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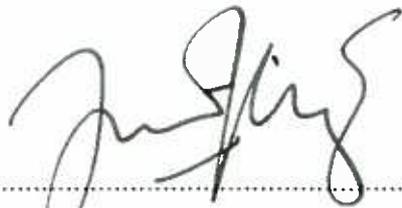
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Date

: 20 May 2011

**SCHEDULING SOFTWARE AS A TOOL FOR  
MONITORING AND CONTROLLING JKR PROJECT**

ZAINAL ABIDIN BIN SIN

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

Faculty of Civil Engineering  
Universiti Teknologi Malaysia

May, 2011

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To my lovely wife, sons and daughter

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## ABSTRACT

Monitoring and controlling project progress is an important role of a project manager. Knowing when and how to intervene underperform project is critical to the overall health of any organization. There are problem faced by many construction player in monitoring and controlling project which lead to low quality of works. Thus in order to enhance effectiveness of monitoring and controlling project, JKR has to use planning and scheduling software and identify the importance features to be incorporated. Even though JKR has implemented scheduling software in their projects but the monitoring and controlling still far from the expectation result. The focus of this study is to investigate scheduling software as an effective tool for monitoring and controlling project at JKR and limited to Microsoft Project software. This was due to the high of percentage of user for this software as compared to other software in JKR. The scope of the study includes identifying aspects of the important features in the software planning / scheduling of projects related to monitoring and controlling in JKR. It also includes an assessment of the effectiveness of these items that are available in Microsoft Project for project monitoring and controlling, further to establish project monitoring and controlling guideline for JKR practice. Data were collected using mixed method approach including document search, interview expert-panel and questionnaire survey to evaluate current practice of management and project team. Data were analyzed using Statistical Package for Social Science (SPSS). Conclusion from this study, level of competency of user just grade “Good” and need more improvement. The finding of this study will facilitate JKR with monitoring and controlling guideline of the projects and the quality of products and services delivered to the client are perceived clients’ expectation and satisfaction.

## ABSTRAK

Pemantauan dan kawalan kemajuan projek adalah perkara yang penting dalam peranan seorang pengurus. Mengetahui bila dan bagaimana projek mengalami masalah adalah factor kritikan tentang prestasi sesebuah organisasi. Banyak masalah yang dihadapi oleh mereka yang terlibat dengan pembinaan adalah disebabkan pemantauan dan kawalan dan mengakibatkan kualiti pembinaan yang rendah. Oleh itu dalam meningkatkan keberkesanan pemantauan dan kawalan projek, JKR telah menggunakan kaedah pengurusan projek dengan penggunaan perisian pengurusan projek dan mengenalpasti ciri-ciri yang khusus untuk pemantauan dan kawalan projek. Walaupun JKR telah melaksanakan pemantauan dan kawalan projek menggunakan perisaian yang berkaitan dalam projek mereka tetapi pemantauan dan kawalan masih jauh dari hasil yang diharapkan. Fokus kajian ini adalah untuk mengenalpasti perisian pengurusan projek sebagai alat yang efektif untuk pemantauan dan kawalan projek di JKR dan khusus pada perisian Microsoft Project. Ini adalah kerana peratusan pengguna perisian ini lebih tinggi berbanding perisian lain di JKR. Skop kajian adalah mengenalpasti aspek dari ciri-ciri penting dalam perisian yang berkaitan dengan pemantauan dan kawalan projek di JKR. Ia juga merangkumi kajian keberkesanan ciri-ciri tersebut yang terdapat di dalam Microsoft Office Project khas untuk pemantauan projek dan kawalan, dan seterusnya mencadangkan kaedah berkesan untuk amalan JKR. Maklumat dikumpulkan dengan menggunakan kaedah pendekatan campuran termasuk carian dokumen, wawancara pakar-panel dan tinjauan kaji selidik untuk menilai amalan semasa pengurusan projek. Data-data yang dikumpulkan dianalisa menggunakan perisian Statistic Package for Social Science (SPSS) dengan analisa dilakukan pada analisa kekerapan, indeks purata dan Kruskal Wallis. Kesimpulan dari kajian ini, adalah mendapati kecekapan pengguna hanya kelas "Baik" dan memerlukan peningkatan terhadap pengetahuan mengenai perisian ini. Keputusan kajian ini juga membolehkan pihak JKR membuat strategi pemantauan dan kawalan projek dan kualiti produk dan perkhidmatan yang diberikan kepada pelanggan dan ianya akan mencapai tahap kepuasan yang diharapkan.

