PRODUCTIVITY RATE OF ROOF WORKS FOR JKR SCHOOL PROJECT SCHEDULING

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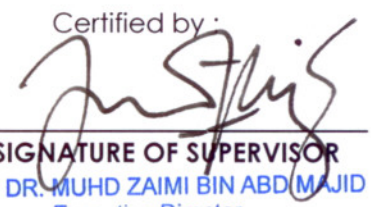

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PRODUCTIVITY RATE OF ROOF WORKS FOR JKR SCHOOL PROJECT SCHEDULING

ZURAIDA ZAINI RIJAL

A capstone project report submitted in partial fulfilment of the
requirements for the award of the degree of
Master of Project Management

Faculty of Civil Engineering
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DECEMBER 2010

I declare that this capstone project report entitled *"Productivity Rate Of Roof Works For JKR School Project Scheduling"* is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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Special dedicated to my beloved husband, my lovely parents and friends for their never ending love and support.

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ABSTRACT

Productivity rate for the local construction industry has been established for the utilization of the industry players. Similarly JKR or Public Work Department, as the largest implementer agency for government projects, the current practice of approving the schedule of works submitted by contractors are mostly based on the engineers estimate and past experience. Until now, there are no reference and standard guidelines for reviewing and checking the work program submitted by the contractors. The objectives of the study is to identify the factors influence the productivity rate of roof works and to establish a reference of productivity rate for roofing works focusing on school project. Those factors can be established through a series of statistical analysis based on the data which were collected from questionnaire survey and preliminary interview from the experts. From the findings, the factors that influence the productivity rate were established such as weather, working in confined space, poor sequencing of works and etc. While the established typical productivity rate for roof works were the installation of cold form roof trusses with insulation, installation of concrete roof tiles, installation of fascia board and etc. Finally, this productivity rate will be using as a guide for improving JKR school project scheduling.

.

ABSTRAK

Kadar produktiviti untuk industri pembinaan di Malaysia telah dihasilkan untuk kegunaan pihak-pihak yang terlibat di dalam industri ini. Begitu juga dengan JKR atau Jabatan Kerja Raya, sebagai agensi perlaksana utama bagi projek-projek kerajaan, amalan kebiasaan dalam menyemak dan meluluskan jadual perlaksanaan projek yang telah dikemukakan oleh kontraktor, kebanyakanya adalah berdasarkan kepada anggaran jurutera tersebut dan pengalaman mereka dalam bidang ini. Sehingga kini, tiada sebarang rujukan dan panduan di dalam meneliti dan menyemak tempoh perlaksanaan dan penggunaan sumber-sumber pembinaan bagi setiap aktiviti di dalam program kerja kontraktor. Objektif kajian ini adalah untuk mengenalpasti faktor-faktor yang mempengaruhi dan mewujudkan satu panduan bagi kadar produktiviti untuk kerja-kerja bumbung terutamanya bagi projek-projek sekolah.. Faktor-faktor berkenaan boleh diperolehi melalui beberapa siri analisa statistik yang berdasarkan data-data yang telah dikumpulkan dari soal selidik dan temuramah dengan pakar. Faktor-faktor yang mempengaruhi kadar produktiviti yang telah diperolehi dari kajian ini adalah seperti cuaca, kerja di dalam ruangan yang terhad, lemah dalam mengatur kerja dan sebagainya. Manakala pengwujudan kadar produktiviti tipikal bagi kerja-kerja bumbung yang terlibat adalah seperti pemasangan kekuda bumbung keluli beserta penebat bumbung, pemasangan genting bumbung, pemasangan *fascia* bumbung dan sebagainya. Akhir sekali, kadar produktiviti tersebut akan digunakan sebagai panduan bagi menambah baik jadual perlaksanaan projek sekolah JKR.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Introduction

Managing construction projects always requires constant monitoring of project performance and the updating on project schedule. Project performance data and productivity data from the construction field is a key role in evaluating and predicting project performance in term of cost and schedule. According to Motwani et al. (1995), the productivity in construction has always been very difficult to measure and control. Even though, productivity in construction hard to measure, there is a need to use it for timely decisions and reduce the negative impacts on cost and schedule. Therefore, the integration of historical productivity data with the on-going performance data in construction field are required (Hwang and Liu, 2005).

Hwang and Liu, (2009) presented that an accurate productivity prediction is important for managing construction projects. In fact, a construction project is commonly to be successful when it is delivering within its budget and timeline. The planning and control process also explains the importance of accurate productivity

estimate which first, estimating time and cost of construction activities that inevitably requires productivity estimates (Hinze, 1998), and second, integrated management of time and cost must involved productivity factor (Dawood and Molson, 1997).

