COMPARING THE PROJECT SUCCESS FACTORS PERCEIVED BY THE PROJECT MANAGERS OF DIFFERENT INDUSTRIES IN MALAYSIA

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

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May 2017

DECLARATION

I hereby declare that this project report is based on my original work except for citations and quotations which have been duly acknowledged. I also declare that it has not been previously and concurrently submitted for any other degree or award at UTAR or other institutions.

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APPROVAL FOR SUBMISSION

I certify that this project report entitled "**COMPARING THE PROJECT SUCCESS FACTORS PERCEIVED BY THE PROJECT MANAGERS OF DIFFERENT INDUSTRIES IN MALAYSIA**" was prepared by **LING KENG ZHENG** has met the required standard for submission in partial fulfilment of the requirements for the award of Master of Project Management at Universiti Tunku Abdul Rahman.

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ACKNOWLEDGEMENT

First and foremost, I would like to express my utmost gratitude to UTAR for providing me the opportunity to pursue this program as a partial fulfilment of the requirement for the Master of Project Management.

Throughout this program, I would like to express my sincere gratitude to my supervisor whose endless guidance, invaluable advises, and enormous patience made the difficult times bearable. Also, I am very fortunate to be blessed with the guidance and encouragement from my course mates for their guidance, encouragement, patience, many constructive comments and helpful suggestions during my time. Special thanks also go to all the survey participants in my research to the successful completion of this project.

I owe a great debt to my mother for her love and concern who provides time, patience, and support for all my hare brained escapades. I promise to make up all the time you allotted me to complete my studies.

Last but not least, I would like to thank all my friends at UTAR for their endless support and friendship throughout my master studies in UTAR. Not forgetting all other staffs of UTAR who have supported me, but I have not mentioned their names here. Please accept my sincere apology and thank you.

ABSTRACT

COMPARING THE PROJECT SUCCESS FACTORS PERCEIVED BY THE PROJECT MANAGERS OF DIFFERENT INDUSTRIES IN MALAYSIA

Ling Keng Zheng

Many publications and researches had proposed project success factors but there has no any official guideline by PMBOK on what success factor that contributes to project success. The purpose of this study is to investigate the success factors perceived by project managers influencing the project success in Malaysia projects as project managers play an important role in determining success criteria and success factors at the project phase. It had been reveal that success criteria and project success rates differ by industry. Through the literature review process, 22 success factors are identified. These success factors are generalisable to all projects and organisations. In addition, this research further investigates if project from different industry sectors may affect the causal relationship between success factor and project success. This empirical research was serve to fill the gaps about the success factors in different industry sectors. A total of 82 project managers from different industry sectors were asked to rate the success factors contributed to project success. The results of analysis indicate that six

out of 22 success factors were found to be significantly correlate with project success. From these six success factors, the three most common success factors perceived by project managers that contribute to the successfulness of project are Ability to coordinate, Project schedule and plan and Monitor and control. This study also empirically demonstrates that Ability to coordinate is significantly affected by Manufacturing and utilities sector. In conclusion, industry sector is a moderating factor that affects the causal relationship between success factor and project success.

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LIST OF ABBREVIATIONS

APM	Association for Project Management
CSFs	Critical success factors
α	Cronbach Alpha
IPMA	International Project Management Association
MIS	Management Information System
MS	Malaysia
OGC	Office of Government Commerce
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
SA	South Africa
SPSS	Statistical Package for Social Science
IT	Information Technology

CHAPTER 1

INTRODUCTION

1.1 Background

Project management is critical to the success of organisation and drive business in diverse industries. Over the past decade, the relentless pace of change in business environment had caused organisations gradually investing in new market and diverse areas. Sticking with the traditional approach to manage projects is no longer suitable to keep up with the new challenges. Two key issues within the context of project management that have been the subject of considerable scientific interest are the critical success factors and the categorisation of projects.

Every project had defined objectives to achieve in order to deliver the business case. Similarly, every project comprised of a define set of critical factors that will successfully deliver the outcome or improve the chances of project implementation. With the ever-growing demand and complexity nowadays, business is susceptible to all sorts of external factors, scope creep, unforeseen circumstances and unstable currencies. An appropriate project approach is particularly important to manage them effectively and determine whether the progress is currently on track. Since projects are widely use the deliver the business case in the industry, it is crucial that project managers

identify the factors that is critical to the successfulness of project at the implementation stage.

