RESOURCE-DRIVEN SCHEDULING: BARRIERS TO IMPLEMENTATION

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A master's report submitted as a partial fulfilment of
the requirement for the award of degree of
Master of Science (Construction Management)

Faculty Of Civil Engineering
University Teknologi Malaysia

OCTOBER, 2005

ABSTRACT

Resource-driven scheduling techniques focus on resource. Their objective is to schedule activities so that a project deadline is met using predefined resource availability limits. This research was carried out to investigate the method of project scheduling being adopted in the construction industry, the status, factors affecting and barriers to implementation of resource-driven scheduling implementation in Malaysian construction industry. Survey was conducted to determine the level of resource-driven scheduling and factors affecting the concerned implementation. Construction Firms registered under G7 (A Class), G6 (B class) and G5 (C class) were used in the investigation. It is significant 59.6 percent firms are implementing resource-driven scheduling partially. The methods of project scheduling and resource options adopted were also investigated. A significant majority of construction firms (approximately 65%) adopted Microsoft project for scheduling. The research also focused on the barriers to implementation of resource-driven scheduling in construction projects. Lack of knowledge, no training session, budget allocation and uncertainty value were found very significant barriers.

ABSTRAK

Teknik jadual kerja berasaskan sumber (Resource-driven Scheduling) memberi fokus kepada penjadualan kerja. Objektif utama penjadualan kerja adalah untuk menyelaraskan aktiviti dan menyiapkan projek dengan menggunakan sumber pada had ditetapkan. Kajian ini di jalankan bertujuan untuk mengenalpasti kaedah penjadualan kerja yang digunapakai di dalam industri pembinaan, status penggunaannya, dan juga faktor-faktor halangan kepada implimentasi kaedah penjadualan kerja berasaskan sumber di dalam industri pembinaan di Malaysia. Tinjauan telah di laksanakan untuk mengenalpasti peringkat pengunaan teknik jadual kerja berasaskan sumber (resource-driven scheduling) dan faktor yang mempengaruhi penggunaan teknik tersebut. Kajian ke atas syarikat pembinaan yang berdaftar di dalam kelas G7 (Kelas A), G6 (Kelas B), dan G5 (Kelas C) di gunakan untuk tujuan ini. Hasil dari kajian menunjukan bahawa 59.6 peratus daripada keseluruhan syarikat telah mengunapakai teknik jadual kerja berasaskan sumber secara tidak menyeluruh. Kajian juga telah dijalankan untuk mengenalpasti kaedah pengunaan penjadualan kerja dan pilihan sumber. Majoriti daripada syarikat pembinaan (dianggarkan sebanyak 65 peratus) mengunakan perisian 'Microsoft Project' untuk penjadualan. Fokus kajian juga bertumpu kepada halangan terhadap implimentasi penjadualan kerja berasaskan sumber (resource-driven scheduling). Faktor kurangnya pengetahuan terhadap perisian, tiada latihan, kekurangan peruntukan kewangan dan ketidak tentuan nilai merupakan halangan terpenting di dalam perlaksanaan penjadualan kerja berasaskan sumber.

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CHAPTER 1

INTRODUCTION

1.1   Introduction

Money is always of special importance to those involved in construction project and hence project completion within time limit is essential regardless of size and complexity of project. Each day of delay in the completion of time constitutes a loss in revenue that can hardly be recovered. Therefore, it is required that a detailed construction schedule be prepared and submitted by the contractor to the owner as a means of monitoring the work progress to ensure the project is completed on time and within budget.

The project schedule is in fact the road map to provide information regarding the project's timeline and measurement of progress. It is necessary that the project schedule be developed at the commencement of the project to ensure completion of the each phase of project in its stipulated period. Also prior and adequate arrangement for provision of resources of construction, such as type and quantity of material, manpower, machines and finance required at each stage of construction can be made as duration of activities depend on the availability of resources. Therefore, allocating resources into the schedule is necessary to determine whether or not there is sufficient supply of resources on hand to perform the work as planned. By comparing the availability of the desired resources against the quantity of labour, equipment, or material required to work the schedule, one is able to manage resource use in the schedule.

Scheduling also indicates the quantities of work and duration of various operations for which plant and equipment can be arranged in due time. It will help in arranging labour (skilled and unskilled) regarding the quantity and period for which they are required. Actual progress can be known and in cases of lagging behind it can be made fast by speeding up of the activities. Resource utilization is optimized and available resources can be directed towards various activities with advantage. Any change or modification made in original plans due to detection of errors in productivity, and delay due to weather and geological conditions can be properly evaluated and the program can be suitably amended.