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## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Introduction**

Nowadays, scheduling software has been extensively being developed and applied in construction industry; the successful realisation of a project depends greatly on careful and continuous planning, monitoring and controlling. The activities of designers, manufacturers, supplier, contractors, and all their resources must be organised and integrated to meet the objectives set by client or contractor. In most cases, the programme will form the basic plan. Sequence activities will be defined and linked on a time-scale to ensure that priorities are identified and that efficient use is made of expensive or scarce resources. According to Partovi (1993), the scheduling process consist of seven steps as follow; establishing a precedence relationship between activities, constructing the network, evaluating the activities' duration, performing forward and backward calculations to determine the time schedule of each activity, project duration and identifying the critical path.

The purpose of scheduling is to plan, monitor, and control the timely execution of the work, from the day the project commences through each of its phases to successful completion. This dynamic nature of a project execution plan is best served by a tool that allows modelling of the plan and analysis of the impact of progress and unforeseen developments. The key to project success is to apply knowledge, experience, and instincts to a project plan, and then attempt to execute according to the plan. Important objectives of scheduling include project planning and strategic

analysis, early detection, and resolution of execution problems to prevent, minimize and/or mitigate the impact of schedule problems on the completion of the project. A project is a temporary endeavour which has a definite beginning and a definite end. It's a set of interrelated activities to achieve a specific goal, within a specific timeframe and to create a unique product or service.

According to A Guide to the Project Management Book of Knowledge Third Edition PMBOK® Guide, areas of expertise of knowledge and skills for effective project monitoring and controlling are application on area of knowledge, standard and regulation, understanding the project environment, general management knowledge and skills and interpersonal skills. The monitoring and controlling of project should cover all the stages of project life cycle; planning, design, procurement, construction and handing over.

## **1.2 Background**

Jabatan Kerja Raya (JKR) is a technical government department that has been entrusted with constructing and maintaining public infrastructure in Malaysia. It was formed in 1872 as the technical advisor to the Government (JKR Strategic Frameworks, 2007). Projects implemented by JKR include government buildings, roads, airports, maritime and ports. According to JKR Strategic Frameworks (2007), JKR's vision is to become a world class service provider and centre of excellence in asset management, project management and engineering services for the development of nation's infrastructure through creative and innovative human capital and state of the technology of art.

Based on JKR Strategy Map 2006 - 2020 (JKR Strategic Frameworks, 2007), JKR has to leverage on ICT to enhance its project delivery system. In managing projects, JKR is involved in the planning, designing, procurement, implementing and monitoring aspects of the projects. In any project implementation, JKR has to

balance the time, resources, cost and quality factors of the project according to JKR's standard quality and its clients' needs (JKR Quality Manual, 2009). During 9<sup>th</sup> Malaysian Plan, JKR has been given the authority by the Malaysian Government to implement 6,116 projects that amounted to RM42.906 billion (JKR Strategic Frameworks, 2007).