It is considered prudent for project managers to adhere to the Project Management Body of Knowledge (PMBOK) guide and PMI global standards in the practice of project management as these standards are widely accepted in practice and reflect the evolving profession. However, project success has remained ambiguously defined by Project Management Institute, Inc. Because of this ambiguity, many organisations would come up with their own simplistic formulae or policy in rating project success or failure. Internal project managers are evaluated within their organisations based on their track record of managing successful projects. Therefore, internal project manager can be placed in a position where their careers may be affected by faulty evaluation criteria of project success. Many project management literatures and journal suggest the assessment of success based on identifying generic factors that varies across the project and product life cycle that contribute to projects' success from different stakeholder even though it is rare to reach a consensus or mutual agreement among stakeholders. The reason behind is because project success is a subjective judgment which can be affected by individual's position in the organisations, their experience and their working role. This is why a project can be considered a success by one or more users but view as a failure by the others. Jugdev and Müller (2005) observed that "success was seen as an analogy for gaining consensus from a group of people to defining good art". Perception of success can be varying by project phases and types, industry sectors, project life cycle, individuals and nationalities. Since project success is multi-dimensional

therefore it requires collaborative effort from project team members to identify the potential problems and solve the arising problems. One study found that "views on project success have changed over the years from definitions that were limited to the implementation phase of the project life cycle to definitions that reflect an appreciation of success over the project and product life cycle" (Jugdev & Müller, 2005, p. 19). It is crucial to find out the perceptions of various project managers and the consequences of different perceptions from each industry sector. An accurate measures of project success must be developed. The measure scale must be widely accessible and specific enough that can be readily applied to different project organisation. This will serve as guidance for project managers in rating project success.

1.2 Problem Statement

Project success has been measured in different publications and research work based on multiple stakeholders (Ebbesen & Hope, 2013; Shenhar & Dvir, 2007). However, different stakeholders have different perceptions on project management and interpret project success differently. It is believed that ultimately project success is best judged by the project managers. Furthermore, the majority of studies have assumed a static view of importance of various success factors over all project types. In other words, a critical success factor was assumed to have the same degree of importance throughout all types of project. Meanwhile, there wasn't any hitherto formal guidance or standard by professional bodies on what constitute a successful project. This leads to our

research question “Comparing the project success factors perceived by the project managers of different industries in Malaysia”.

1.3 Aims and Objectives

The aim of this study is to establish the success criteria and success factors in different industry sectors to improve project management practice.

The objectives are set forth:

1. To establish correlation between the identified success factors required for project success.
2. To examine the common project success factors perceived by the project managers from different industry sectors.
3. To determine if industry sector affect success factor required for project success.
4. To examine the project success factor in different industry sector best concerned by project managers involved in different project in Malaysia.

1.4 Scope of Research and Limitations

This research targeted project managers in Malaysia from different industry through questionnaire survey that cover project success factors based on the comprehensive literature review. The selected respondents must be project manager of a company. In this study, 22 success factors have been pre-selected in the questionnaire survey.

There are many ways of categorising projects. Crawford, Hobbs, and Turner (2004) proposed 14 attribute areas on project categorisation. “They suggest one reason for categorizing projects is to select appropriate competencies for their delivery” (Crawford et al., 2004). They do not suggest their list is comprehensive, however, in this research the 26 industry sectors from the list was categorised into five main groups for the scope of our research.

Mir and Pinnington (2014) assert that “establishing a set of criteria applicable to any type of project is unrealistic and impractical”. “This is due to every projects differ in size, uniqueness and complexity” (Müller & Turner, 2007a). It is worth to take note that this study did not distinguish different attributes of projects within industry sectors.

Perceptions can change over time and deviate by exposing to different education, qualification, corporate culture, personality traits, practical experiences and work roles. Different industry background and company external and internal environment may also affect individual views. According to Boltanski and Chiapello (2005), “perceptions are affected by published works, but especially by best practices”. Industry professionals and subject matter experts may see project success differently and no one perception is best. Andersen (2016) supported this claim by stating “One person may see things, which remain invisible to somebody else because their perceptions are guided by different knowledge and experience” (p. 59).

1.5 Significance of Study

“Project managers and project team should be aware that project success measures need to be incorporated in the planning process and they need control parameters (leading performance indicators) that look beyond completing the scope of the project on time and within budget” (Turner & Zolin, 2012). The reliability of the data collected would have strong practical implications corroborating with the critical success factors in different projects to create a competitive measures of success scope, particularly at project management level. This will improve the project management practice and project outcome over the long term.

