it was scheduled. Within budget means no cost overruns.

However, measurements of schedule and budget offer too little information for day-to-day project management. They do not tell us where the problems lie and they do not point us toward solutions. Time and budget measurements frequently come too late to guide daily management decision making. They are better-suited as gross measurements of a completed job. On-site management needs more refined measurements for job control, measurements that provide timely feedback concerning current performance.

In the era of globalization, most of the project managers encounter difficulties to predict the performance of DBB project. They need the skills to evaluate the factors that affect DBB project success. This has prompt to the need for computerization of the analysis for the ease of project managers. The management team needs a means to determine the strategy and level of management controls to achieve a good project performance. As a result, the project managers are asking for software modelling to evaluate and analyze the different factors in the project. There

is possibility that construction project performance in Malaysia could be measured by an ANN model.

Under this circumstance, there is an urgent need to study, analyze and investigate into the prevailing conditions with a view to identify the factors and formulate solutions and, if required, to carry out extensive researches to upgrade and improve the project performance evaluation by ANN approaches. From the developed model, the project managers can evaluate their project performance easily and accurately. This study is important because project coordinators and their members will know the important variable that they must pay closer attention to, in order that their DBB projects can be completed according to schedule. It is anticipated that the findings reported in this study could be important for future strategies and guidelines for measuring construction project performance in Malaysia.

1.2 Objectives

The objectives of this research are stated as follow:

i. To identify factors that affecting the project performance.
ii. To determine the degree of importance for each of the respective factors.
iii. To develop a model based on Artificial Neural Networks (ANN) to predict the performance of design-bid-build (DBB) projects from the time aspect.

1.3 Scopes of Work

The scopes of work for this research are as shown:

i. Focus on the traditional project delivery system, which refer to Design-bid-build (DBB) projects.
ii. Emphasis on the model development using Artificial Neural Network (ANN).
iii. Study on the project performance according to time.

1.4 Project Methodology

The methodology of the project consists of seven steps, as shown below (Refer to Figure 4.1):

1. Gather information from internet, reference books, and journals.
2. Literature review on the factors affecting project performance.
3. Preliminary interview with several project managers to identify the most important variable among time, cost and quality.
4. Identify the most important factors from the aspect of project managers over the 44 factors thru Questionnaire Survey.
5. Develop the prediction model using Artificial Neural Network.
6. Test and validate the model using Mean Square Error (MSE) Method.
7. Conclusion and Recommendations.

1.5   Significance of Findings

This study had identified fourty-four factors that affect the project performance and determine the project success. The factors affecting project success are categorized into attributes relating to the project characteristic, project procedures, project management actions, project participants, and external environment. The degree of importance for each of the respective factors had been determined.

As project success can be measured in terms of time, cost and quality, this study focuses only on time that governs construction project performance. Based on data obtained from contractors and developers on their projects, a neural network-based project performance evaluation model that fits the observed data is developed. It is used to predict the performance of design-bid-build (DBB) projects from the time aspect. It will provide the project management team a means to determine the strategy and level of management controls it should provide in order to achieve a good project performance. The model is also used to evaluate the effects in the trade-off of different levels of inputs. Through an iterative process, the neural network is able to learn from a subset of the knowledge domain represented by case examples and draw its own pattern of relationships.

1.6   Report Structure

This report consists of seven chapters which gives a better understanding about the propose title, project progress and the achievement of the project. The seven chapters are:

1. Chapter 1: *Introduction* gives the overall view on the project including the objective, scope and project methodology of the thesis.

2. Chapter 2: *Overviews of Artificial Neural Network (ANN)* gives the overall view of ANN definition, principles, models and its application.

3. Chapter 3: *Construction Project and its Performance Measurements* describe the DBB projects, its current practice and concepts in detail.

4. Chapter 4: *Research Methodology* describes the methods used in this research.

5. Chapter 5: *Questionnaire Survey Analysis* shows the results of interviews and questionnaire survey conducted, together with the related analysis and discussion.

6. Chapter 6: *Development of ANN Prediction Model* discusses the programming tools used in developing the prediction model. The ANN model will be developed using SPSS: Neuron Connection. The interfaces in prediction model will be shown in this chapter.

7. Chapter 7: *Conclusions and Future Recommendations* conclude the overall works and activities of this research. Recommendations for further work are briefly discussed.

1.7   Summary

This chapter covered the introduction to the problem of construction project performance that has prompted to this study. Furthermore it states the objectives, scopes, methodologies used. It continues with the significance of findings, and explains the report structure. The whole project is based on developing a prediction model using ANN. The developed model will be organized in appropriate forms and interfaces for easy access for the user and will systematically carry out a procedural analysis.