The ultimate advantage of scheduling is that inter-relationship of various activities and relative importance of each activity at any stage of construction can be known which will help in fixing their priorities properly to execute work in an efficient manner without wastage of the inputs. This will result in gaining maximum possible construction economy.

Schedules can also be classified in order to make the project requirements easy from various aspects as follows:

i)   Construction Schedule
ii)   Material Schedule
iii)   Labour Schedule
iv)   Equipment Schedule
v)   Financial Schedule

1.1.1   Construction Schedule

Construction schedule is roaster prepared for the execution of different operations in the construction of a certain project. In this schedule the work is sub-divided into many sub-heads or operations. The quantity of each operation is calculated and time is allowed for its completion. The amount of work and rate of

completion of work making allowance for bad weather and other unforeseen circumstances, number of men required (both skilled and unskilled), and type of equipment needed and inter-relationship is calculated, the sequence of various operations is given and the date of completion of each operation is mentioned. In fact, construction schedule governs all the other schedules.

1.1.2   Material Schedule

Moving and storing the material in any form is known as material schedule. It is the schedule, which shows the dates of delivery of each type of material on site. A material schedule is a useful guide and measure of control of construction materials.

1.1.3   Labour Schedule

Labour schedule is the graphical representation of the labour requirement on certain days or during certain weeks. Labour schedule will indicate the nature and quantity of labour for the execution of different operations on different dates. It helps for the arrangement of special type of labour if required for a particular operation in the project.

1.1.4   Equipment Schedule

Equipment schedule shows the types and quantities of equipment required on particular dates in the entire project. Equipment schedule enables to make proper arrangement and to have maximum use of construction equipment. This schedule is prepared with the help of a construction schedule.

1.1.5   Financial Schedule

Financial schedule shows the flow of money into project.

Various computer programs have been established so far to prepare schedules of which Microsoft project and Primavera Project Planner are two popular software programs used in construction industry. Both programs allow the user to prepare detailed schedule and allocate resources and level the type and quantity of resources required for each activity on the schedule. For the current study an example data is taken and scheduled by using Primavera Project Planner and Microsoft Project to visualize the effect by the application of resource-driven scheduling features in both software packages. Finally, the results obtained with both software packages are compared.

1.2   Problem Statement

In construction industry planning and scheduling have a lot of importance as they help as a mean of monitoring progress to ensure the project is completed on time and within budget and this depends on the availability of resources. Unfortunately, most discussions of scheduling in the project management arena focus largely on timing issues without taking into account the link between resource availability and capability and the project schedule (Gido and Clements, 1999). Also based on the discussions with the experts involved in construction industry, it was observed that there is normally not much consideration of resources in scheduling and there is low level of implementation of resource-driven scheduling as compared to time-driven scheduling. Since the duration of each activity is dependent upon the availability of resources, the problem arise when work proceeds without taking into account how much the limited amount of labour, equipment and materials will impact the schedule. Therefore the problem of scheduling activities under resource and precedence restriction with the objective of minimizing the total project throughput duration or the objective function is very important to perform the work as planned.

1.3   Aim of the study

The need for the implementation of resource-driven scheduling in construction is necessary in order to complete the projects according to the schedule and within the time and available resources. The aim of this research is to study barriers to the implementation of resource-driven scheduling in construction industry.

1.4   Objectives of the study

In order to achieve the aim mentioned earlier the following objectives have been identified:

1. To evaluate/identify and compare resource-driven scheduling features in Primavera Project Planner and Microsoft Project.
2. To identity the level of implementation of resource-driven scheduling features in construction projects.
3. To identity the barriers to the implementation of resource-driven scheduling.

1.5   Scope of study

This study covers a comparative study of resource-driven scheduling features available only in Microsoft Project and Primavera Project Planner. A questionnaire survey was carried out among the participants of the construction industry registered under classes G7 (A grade), G 6 (B grade) and G5 (C grade) in:

➤ The state of Johor   (Malaysia)
➤ Selangor (Malaysia)

1.6   Framework of research

This section discusses the framework of research. This will help to realize the essential stages of methodology performed or steps of process carried in order to achieve the aim and objectives of this study. The framework of methodology represented diagrammatically in figure 1.1 to show the distinct stages and sequence carried out. Conceptualization is the understanding the importance and basics of the work intended to be carried out.