1.6 Research Methodology

Research design to be selected depending greatly on the research question. The design of this research is cross-sectional. Cross-sectional study collects sample and make comparison at a single point in time. Cross-sectional study is observational study. The information about the subjects must be recorded without manipulating the study environment. The benefit of a cross-sectional study design is that it allows researchers to compare many different variables at the same time. This research will be conducted by adopting the quantitative research method.

1.7 Chapter Outline

Chapter one provides the research background, problem statement, the aim of the study, research objectives, scope of research, significance of study, a brief explanation of the research methodology and the outline of all chapters.

Chapter two reviews all relevant literature including academic journal and any scientific research related to the study. Foundation for conceptual framework was developed through literature review to find out related research issues and results outcome.

Chapter three illustrates the conceptual framework, research design, research question, hypothesis, research approach, sampling method, data collection and data analysis method.

Chapter four shows the result and the interpretation of the analysis obtained from the questionnaire. The data collected from the questionnaire will be analyse by using IBM Statistical Package for Social Science (SPSS) version 24 as the software platform. Analysis tests that were carried out include descriptive statistics, reliability test, normality test, correlation test, Kruskal-Wallis test... Hypotheses were concluded from the result analysed.

Chapter five discuss the overall result findings of the research study from the statistical analysis tests. The outcomes from each research questions were discussed with regard to the outcomes from other literatures.

Chapter six discusses the interpretation and outcome from analysis to answer for each of the research objective's. This chapter not only provides conclusion to all the research problems but also the implication of study for research and society. Lastly, this chapter discussed the limitations of research and recommendation for future studies.

CHAPTER 2

LITERATURE REVIEW

2.1 Definition of Project

Before attempting the literature review on the pre-selected success factors, it is first important to look into the definition of project. In order to elucidate the concepts that are prone to individual assumptions and interpretations, the key concepts and theoretical perceptions of project definition will be adequately defined. It provides a foundation for everything that follows. This section is concerned with the project definition in order to shed light on the basis for what constitutes a project. International Project Management Association define project as followed, "A project is a time and cost constrained operation to realise a set of defined deliverables up to quality standards and requirements" (International Project Management Association, 2006, p. 13).

Notice in the definition IPMA included the "Triple Constraint" as essential in realising project deliverables. Project managers must deliver the project through a trade-off within the continuums of these constraints to achieve the project goals. Next, the definition offered by Office of Government Commerce considers project as "a temporary organisation that is created for the purpose of delivering one or more business products according to an agreed Business Case" (Office of Government Commerce, 2009, p. 31).

The OGC's justification of a project emphasise on the basis of its expected commercial benefit from an agreed business case. Once the business products are delivered indicates the completion of the project. This is in line with Meskendahl (2010) which he refers to projects as "the central building block used in implementing strategies and therefore business success is determine by the success of the projects". Other definition such as the Project Management Institute provides a definition for project as "a project is a temporary endeavour undertaken to create a unique product, service, or result" (Project Management Institute, 2013, p. 3).

The definition provided Project Management Institute is clear-cut and straight to the point. Lastly, Association for Project Management defined project as followed.

> "A project is a unique, transient endeavour, undertaken to achieve planned objectives, which could be defined in terms of outputs, outcomes or benefits. A project is usually deemed to be a success if it achieves the objectives according to their acceptance criteria, within an agreed timescale and budget" (Association for Project Management, 2012, p. 12).

To put it simple, a project can be characterised by a few elements. Firstly, a project has planned objectives to achieve which is definable with product, service, result or output. A project also has interrelated activities within timescale and budget, large number of different tasks, certain risk of failing, is a unique temporary assignment and had a defined beginning and end date. Munns and Bjeirmi (1996) defined project management as "the process of controlling

the achievement of the project objectives, using the existing organisational structures and resources and manage the project by applying a collection of tools and techniques without interrupting the routine operation of a company". Clarke (1999) however stressed that "project management is only a tool to help the process of change and when used timely can leads to problem solving of critical issues for an organisation".

