ASSESSMENT OF ENGINEERING PROJECT MANAGEMENT INTEGRATION APPROACH FOR TYPICAL SMALL TO MEDIUM MANUFACTURING COMPANIES

BY

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A thesis submitted in fulfilment of the requirement for the degree of Doctor of Philosophy (Engineering)

Kulliyyah of Engineering
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SEPTEMBER 2019

ABSTRACT

Project management can be defined as the application of processes, knowledge, methods, and skills to achieve project objectives. Project management should benefit small and medium scale enterprises (SMEs) the most in their economic part, where failure rates should decline in economic system that practice project management. Any organisation that practice project management should be able to reap the advantages where projects can be completed in an organised manner, within the project timeframe, and within the planned budget. However, there has been a concern over how SMEs susceptible to problems when integrating project management into their organisations. The objectives of this research were to identify the problem areas that hinder the SMEs in applying successful project management, recommending the solutions for the identified problems, and to measure the degree of awareness and implementation of project management for SMEs.

The identified general problem areas in project management were: 1) poor basis for the project, 2) appointment failure for project manager, 3) unsupportive top management, and 4) lack of commitment to project. Furthermore, the problems that focused only to SMEs can be identified as: 1) management problems, 2) financial problems, 3) lack of knowledge, 4) project management awareness, 5) labour mobility, and 6) lack of experienced team members.

A survey through the distribution of a questionnaire was developed in the current research to measure the awareness and implementation of project management in SMEs. The questionnaire was designed to accommodate the data collection on the background of the respondents, the comprehensive level of project management by respondents, and the implementation level of the concept in the respondents' organisations. Participants were taken from Pahang and Sarawak states of Malaysia, and 5 out of 45 distributed questionnaires returned for analysis. Statistical Package for Social Science (IBM® SPSS version 23.0) was then used to check the reliability of the collected data and to provide further analysis. The findings show that all participants (100%) are fully aware and have previously heard over the concept of project management. However, only 80% of the respondents perceived that project management is very important. Regardless, all the participants (100%) have been implementing project management within their organisations. Based on the project goals implementation of budget, schedule, and performance, the results of the project management were satisfactorily for the respondents, even though a room for improvement is available. Furthermore, the success factor criteria assessment also revealed that the top management support, clear goals and objectives, planning and control, as well as excellent project manager, to be some of the significant factors in the practice of project management.

خلاصة البحث

يمكن تعريف إدارة المشاريع بأنها تطبيق العمليات والمعارف والأساليب والمهارات لتحقيق أهداف المشروع. وينبغي لإدارة المشاريع أن تفيد المؤسسات الصغيرة والمتوسطة الحجم أكثر من غيرها في جانبها الاقتصادي، حيث ينبغي أن تنخفض معدلات الإخفاق في النظام الاقتصادي الذي يمارس إدارة المشاريع. وينبغي لأي منظمة تمارس إدارة المشاريع أن تكون قادرة على جني المزايا التي يمكن أن تنجز بها المشاريع بطريقة منظمة، ضمن الإطار الزمني والميزانية المقررة للمشروع. ومع ذلك، هنالك قلق بشأن كيفية تعرض المشاريع الصغيرة والمتوسطة للمشاكل عند دمج إدارة المشاريع في منظماتها. وبالتالي يهدف هذا البحث إلى تحديد المشاكل التي تعيق المشاريع الصغيرة والمتوسطة الحجم في تطبيق إدارة ناجحة للمشاريع، والتوصية بحلول لهذه المشاكل، وقياس درجة الوعي في فهم وتنفيذ إدارة المشاريع الصغيرة والمتوسطة. وكانت المشاكل العامة المحددة في إدارة المشاريع هي: 1) سوء أساس المشروع ، 2) الفشل في تعيين مدير المشروع ، 3) الإدارة العليا غير الداعمة ، وَ 4) عدم الالتزام بالمشروع. وعلاوة على ذلك ، فإن المشاكل التي تركز على المشاريع الصغيرة والمتوسطة يمكن تحديدها على النحو التالي: 1) مشاكل إدارية ، 2) مشاكل مالية ، 3) نقص المعرفة ، 4) الوعي بإدارة المشروع ، 5) تنقل اليد العاملة ، 6) عدم وجود أعضاء فريق من ذوي الخبرة. وُضعت في البحث الحالي دراسة استقصائية من خلال توزيع استبيان لقياس الوعي بإدارة المشاريع وتنفيذها في المؤسسات الصغيرة والمتوسطة. وقد صُمم الاستبيان لاستيعاب جمع البيانات بناءً على خلفية المجيبين، والمستوى الشامل لإدارة المشاريع ، ومستوى تنفيذ المفهوم في منظماتهم. وقد تم اختيار المشاركين من ولايات باهانج وساراواك في ماليزيا، حيث تمّ إعادة خمسة من 45 استبياناً موزعاً للتحليل. ثم استخدمت المجموعة الاحصائية للعلوم الاجتماعية (IBM® SPSS version 23.0)للتحقق من موثوقية البيانات التي تم جمعها ولتوفير المزيد من تحليل النتائج. بيّنت النتائج أن جميع المشاركين (100%) مدركون تماماً لمفهوم إدارة المشروع وقد سبق لهم أن سمعوا عنه. غير أن 80 % فقط من المجيبين يرون أن إدارة المشاريع مهمة جداً. وبالرغم من ذلك، أجاب جميع المشاركين (100%) أنه قد تم تنفيذ إدارة المشاريع داخل منظماتهم. واستناداً إلى أهداف المشروع المتعلقة بتنفيذ الميزانية والجدول الزمني والأداء ، كانت نتائج إدارة المشروع مرضية بالنسبة للمجيبين عن الاستبيان، على الرغم من وجود مجال للتحسين. وعلاوة على ذلك، كشف تقييم معايير عوامل النجاح أيضاً أن الدعم الإداري الأعلى، والأهداف والغايات الواضحة، والتخطيط والمراقبة، وكذلك مدير المشروع الممتاز، هي بعض العوامل الهامة في ممارسة إدارة المشاريع.