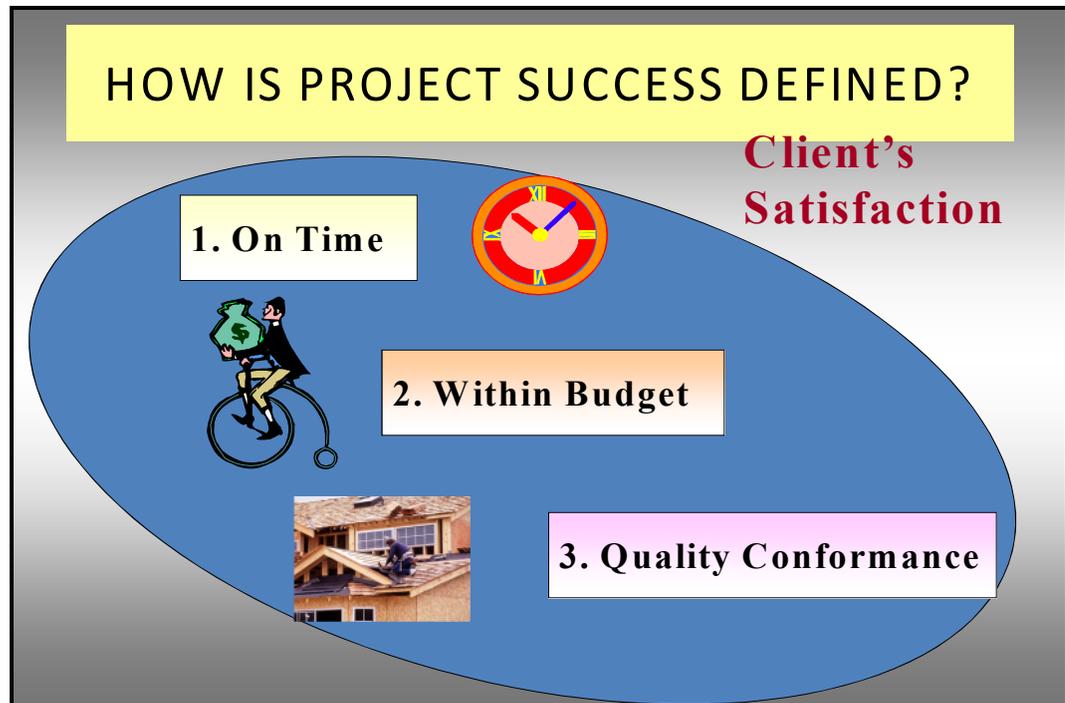
Since JKR is committed to deliver its projects to the clients as stated in its core business objectives in term of time, cost and quality, it needs comprehensive monitoring tools to help the organisation to control its projects effectively and efficiently. The reports produced are very critical for fast decision and policies making to overcome the problems occurred during projects' implementation. Currently, JKR is using a number of systems or applications to execute or monitor its projects. The systems or applications are based on variety of software ranging from commercial software such as Microsoft Office Project or Primavera Project Planning (P3e) to in-house development of software's applications, SKALA.

For the purpose of monitoring and controlling project, JKR has decided that the item on implementing the Critical Path Method (CPM) programme for planning of resources and progress of work as specified that contractor shall provide software for JKR which to be retained by JKR after the completion of the project. The software to be utilized is the latest version of Microsoft Office Project for the projects costing less than RM50 million and Primavera Project Planning (P3e) for projects costing more than RM50 million.

### **1.3 Problem Statement**

Since JKR has obtained MS ISO certificate in Jun 2000, the quality of products and services delivered to the client are perceived as far from clients' expectation and satisfied. In the 9<sup>th</sup> Malaysia Plan, JKR is supposed to deliver 6,116 projects that amounted RM42.906 billion to the various clients' departments. From that number of projects, 631 projects didn't meet the client expectation and satisfaction. The

successful of project is defined by complete on time within budget allocation and achieve quality conformance as shown in figure 1.1.



**Figure 1.1:** Definition of project success in the client perspective

Monitoring and controlling consists of those processes performed to observe project execution so that potential problems can be identified early and corrective actions can be taken, when necessary, to control the execution of the project. The key benefit of this process is that project performance is observed and measured regularly to identify variances from the project management plan. This process also includes controlling changes and recommending preventive action in anticipation of possible problems.

Monitoring the ongoing project activities against the project management plan and the project performance baseline influencing the factors that could circumvent integrated change control so only approved changes are implemented. Monitoring provides the project team insight into the health of the project and highlights any areas that require additional attention. When variances jeopardize the project

objectives, appropriate project management processes within planning process are revisited as part of the modified plan-do-check-act cycle.

#### **1.4 The Aim and Objectives of the Study**

The aim of this study is to investigate scheduling software as a tool for monitoring and controlling JKR projects. The objectives of this study presented in this report are as follows:

- (i) To identify the knowledge or competency level of user, using of Microsoft Office Project for monitoring and controlling projects within JKR;
- (ii) To identify the appropriate features in scheduling software which are relevant for monitoring and controlling projects; and
- (iii) To suggest improvement of users' competency

#### **1.5 Scope of the Study**

There are two types of project, conventional and design and built will be considered for this study and focusing on Microsoft Office Project software. This software was chosen because of percentage of users are higher as compared to other software and number of project less than RM50 million are more. Furthermore most document contract for projects costing less than RM50 million shall utilized Microsoft Office Project and any projects costing more than RM50 million shall utilized Primavera Project Planning (P3e). However, most of JKR personnel preferred to use Microsoft Office Project since they are familiar to it and user-friendly as compared to Primavera Project Planning (P3e). There is statement regarding the usage of scheduling software in document contract as shown in Figure 1.2.