2.2 Project Categorisation

Much of the papers, literatures and researches in the field of project management discussed success factor for individual projects but barely some literatures examine the categorisation of projects. Crawford et al. (2004) mentioned that "all organisations that have large numbers of projects must and do categorise them, although the categories are not always immediately visible". In spite of the categorisation effort by researchers, no established categorisation system exists due to the complex characteristics of projects and increasing sophistication of projects. "They might be categorised based on type or meaning of the project, the technology uncertainty, or on some format that fits the specific organisational tasks and character" (Crawford, Hobbs, & Turner, 2006; Fricke & Shenhar, 2000). "Other studies acknowledge the importance of project categorisation referring to project selection, prioritisation and resource allocation" (Cooper, Edgett, & Kleinschmidt, 2000). Systematic investigation of the use of project categorisation by these stakeholders was not undertaken. There is clearly a gap in knowledge and literature which needs to be filled to present a comprehensive knowledge of the issue at stake.

The terminology for “categorisation” and “classification” had closely-related meanings, which can easily lead to confusion and may cause the word to be used in an inaccurate way. The term “categorisation” is use when similar characteristics of items were group together to represent a category. Categories are not mutually exclusive and therefore can be place in more than one category for a specific purpose. An item with multiple characteristics can be grouped in different categories. On the other hand, “classification” denote a set of items divided according to their types. The term class implies a distinct and absolute order therefore classes are mutually exclusive. “Focus groups confirmed that there are intended and unintended consequences of that need to be considered in development of classification systems, such as loss of autonomy, creation of barriers and silos and effects of visibility or invisibility due to inclusion or exclusion from a classification system” (Crawford, Hobbs, & Turner, 2002).

Most researchers are concerned with the comparability of project categorisation systems from one literature to another because these categorisation systems may apply well in some organisation practices but deem unfit to other organisation. If each research project introduces different ways of categorising projects or if the system fails to report on those characteristics that have been shown to be associated with important variations, then it is very difficult to interpret, verify, or replicate results. The categorisation system must allow organisations to classify their projects to the purpose at hand in a way which are most useful to organisations and also practically oriented. These

concerns create a strong interest in the research community for the use of standards for categorising projects and project knowledge.

"Youker (1999) categorise projects for practical purposes according to four possible categorisation methods which are the geographical location, industrial sector, stage of the project life cycle and product of the project. He concludes that the most useful classification of types of projects is by the product of the project". This is because there is more commonality when comparing based on business product, although conversely, it may not be very useful to the purpose of some organisation, e.g., multinational corporation.

A project can be categorised as either national or international. International projects are then categorised according to the geographic region in which the project will be executed. Projects for the national market are categorised by sector of activity. "Crawford et al. (2004) recommended a classification system of projects which are described in Table 2.1, focusing primarily on sectors of activity".

Table 2.1: Industry sector of organisation

Industry Sector
1. Arts/Entertainment/Broadcasting
2. Automotive
3. Business Services
4. Constructing
5. Consulting
6. Defence and Aerospace
7. E-commerce
8. Educational/Training
9. Electronics
10. Environment/Waste/Sewerage
11. Financial Services
12. Health/Human/Social Services
13. Information Systems (including software)
14. Information Technology
15. Insurance
16. International Development
17. Manufacturing
18. Petrochemical
19. Pharmaceutical
20. Recreation
21. Resources
22. Telecommunication
23. Transportation
24. Urban Development
25. Utilities
26. Other

2.3 Different Stakeholders Perception of Project Success

Project achieves success by meeting user requirements or delivering values to various stakeholders such as project managers, project team members, project sponsors, client or end users whom are indirectly or directly involved in the project or able to influence its result or outcome. Different stakeholders associate success to different indicators. Project managers associate success with meeting time and cost target within given scope, whilst users may associate success with their perceived satisfaction and expectation. “Criteria for measuring project

success must therefore reflect different views" (Stuckenbruck, 1986). Hence, project success can only be realized when there is minimal or no conflict among stakeholders.

Stakeholders perception mainly depend on their daily tasks, role in the company, tools they are working with, and how their work is evaluated. Project managers usually consider on time completion to be a success measure. To be on time they might exploit project workers to work faster. This action causes the Lister's effect whereby "people under time pressure don't think faster" and create a situation which workers compromised their work diligence resulting in low quality product. Consequently, client may be unsatisfied with the perceived product due to low quality. This situation eventually causes the condition to reach consensus on what constitute a successful project to be complicated among the stakeholders.

"Egorova et al. (2009) distinguished three types of perceptions among stakeholders in their research and concluded that a project may be considered successful by one stakeholder, but viewed as a failure by another". In the comparison of different stakeholders' perception to project success, Davis (2014) summarise that "time, cost, quality and stakeholder satisfaction were the most important factors for project managers". "Davis (2014) also found that there were some factors in common among different stakeholders. This might due to overlap among stakeholders of different perceptions". In conclusion, stakeholders of different perceptions give different weight on the characteristics

of successful projects. The research focuses on longitudinal evaluation on the perception of project manager on project success factor.