APPROVAL PAGE

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DECLARATION

I hereby declare that this thesis is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

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ACKNOWLEDGEMENT

‘In the name of Allah, Most Gracious, Most Merciful’

Foremost of all, we would like to show our gratitude to ALLAH THE ALMIGHTY for His blessings bestowed upon us. It is with the deepest senses of gratitude of the almighty that gives strength and ability to successfully complete this project and thesis. I would likewise like to express my gratitude, appreciation and special appreciation to all people who served in the Department of Manufacturing and Material Engineering of International Islamic University Malaysia for granting me the chance to take this project as my partial fulfilment for a degree in PhD (Engineering).

Special and sincere thanks to my dedicated lecturer and project supervisor, Prof. Dr. Erry Yulian T. Adesta, for all the valuable information and ideas on how to perform this project, magnificent support, guidance, encouragement, and tolerance during the culmination of this project.

Last, but certainly not least, the continual encouragement and support from my parents and family members is deeply and sincerely appreciated throughout the completion of this project. May Allah bless everyone that contributed to this project, Inshaa Allah.

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LIST OF ABBREVIATIONS

GDP	Gross Domestic Product
GLCs	Government-Linked Companies
MNCs	Multinational Corporations
NSDC	National SME Development Council
SMEs	Small and Medium-scale Enterprises
SMIDEC	Small & Medium Industries Development Corporation
SPSS	IBM® Statistical Package for Social Science

CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND OF THE RESEARCH

Nowadays, it is widely acknowledged in economic and developmental stages that small and medium scale enterprises (SMEs) are the most important key in overall national development. They play an important function in the economy in regard to economic development and growth as well as employment. As a fact, according to SME Annual Report 2015/2016 (SME Corporation Malaysia, 2016), SMEs consistently contributed to the increase of the percentage of gross domestic product (GDP), employment share rose and also exports. SMEs donated 36.3% to GDP in 2015, while only less than 30% was reported in 2005. The employment portion rose increase 8.7% from 56.8% in 2005 to 65.5% in 2015. In addition, exports also show better growth momentum from 16.4% in 2010 to 17.6% in 2015.

Back in 1996, Small & Medium Industries Development Corporation (SMIDEC) is the responsible agency for SMEs development to be competitive in the worldwide market. The year 2004 marks another chapter in SMEs history with the formation of the National SME Development Council (NSDC) that responsible in formulating strategies, coordinating programs, encourage partnership and also to ensure the effective implementation in the development of SMEs across all economic factors. Four years after NSDC was established, SMIDEC took over again NSDC role in SMEs development. A year after, on 2 October 2009, SMIDEC was officially rebranded as Small to Medium Enterprise Corporation Malaysia (SME Corporation Malaysia) which now is the national organization central point regarding information

and activities for the development of progressive SMEs through various platforms and programs.

On the other hand, SMEs have a lot of definition by different authors. Small to medium enterprises (SMEs) definition varies with experience, time, author, country, context and global enunciation of the catalytic role of the SMEs. One should take a look at the definition of SMEs back in 2005, since the first census was implemented to get SMEs economic profiles in that very year. In the later time, according to 2011 Economic Census, SMEs in Malaysia are defined for only two sectors. A leading industry is the manufacturing sector, which has a sales turnover of less than RM25 million or less than 150 full-time employees. Following industry include services and other subdivisions which have a sales turnover of lower than RM 5 million or less than 50 full-time employees.