The reduction of productivity in construction industry during the past decade has led to the recognition that the better ways of measuring construction productivity are needed. Quantifying both current performance and the effects of changed method or condition are probably prerequisite to improve measurement of productivity. The productivity data will require by construction project manager to guide their efforts and need by the owner especially to know how effective their project is being managed (BRT, 1985).

There are most previous studies focusing on defining factors influence productivity and measuring limited parts of activities at micro level to investigate the relationship between factors and productivity. A standard construction productivity system that more reliable is a critical element in construction productivity performance evaluation and improvement process. There is a need of tool to drive performance improvement through internal and external benchmarking. Park, et al., (2005) present that nowadays, demand from the construction industry on developing acceptable construction productivity and standardized productivity data are the main issues to focus by the industry players and researches.

According to Tavakoli, (1990), productivity rates are subjective or a matter of experience, as well as easy to obtain from available publication that provide such information. It should be reflect the immediate environment surrounding the user. Only then, the productivity data closely approximately prevailing local construction condition such as labor productivity, contractor's efficiency, weather, material lead times and so on.

1.2 Background

Productivity was significant in construction industry and has profound impact on projects that depend on time and cost of the construction operation. Furthermore, time and cost estimates are derived from productivity. Thus, to make the plan and control of the construction operation more effectively, an accurate prediction of productivity is essential (Hwang and Liu, 2009).

Many have expressed concern about productivity in construction industry. Perceptions of productivity trends are vary widely within academia and construction industry. Currently, perception of those in industry has not been well quantified (Goodrum, et al., 1999). In U.S. economy, construction labor productivity remains least understood factors. Regard on that matter, Bureau Labor Statistic (BLS) maintains productivity indices for all significant sector of economy including the construction sector (BLS, 2010).

Despite the productivity is significance, the accuracy of its estimate remain low. Based on previous study, similar deviation was observed in historical productivity where the data was collected. High degree of deviation is attributable to nature of the budget estimates which is normally are prepared at the planning stage with limited information about the activities and involve many assumption activities. An accuracy of initial estimates is important where it is equally or even more critical to predict productivity continually in a proactive manner in order to effectively plan and control performance of construction operation. In fact, to forecast and update construction productivity continually and proactively during construction, engineers need to observed current operations, collect data those associated with the operations and analyze data (Hwang and Liu, 2009).

Malaysian construction industry is generally separated into two areas. First area is general construction which is comprises civil engineering construction, residential construction and non-residential construction. The second area is a special trade works, which is comprises activities of glass work, tiling and flooring work, carpentry, painting work, sewerage and sanitary work, refrigeration and air-conditioning work, plumbing, electrical works and metal works (Abdul Razak, et al., 2010). Since Malaysia is in the process of industrialization, the construction industry is important because it provides economy and social infrastructure for industrial production and reproduction. In fact, Malaysia Government has realized the important of building up the construction sector to benefit other sector along the way.

In recent years, the construction industry becomes slowdown because of decline in the number of large-scale infrastructure projects. According to Pratt (2000), a construction and project management consultant (PMC) in Malaysia since 1962, has mentioned that Malaysian projects in last decade especially the magnificent monuments were not cost and function effective. He also highlight that in certain cases the budget was exceeded, projected completion date were not achieve and the quality was not always up to expectation.

The Construction Industry Development Board (CIDB) was highlighted that Malaysia construction industry problems such as low quality, low productivity, poor image, economic volatility, delays, shortage of manpower, lack of data and information are key contribution to the unsuccessful of project in Malaysia. The low productivity in the industry means there is attribute to low technology usage, poor project and site management, unskilled labor, high-input cost and duration estimate, shortage of construction manpower, high –construction wastage, poor maintenance, non conducive and accident prone environment (CIDB Master Plan OSHA, 2004). Consider to those problems, the CIDB in collaboration with Building Industry President Council held a roundtable discussion in June 2003 with presidents and chief

executive officers of Malaysian construction industry. The discussion was establishing priorities to improve the Malaysian construction industry for future. Ten priorities and recommendation for improvement was identified where productivity and quality were parts of it (Abdul Razak, et al., 2010).

Even though, there are many companies have developed their own productivity tracking system based on their experiences and accounting system, they prefer to use internally and not for outsiders due to competition in getting the contracts. In fact, none of previous researchers have successful in establishing common definitions and developing a survey tool that collects standard productivity data at the appropriate levels (Park, et al., 2005). Similarly JKR, as the largest implementers' of government projects, the current practice of approving the schedule of works that submitted by contractors are mostly based on the engineers estimate/opinion and past experience. There is no standard reference to review and check the duration and resources allocation in each activity in contractor's work program.