2.4 Project Manager Traits Related to Project Success

As the extensive interest and multidisciplinary research emphasise on stakeholder, there is growing concern placed in the study of the traits of project manager affecting the project outcome. “This is due to the capacity for a project manager to communicate and lobby for a project to create and sustain positive perceptions is the most important factor” (Saadé, Dong, & Wan, 2015). “Müller and Turner (2007a) emphasise the project manager role in identifying the relevant success criteria, consequently leading to those increasing the chance of success”. It is fundamental to a project manager to ensure project success as project manager is the most referenced stakeholder where organisation continue to place increasing pressures on project managers in terms of project performance and schedule. As a result, project managers not only have crucial roles to assemble the right people for the right task, they also have heavy responsibilities on managing the project. Project success criteria and project success rates may differ by industry, project complexity and the age and nationality of the project manager.

“In a research by Saadé et al. (2015) to analyse the project success factors related to project managers’ traits, they extracted 19 factors from previous related studies”. The mean and standard deviation generated from their survey result were shown in Table 2.2. The factor that score the highest mean and deem

the most important trait that a project manager should have is the "Ability to communicate at multiple level". It is important that project managers acquire excellent communication skills to engage with stakeholders, horizontally and vertically. On the other hand, "Length of prior engagements", "Past team size managed", and "Certification" have the lowest mean. This hint that experience and certification are much less important than communication, coordination, leadership and commitment.

Table 2.2: Project manager traits that lead to project success

Success Factors related to Project Manager	Respondents (N = 66)	
	Mean*	**SD**
1. Ability to communicate at multiple levels	4.5	0.7
2. Ability to deal with ambiguity and change	4.0	0.9
3. Ability to escalate	3.3	0.9
4. Working attitude	3.8	0.8
5. Cultural fit	3.2	0.9
6. Education	3.2	0.9
7. Effective leadership	4.2	0.9
8. Length of prior engagements	2.7	1.0
9. Past team size managed	2.8	0.8
10. PMP or PRINCE2 certification credential	2.8	1.1
11. PMP or PRINCE2 trained	3.0	1.2
12. Technical knowledge and hands-on experience	4.0	0.8
13. Work history	3.3	0.8
14. Effective verbal communication	3.8	0.7
15. Written skills	3.5	0.9
16. Commitment to the project	4.2	0.8
17. Ability to coordinate	4.3	0.8
18. Situational management	3.5	0.7
19. Competence	4.3	0.8

* 5 = most important, 3 = irrelevant, and 1 = extremely unimportant

2.5 Criteria to Measure Project Success

It is essential to define the differentiation between success criteria and success factors leading to success on any projects. It is common for project management literature to confusingly intertwine these two separate components of project success and present them as a single homogenous group. In order to properly define and assess project success, a distinction should be made between success criteria and success factors, as they are not the same.

Müller and Turner (2007a) define success criteria as "variables that measure project success". Criteria are the set of principles or standards on which project success can be evaluated. Project success criteria is what defines the success of the project. Project success criteria are those goals identified and agreed by stakeholders on what the project is required to deliver in order for the project to be considered a success. Success criterion is essential for both the project manager and stakeholders to understand what a successful delivery will look like and it will ultimately be the stakeholders who use the criteria in the handover and closeout phase to decide whether the project was a success.

There has been a great deal of researches on project success over the years. Accordingly, the "Golden Triangle" or "Iron Triangle", had long been used as project success criteria by completing the defined scope of work to specification, and meeting the time and budget goals. The Iron Triangle have become inextricably linked with measuring the success of project management since then. In fact, the Iron Triangle had been discussed so frequently in the past but was rarely agreed upon as the notion of project success. The Iron Triangle

continued to be described as failing and inadequate in determining project success due to many critics' criticise that there was no any long term follow-up action or customer appreciation effort.

"Further study implies project success must also be evaluated from the perception of various stakeholders" (Atkinson, 1999; Turner & Zolin, 2012; Gemunden, 2015). The main reason being the project outcomes may not align to customer needs. This is not surprising as in most cases when working in a project there is a misunderstanding of what the customer wants and what the project manager thinks that they want. One of the biggest gaps is between the actual project outcome needed by the customer and the desired project outcome as described by the customer. These breakdowns are called project performance gaps. Therefore, even a project that was completed on time, on budget and fulfilled all originally specified scopes, features and function might not fully represent the expected outcome of stakeholder. "Some academicians' (Lim & Mohamed, 1999; Lipovetsky, Tishler, Dvir, & Shenhar, 1997) assert that traditional measures of time, cost, and quality are still important in the early stages of the project, while later stages should focus more on other project success criteria such as overall customer benefit and customer satisfaction".