Effective 1 January 2004, the definition has a little improvement. According to SME Corporation Malaysia in SMEs annual report 2015/2016, under the manufacturing sector, they must have sales turnover with a maximum of RM 50 million or a maximum of 200 full-time employees. Apart from that, in services and other sectors, sales turnover not exceeding RM 20 million or full-time employees not exceeding 75. To be specific about the definition, there are facts that all SMEs must be registered entities with SSM or other equivalent bodies. It is, however, excludes companies that are public-listed or subsidiaries of multinational corporations (MNCs), government-linked companies (GLCs) and state-owned enterprises. For SMEs company, they require to build up their quality and competitiveness to match or exceed the rivalry in this competitive period. Here, project management is the golden key needed to perform an excellent role in the management and growth in SMEs

economy. Initially, project management was developed in the heavy engineering industries, mainly construction, defence, aerospace and shipbuilding (Morris, 2011). It later expands to a discourse not only smaller projects but medium-sized projects in large firms (Turner et al., 2010). Project management can be defined as a well-established discipline that helps in identifying, plan and implement successful projects. It is a significant component because all organizations, either they are small or large, are involved in implementing new procedures such as the implementation of a new production line in a manufacturing company, the improvement of a new product or service, a major building program and a public relations promotion campaign.

Project management benefits SMEs the most in their economic part. SMEs failure rates decline in an economic system that practice project management (Safiriyu & Njogo, 2012). Without required management frameworks, technologies, tools and widely accepted standards of practice, many SME projects before have either failed or been abandoned. In order to accomplish economic development and growth, SMEs should devote 3% of their turnover on innovation. However, successful innovation is not easy for SMEs (O'Regan & Ghobadian, 2006). For instance, small firms possess several drawbacks in innovating such as a limited low pool of skills and knowledge, cash flow and a fewer sales over volume which to spread the costs of innovation (Rogers, 2004).

1.2 PROBLEM STATEMENT

Every project has a specific goal. The goal of a project is to accomplish something, like solving a problem or taking advantage of an opportunity. This goal drives every decision in managing a project. There are some small and medium enterprises that has built reputations for being able to manage projects effectively using project

management consistently. In today's highly competitive marketplace, benefits of the project with project management are projects can be completed more quickly and cheaply. Besides, the project will be more predictable, such as in estimated schedule and budget.

The principles of good project management are applicable to both SMEs and multinational companies. However, SMEs often has a plus point over multinationals where project management is mostly concerned. Modest projects and smaller teams make management easier, but failures still occur frequently. Problems regarding project management in SMEs must be listed along its way forward in order to help SMEs to be the golden key for economic growth. Those ways forward or the solutions can be applied in SMEs operations, and they will be a stepping stone for SMEs to soar up, while at the same time helping to eliminate all the problems in the implementation of project management.

There are also awareness problems that need to be concentrated. Lack of awareness is the main cause of why project management exists. Issues like insufficient project management expertise, no opinion of the leaders, and lack of project management innovative practice, may cause a project management implementation away from its objectives.

1.3 RESEARCH OBJECTIVES

Since the problem area are listed, a study entitled the 'Assessment of Engineering Project Management Integration Approach for Typical Small to Medium Manufacturing Companies' were performed in order to accomplish the following objectives:

1. To identify the problem areas in successfully applying project management in SMEs that focused on manufacturing industries.
2. To recommend solutions and ways forward against identified problem areas in Objective 1.
3. To measure the degree of awareness and implementation of project management in small to medium manufacturing companies.

1.4 RESEARCH SCOPE

The scope of this research is to focus on how well the SMEs manufacturing companies aware on the existence of project management as well as the degree of its implementation in their companies. The suggested method is by designing a data collection effort through questions that are simple, pleasing and comfortable, yet comprehensive to obtain all the necessary information needed in the research. Hence, a survey will be conducted using the data collection questions. Subsequently, the collected data will be evaluated after. The results represent the degree of implementation and awareness of project management among SMEs manufacturing companies. Furthermore, this research also concentrates on the problem area of project management implementation, especially in SMEs. Solution and recommendation were designed in order to get rid of all problems presented in applying project management. The solutions may help SMEs manufacturing companies to apply project management without the fear of problems.

1.5 SIGNIFICANCE OF THE RESEARCH

This study is significant in order to ascertain the degree of awareness of project management in manufacturing companies. The research was designed to help manufacturing companies in realizing a better outcome from project management implementation in their company's operation. Through this research, the benefits were captured, and the problems faced when applying project management were analytically solved. With all the problem area listed, solutions that benefit to manufacturing companies were designed and mentioned in the recommendation.