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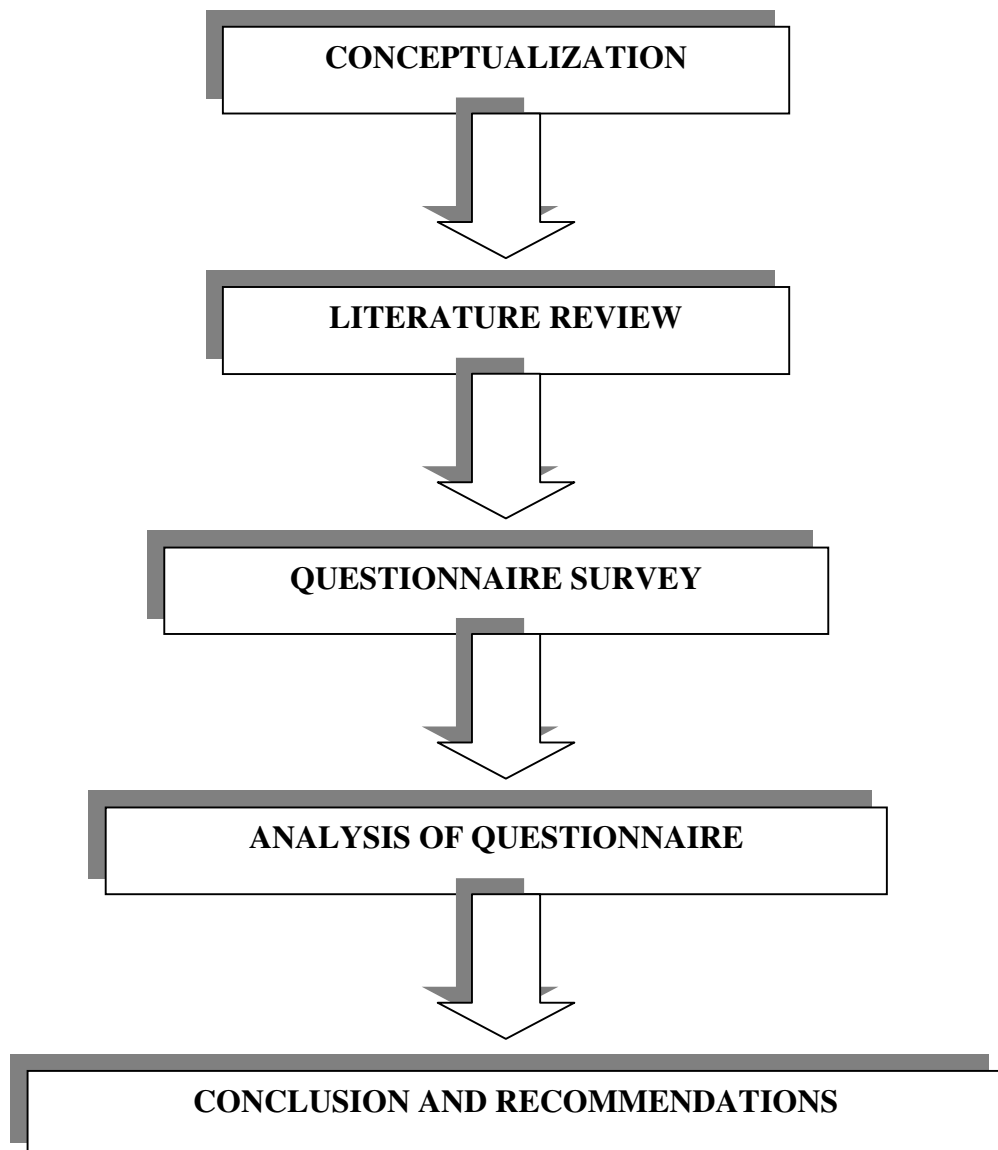
Figure: 1.1: The Research Methodology

1.7   Organization of dissertation

The dissertation is structured into six chapters as follows,

In chapter one, a brief introduction and importance of the study is given along with the aim, objectives and scope of study. A brief methodology of the study is also given in this chapter.

The basic knowledge, historical background and significance of the topic of study are described in chapter two. Theoretical aspects of the research are also discussed briefly.

Chapter three includes the study of various features of resource-driven scheduling in Microsoft Project and Primavera Project Planner and the comparison between the two by implementing on a simple example.

In chapter four, the methodology adopted to achieve the aim and objectives of the study is explained.

A complete description of the findings of the study is presented in chapter five. It also includes a description of the outcomes, especially if it deviates from expectations and quantitative data analysis approaches that are specifically linked to the key questions.

Chapter six presents conclusions to the findings of the study with particular emphasis on the contribution made by the research and recommendation for future research.

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