Further literature review reveals that researchers had extend the measurement criteria to after delivery stage. The reason is because researchers consider project ends with project delivery and that is the point at which project management ends. Munns and Bjeirmi (1996) noted that "much literature considered projects end when they are delivered to the customer. They do not

consider the wider criteria which will affect the project once in use". However, in some cases where the initial project objectives were met, but the client appear to be unhappy with the deliverables. This may due to customer contact after project delivered was minimal. Any form of long term follow-up or troubleshooting was often not included.

"A study by Lim and Mohamed (1999) propose to the micro and macro viewpoint of project success. The micro viewpoint looks at project completion within the project efficiency while the macro viewpoint involved both project completion and satisfaction as criterion". This is due to project may be successful at completion but ended up a failure in long term. On the contrary, some project was publicly acknowledged to be a failed project but turns up a roaring project success in the long run. Followed by a study from Baker, Murphy, and Fisher (2008) concluded that "project success is something much more complex than simply meeting cost, schedule, and performance specifications. Although certain criteria might be relevant in measuring the success of most projects, they should be adapted to size, complexity, duration, project phases, type and stakeholders' requirements". In relation to that, Prabhakar (2005) conclude that "most researchers have agreed to disagree on what constitutes project success".

2.6 Factors Contributed to Project Success

Success factors are those factors in the project most conducive to the project team and in the project environment that will underpin the project and the

likelihood for the project to be successful. Typical success factors would be top management support, ability to coordinate and synergy of team. Success factor are not related to the time, cost & quality elements used in the success criteria. “Success factors are perceive as levers that can be operate by project managers to increase chances of obtaining the desired outcomes” (Westerveld, 2003). Clarke (1999) argues that “managing equally all the success factors at the same time would be impractical and unachievable”. This all being said, there is hardly a recipe for project success factor which fit for all different types of projects. Many researchers are in an agreement that “there is no single agreed-upon project success factor”.

“The success implementation of project is not predominantly affected by a particular group of factor but perhaps an interaction of a few factors from different groups. A combination of factors determines the success or failure of a project and influencing these factors at the right time makes success more probable” (Savolainen, Ahonen, & Richardson, 2012). While not all success factors contribute to project success, there are factors that may cause project failure. The success factors that if absent would cause the project to fail are called critical success factors. According to Mobey and Parker (2002), “to increase the chances of a project succeeding it is necessary for the organisation to have an understanding of what are the critical success factors, to systematically and quantitatively assess these critical factors, anticipating possible effects, and then choose appropriate methods of dealing with them”. “The appropriate success factors must be established at the concept stage of project life-cycle to inform the business case and must be regularly reviewed and changed at any stage

through the change control process during the project life-cycle as these critical success factors can be used as a guide to stakeholders' behaviour and a key determinant of project success. Otherwise, project team will be working in wrong direction towards project goal and the result of the project will not be successfully determined due to difference in perception, emphasis and objectives" (Baccarini, 1999). "Project manager requires the necessary system to help him/her focuses attention on important areas and set differential priorities across different project elements. If it can be demonstrated that a set of factors under the project manager's control can have a significant impact on project success, the project manager will be better able to overcome the impediments in project and effectively channelling his/her energy more efficiently in attempting to successfully implement the project under development. The struggle to identify the critical success factors is an ongoing topic, approached by many researchers especially due to the pressure of implementing successful projects in a dynamic global market and ever changing business world" (Crisan & Borza, 2014). In all of the literature reviewed, a selection of the success factors developed by earlier literatures was proposed. These success factors are generalizable to all projects and organisations. As indicated in Table 2.3 below shows 22 success factors that contribute to project successfulness listed in the questionnaire.