1.6 ORGANISATION OF THE THESIS

The introduction in CHAPTER ONE starts and shapes the main flow, as well as providing a clear background, for the whole organisation of the report. This chapter creates the first impression on the subject of the study. It provides an overview on the overall topic to guide the reader carefully into the subject materials. The following CHAPTER TWO, which provides the literature review, includes a comprehensive overview of the central ideas in the literature on project management in small to medium manufacturing companies. In CHAPTER THREE, the research methodology outlines the necessary research methods, few theoretical backgrounds, followed by a description of the process steps to gain information and research approach. In CHAPTER FOUR for research results and discussion, the outcomes of the study are presented, and the chapter explains those results and answers the raised research questions. The collected data were analysed with a statistical package software in order to convert the collected data into their mathematical form. Lastly, CHAPTER FIVE provides the conclusions of the research where the study findings were summarized, and their educational implications were evaluated.

CHAPTER TWO
LITERATURE REVIEW

2.1 PROJECT MANAGEMENT

2.1.1 The History of Project Management

People solely began discussing project management in the last part of the 20th century, even though projects have been built up for a long time. In the late 19th century, Frederick Taylor started his comprehensive studies. He used scientific reasoning by indicating that workers can be observed and developed by concentrating on its important sections that contribute to the idea of working more efficiently, rather than operate longer and harder. His colleague, Henry Gantt then focused on a sequence of operations in practice and he is renowned for building up the Gantt Chart (Barron & Barron, 2016). A Gantt Chart is a kind of bar chart that clarifies a project plan and common skill for the phases and activity of project work to be embraced by a varied audience. This Gantt Chart helps a lot in a particular project so that the supervisor or engineer can supervise immediately on the project timeline (Herrmann, 2005).

In the middle of the 20th century, projects were accomplished based on an improvised basis utilising mostly informal techniques, tools and also Gantt charts that were built before. The Manhattan project was originated, and its difficulty has been just conceivable owing to project management methods during that time.

The modern project management period began in 1950s. Two scientific project development models were established which is the Program Evaluation and Review Technique (PERT) created by Booz-Allen & Hamilton, and the Critical Path Method (CPM) formed in a joint venture by both DuPont Corporation and Remington Rand Corporation for managing plant maintenance projects. Generally, the critical path is the longest full path of the project and PERT is a project management tool that helps in analysing and represent the tasks involved in completing a given project (Mazlum & Güneri, 2015; Trietsch & Baker, 2012).

Figure 2.1 displays an example of PERT application and Figure 2.2 shows an example of CPM usage that defines the critical path.

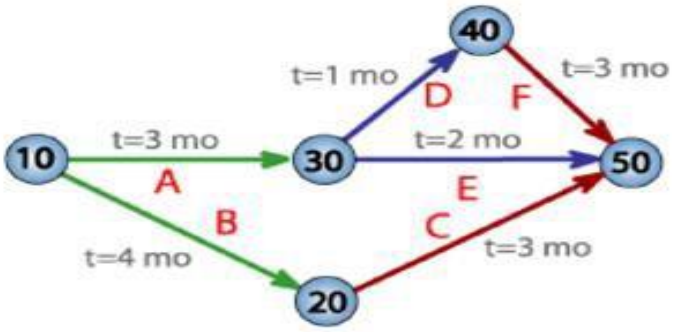

Figure 2.1 PERT Network Chart (Barron & Barron, 2016)

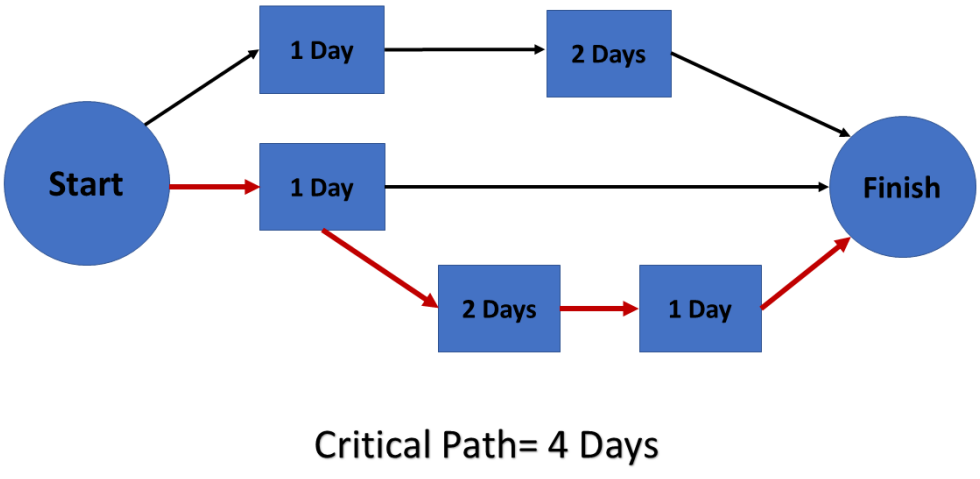

Figure 2.2 The CPM Method (Bahnmaier, 2001)