As an effort, this paper was initiated to develop a productivity rate for roofing works as a standard reference or guides for improving JKR projects scheduling.

1.3 Problem Statement

As the main technical agencies for the Government of Malaysia, Public Work Department (PWD) or Jabatan Kerja Raya (JKR) entrusted to implement development projects throughout the country. It is the goal of JKR to ensure that the organization is run efficiently and effectively in order to achieve the vision, mission and objectives of

the department. JKR is responsible to ensure that all the projects must be approximately implemented, complete on time, within the budget and provide quality products. In 9th Malaysian Plan (RMK 9), most of JKR projects cannot be delivering on time. For example, about 41% of projects in JKR Wilayah Persekutuan Kuala Lumpur cannot be delivering on time which is most of it are due to wrongly estimate the duration of the construction activities in project scheduling. It is also regarding to lack of competency of JKR officers in reviewing and giving advice to contractors especially in preparing realistic project's work program. This problem can be categorized as serious matter and give high impact to the overall performance of JKR due to unsatisfaction of client with JKR's reputation. As the biggest technical government agency, there should be a way to solve the problem so that it will improve JKR image and give high reputation to the clients.

Nowadays, JKR has started to develop main Scheduling Office Department at the head office level with intention to avoid the problem continues to occur. The main purpose of this Scheduling Office Department is to develop a standard/guideline for all JKR officers at states and districts level as a reference especially in reviewing and monitoring the JKR projects scheduling. It is important to all JKR officers to have a clear and same understanding about project scheduling. The functions of this Scheduling Office Department are as below:

a) to ensure compliance to standard/guideline

b) to facilitate review work program for approval

c) to facilitate integration of SKALA S-Curve with work program

d) as referral centre for work program development (issues management)

e) as repository centre for work program data and project information

Refer to function (e), this paper was initiated to support JKR Scheduling Office Department to establish the productivity rate of roofing works for the building projects scheduling. There should be a standard productivity rate of each activity in the project in order to guide the contractor and the JKR supervision team to plan and implement the projects successfully. Therefore, the study on productivity rate of roof works for building project scheduling as an effort and starting point to establish the standard productivity rate of project activities for JKR's projects.

In fact, this study is consistent with JKR strategies and action plan in achieving Effective Implementation of Malaysia 5 – Years Plan especially to ensure that projects are implemented through appropriate implementation methodologies to meet customer needs and outcomes. One of the action plans stated in JKR Strategic Framework is to establish effective project performance tracking system which is JKR must analyzing all data that related to the project in order to improve JKR project implementation (JKR, 2007).

1.4 Aim and Objectives

The aim of this study is to establish the productivity rate of roof works for JKR building projects scheduling. In order to achieve this, the following are the objectives of the study:

a) To identify the factors that influence the productivity of roof works;
b) To establish the relationship between influential factors and productivity of roof works; and
c) To establish productivity rate for roof works

1.5 Scope of Study

There are certain limitations to be follow to ensure that this study is completed within the time frame given. Firstly, this study only takes into consideration on all projects which implement in central region of Peninsular Malaysia i.e. projects in JKR Wilayah Persekutuan Kuala Lumpur and three (3) chosen districts in JKR Selangor.

Second, the sample for this study is concentrate only in school project that has been implemented by JKR in 9th Malaysian Plan. Since standard design was using in school projects, the area of roof is fixed. This given the standardization to estimate the productivity rate for roofing works referring to the floor area involved.

There are several components included in the roof works such as roof trusses, insulator and roof covering. Roof trusses in construction projects can be classified into several types such as timber roof trusses, hot rolled roof trusses, cold form roof trusses and etc. The third limitation of this study is only taking into consideration on the cold form roof trusses because most of the school projects are using this type of trusses. In addition, JKR already has a list of 22 names of cold form roof trusses suppliers which their design have been reviewed and approved by the JKR Structure Expert Division. This list is for the JKR officers in state and district office to choose for their projects especially school projects. Fourth, this study only takes into consideration concrete roof tiles including insulations as type of roof covering.

There are several activities involved in production of roof works:

a) Design - in term of area (m2);

b) Production - in term of size of trusses / per pieces / per day;

c) Delivery - in term of geographical location;

d) Installation - in term of per day / per area m2 / per trusses; and

e) Inspection

Based on the time given, this study will be more focused on activities that related to roof works installation at construction site.