Table 2.3: Success factors affecting the successfulness of project

Success Factors	Author					
	Belassi and Tukel (1996)	Kuen, Zailani and Fernando (2009)	Els, Van der Merwe and Hauptfleisch (2012)	Alexandrova and Ivanova (2013)	Beleiu, Crisan and Nistor (2015)	Jelodar, Yiu and Wilkinson (2016)
Ability to coordinate	√			√		
Application of project management techniques					√	
Client acceptance		√				
Client consultation		√				
Communication	√	√	√	√		
Executive commitment		√			√	
External environment	√	√	√			
Lesson learnt			√	√		
Monitor and control		√	√	√	√	
Organisation structure	√		√			
Organisational adaptability		√				
Personnel		√				
Project manager leadership and competencies	√	√	√	√	√	
Project mission		√		√	√	
Project schedule and plan		√	√	√	√	
Quality management			√	√		
Relationship quality						√
Risk management		√	√		√	
Synergy of team				√	√	
Technical tasks ability	√	√	√		√	
Top management support	√	√		√	√	
Trouble-shooting	√	√			√	

2.6.1 Belassi and Tukel's Critical Success Factors

Belassi and Tukel (1996) grouped the critical success factors listed in the literature into four areas. They performed two surveys targeted the project managers to rank success factors. Table 2.4 showed the result of their first survey and they concluded "in most of the industries, the project managers ranked the most critical factor for project success as availability of resources, followed by top management support. It has also shown that despite many industries perceived client consultation as a relatively low importance factor but one sector found it to be an important factor" (Belassi and Tukel, 1996).

Table 2.4: The ranking of critical success factors for each industry

Factors/industry	Top mgt. support	Client Consultation	Preliminary estimates	Availability of resources	PM performance	Others
Construction	1	5	4	3	2	6
Defence	3	5	4	1	2	6
MIS	1	1	4	3	5	6
Utilities	2	2	4	1	4	6
Environmental	3	3	5	1	2	-
Manufacturing	2	5	3	1	4	6
Others	1	5	3	2	4	6

The value indicates the mean scores of importance on a scale of 1, which is the most, to 6, which is the least

In their second survey, they chosen three most commonly factors in each group which made up a total of 15 factors from five groups. Majority of the project managers ranked top management support, team member commitment, team member technical background, project manager's ability to coordinate and project manager competence as critical success factors for project success.

2.6.2 Kuen, Zailani and Fernando's Critical Success Factors

"A study by Kuen, Zailani, and Fernando (2009) was carried out using structured questionnaire to investigate the critical factors that influence a successful project among manufacturing companies in Penang, Malaysia. They revealed that project success was divided into two dimensions which this study classified as micro and macro project success. Direct Project Success (micro project success) is measured based on the value project delivers and satisfy the direct end users. Indirect project success (macro project success) was measured based on the benefits realised by the organisation". They identified and summarised 19 success factors (as shown in Table 2.5) from literature review. "Kuen et al. (2009) conclude that project personnel competency and project mission are critical factors influencing the micro project success, while top management support and project mission are critical factors influencing the macro project success".

Table 2.5: Critical factors for project success

	Success Factors from the Literature
1.	Corporate understanding
2.	Common understanding with stakeholders on success criteria
3.	Executive commitment
4.	Organisational adaptability
5.	Communication
6.	Project manager selection criteria
7.	Project manager leadership / empowerment
8.	Environment
9.	Commitment to planning & control
10.	Project mission / common goal / direction
11.	Top management support
12.	Client consultation / acceptance
13.	Monitor performance and feedback
14.	Personnel / teamwork
15.	Technical task ability
16.	Trouble shooting / risk management
17.	Project ownership
18.	Urgency of project
19.	Duration and size of project

2.6.3 Els, Van der Merwe and Hauptfleisch's Critical Success Factors

"Els, Van der Merwe, and Hauptfleisch (2012) categorised the success factors into four main groups (as shown in Table 2.6) and used their result for a comparative analysis to evaluate the correlations between the South African (SA) and Malaysian (MS) findings".

Table 2.6: Success criteria and the respective success factors

SUCCESS CRITERIA	SUCCESS FACTORS	ELEMENTS OF SUCCESS FACTORS
APPRECIATION BY STAKEHOLDERS	HUMAN MANAGEMENT	Team and leadership Project manager Communication Stakeholder management
TIME	PROCESS	Planning Scheduling Monitoring and Control Quality Management Risk Management
QUALITY	ORGANISATION	Organisation structure Financial resources Policy and strategy Learning Organisation External environment
COST	CONTRACT & TECHNICAL	Procurement & Contract Contractor Technical Innovation

Their results draw a comparison between the SA and MS respondents. From Table 2.7, team and leadership is perceived as the most important success factor element in Human Management by both SA and MS respondents. An effective and efficient team may expedite the project delivery and save cost by reducing mistake in work. While SA and MS respondents both had different perception on the process success factor, control and monitoring showed a higher average mean value among others element. No one makes a plan for project and then proceed indefinitely without making changes. Control and monitoring underpin the project success and is regarded as a measure of reducing project risk. Similarly, for organisation success factor, organisation structure had the highest average mean value. This showed that an effective enterprise environmental factor influence how projects are conducted. Lastly, for contract and technical success factor, procurement and contract had the highest average mean value. A standard contract provision is mandatory to establish an agreement and lead the project to assure proper delivery.