<p><b>1.2.6.4 Works Programme</b></p> <p><b>Unit</b></p> <p>The unit of measurement for implementing the Works Programme using the Critical Path Method (CPM) programme for planning, monitoring and control of resources and progress of works shall be Lump Sum.</p> <p><b>Measurement</b></p> <p>The measurement for payment shall be made in each interim payment in proportion of the total period lapsed to the Contract Period (excluding Defects Liability Period).</p> <p><b>Item Coverage</b></p> <p>(a) item on implementing the CPM programme for planning of resources and progress of work as specified in Appendix 'IG' of the Specification and should include:</p> <ul style="list-style-type: none"> <li>(i) trained and qualified personnel to maintain and update the programme;</li> <li>(ii) planning using the CPM programme;</li> <li>(iii) providing software for JKR, which is to be retained by JKR after the completion of the project. The software to be utilized is <ul style="list-style-type: none"> <li>- the latest version of Microsoft Project 2000 or equivalent for projects costing less than RM50 million;</li> <li>- Primavera Project Planning (P3e) or equivalent for projects costing more than RM50 million</li> </ul> </li> </ul> <p>(b) carry out regular check of progress including updating all information and maintain the planned programme periodically or as and when instructed by the S.O.;</p> <p>(c) submission of the reports to JKR on computer medium and printed hard copies periodically or as and when instructed by the S.O.;</p> <p>(d) identification of critical path for the timely execution of the work to completion;</p> <p>(e) a detailed programme which would identify the requirements of every possible resources for the successful implementation of at least six (6) months of work for assisting everyone concern in planning their associated activities.</p>
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**Figure 1.2:** Statement in Document Contract

The scope of the study is to identify aspects of appropriate features in the software planning / scheduling of projects related to monitoring and control. It also includes an assessment of the effectiveness of these items are available in Microsoft Office Project for project monitoring and control.

## 1.6 Research Methodology

The methodology used for this research comprises three phases as shown in Figure 1.3. Generally, phase 1 consists of problem statement, aim and objectives of this study and literature review. In phase 2, data was collected through survey questionnaires. Survey questionnaires were designed based on various aspects and factors identified from literature review. The objectives of survey questionnaire are:

- (i) To identify the knowledge or competency level of user using Microsoft Office Project for monitoring and controlling projects within JKR;
- (ii) To identify the appropriate features in scheduling software which are relevant for monitoring and controlling projects; and
- (iii) To suggestion the improvement of users' competency.

The survey's respondents were selected randomly from JKR project team members such as Head of Project Teams, Head of Design Teams, Project Site Office and District Engineer (JD) who were involved in project management

After data was collected, analysed and concluded in Phase 3. Details of research methodology and processes involved in each phase are further discussed in Chapter 4.

## **1.7 Summary of Chapters**

This Chapter is an overview of the study which includes the introduction of the topic, problem statement, aim and objectives of the study. It also briefly discusses on the research methodology.

In summary, the aim of this study was to identify the appropriate features in Microsoft Office Project for monitoring and controlling projects. The aim of this study can be achieved through the following objectives:

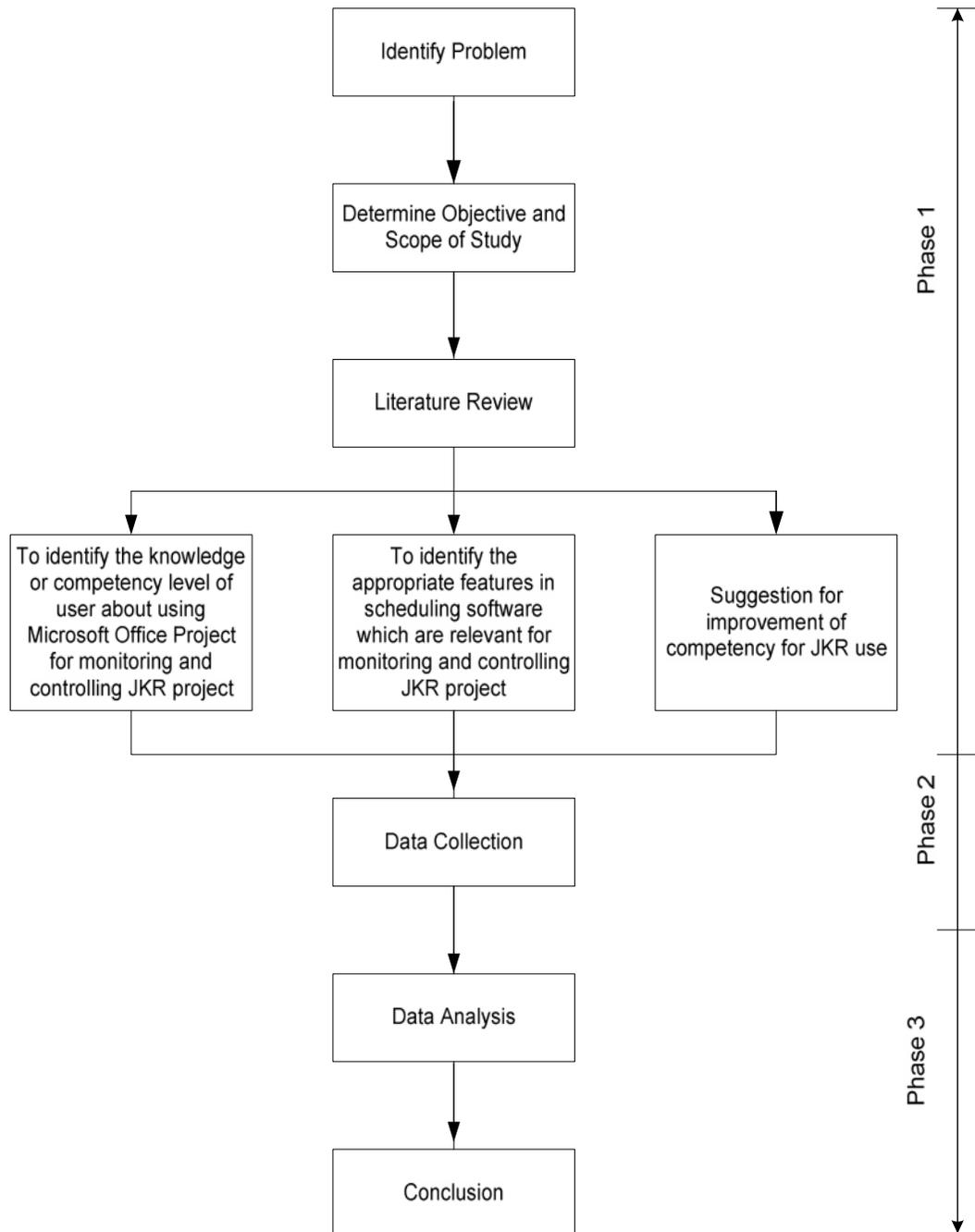
- (i) To identify the knowledge or competency level of user about using of Microsoft Office Project for monitoring and controlling projects within JKR;
- (ii) To identify the appropriate features in scheduling software which are relevant for monitoring and controlling projects; and

- (iii) Suggestion for improvement of competency for JKR use.

Chapter 2 and Chapter 3 will be discussed on the related literatures of scheduling software and its features for monitoring and controlling project and more focusing on Microsoft Office Project and will discuss on the monitoring and controlling project and relationship between them in order to make scheduling software as an effective tool for monitoring and controlling.

Chapter 4 will discuss and elaborate the research methodology for this study. It presented the three phases of conducting the research which are literature review, data collection and data analysis. Chapter 5 described the data collected and data analysis. The data were obtained from survey questionnaire and were analyzed by using statistical methods such as Frequency Analysis, Average Index and Kruskal Wallis. The purposes of statistical methods are to determine the frequency distribution, ranking in term of importance of factors and to examine if there is a significant difference among the respondent's groups.

Chapter 6 will emphasize on the findings of this study. All of these findings can be used for improvement of competency of JKR project team communication and Chapter 7 will conclude the study of scheduling software as an effective tool for monitoring and controlling JKR project.



**Figure 1.3.** Flow chart of Research Methodology