1.6 Research Methodology

Research methodology is a framework for researcher on how a study is carried out, such as process of data collection, analyzing the finding and interpretation of observations. In general, research methodology consists of four main parts which are literature review, site observation, questionnaire and interview with experts. *Figure 1.1* illustrates the schematic of research methodology that partially has been implemented for this study in order to achieve the determined objectives. The research methodology for this study consists of four distinct phases, which are phase 1, phase 2, phase 3 and phase 4 respectively. Generally, phase 1 involves determination of the objectives and scope of this study, literature review, preliminary site observation and preliminary interview. Phase 2, consists of the identification of all the factors that will influence to the productivity of roof works and observation on quantity of roof works/man hours. In the same time, there is interviewing session was carried out with the expert among contractors and suppliers of roofing materials in order to get the information on material, labor and equipment either the delay of those parts will affect the productivity of roof works. This method will make the designed questionnaire were supported by the real situation at site. The questionnaires was also

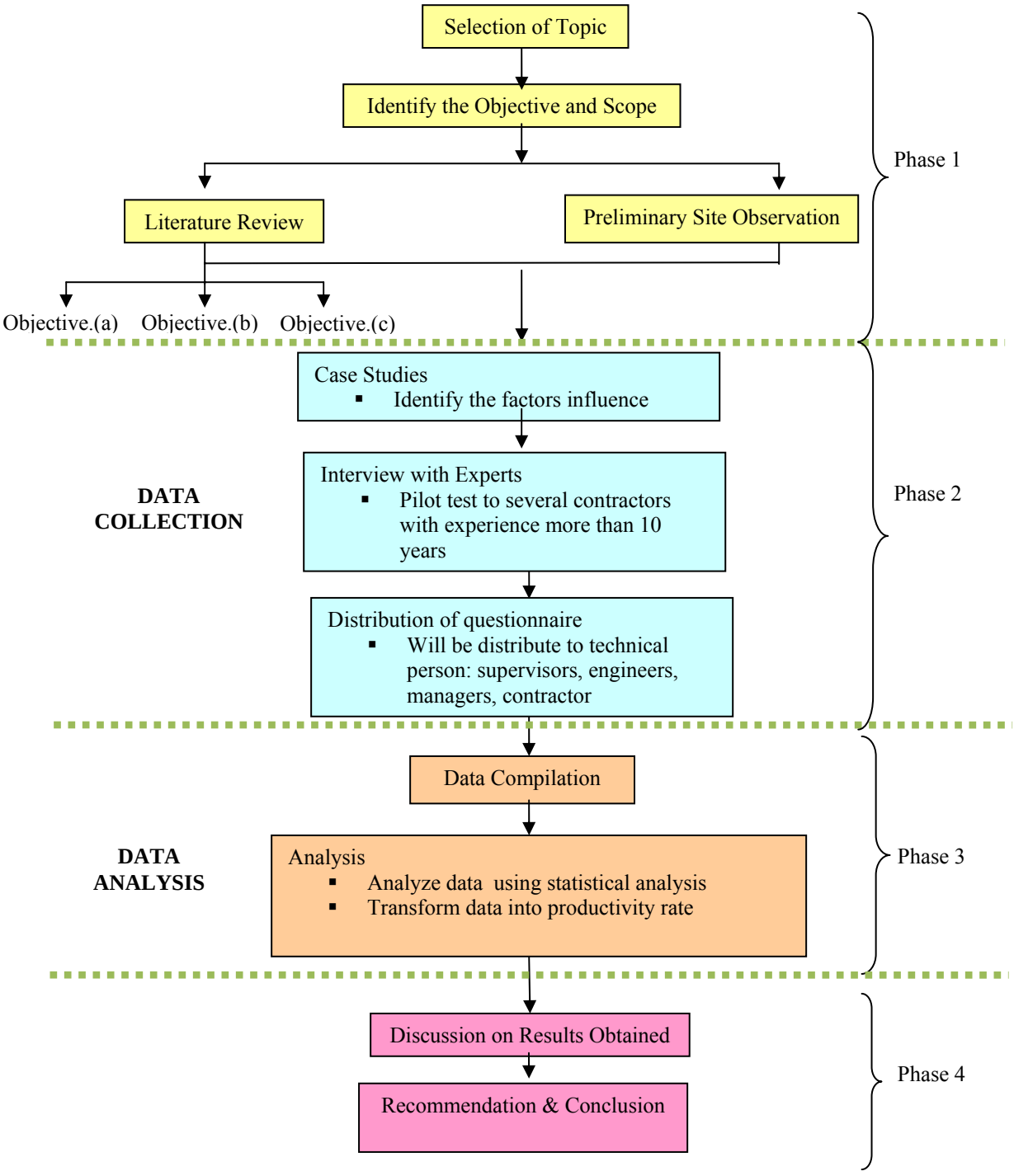

Figure 1.1: Schematic of Research Methodology