Table 2.7: Elements of success factors ranking

Rank	Factors/Elements	Ave. Score	South Africa	Malaysia
	Human Management			
1	Team and leadership	**4.62**	**4.55**	**4.68**
2	Communication	4.40	4.43	4.37
3	Project manager	4.38	4.33	4.43
4	Stakeholder management	4.11	4.05	4.16
	Process			
1	Scheduling	4.19	**4.35**	4.02
2	Planning	4.22	4.33	4.10
3	Risk management	3.81	4.30	3.31
4	Control and monitoring	**4.25**	4.26	**4.24**
5	Quality management	3.99	4.23	3.75
	Organisation			
1	Financial resources	4.13	**4.43**	3.83
2	Policy and strategy	4.11	4.40	3.82
3	Learning organisation	3.89	4.25	3.53
4	Organisation structure	**4.21**	4.14	**4.27**
5	External environment	3.43	3.68	3.17
	Contract and Technical			
1	Technical	4.23	**4.43**	4.03
2	Procurement and contract	**4.30**	4.36	**4.24**
3	Contractor	4.22	4.26	4.18
4	Innovation	3.57	3.89	3.25

2.6.4 Alexandrova and Ivanova's Critical Success Factors

Alexandrova and Ivanova (2013) came up with 15 critical factors for project success. They selected 132 project managers to participate in their study (result as shown in Table 2.8) and found that "Competence of project manager" is an extremely important factor in project success. Meanwhile, they showed that "Clarity of project goals" is perceived as a high importance factor. Lastly, they concluded "Precision in documenting and archiving of project information" and "Competence and adequate support from a project consultant" are viewed as medium importance factor in realisation of project success.

Table 2.8: Importance of suggested success factors

Success Factors	Not important	Low importance	Medium importance	High importance	Extremely important
Competence of the project manager		2.3	1.5	14.4	81.8
Support from the agency administering the respective OP		1.5	5.3	34.8	58.3
Clarity of project goals			3.0	49.2	47.7
Top management support	0.8		6.1	28.8	64.4
Competence of project team members			3.0	30.3	66.7
Motivation of project team members		2.3	5.3	29.5	62.9
Effective communication between project stakeholders			4.5	39.4	56.1
Quality of subcontractor services			1.5	31.8	66.7
Precision in documenting and archiving of project information	0.8	2.3	12.9	37.1	47.0
Effective coordination of project activities			3.0	40.9	56.1
Compliance with the rules and procedures established by the OP		0.8	0.8	20.5	78.0
Systematic control over the project execution			5.3	37.1	57.6
Access to organisational resources		1.5	5.3	37.1	56.1
SMART planning			6.8	39.4	53.8
Competence and adequate support from a project consultant	3.8	2.3	12.9	34.8	46.2

2.6.5 Beleiu, Crisan and Nistor's Critical Success Factors

"Beleiu, Crisan, and Nistor (2015) developed an elaborated list of success factors (as shown in Table 2.9) that have the highest influence on project success based on Pinto and Slevin (1987) and Davis (2014) studies". They concluded that "Clearly defined goal and directions", "Competent project team members", "Clearly defined roles and responsibilities", "Communication and consultation with stakeholders" and "Compliance with the planned budget, time frame and

performance criteria" to be the five critical success factors that have the highest impact on project success.

Table 2.9: Ranking of success factors

Success factors	Number of choices	Percentage of respondents choosing the factor
Compliance with the planned budget, time frame and performance criteria	19	40.4 %
Clearly defined goals and directions	33	70.2 %
Accurate schedule and plan	17	36.2 %
Timely and comprehensive control	10	21.3 %
Adequate use of project management techniques	10	21.3 %
Adequate use of technical skills	5	10.6 %
Competent project team members	25	53.2 %
Clearly defined roles and responsibilities	25	53.2 %
Synergy of the team	15	31.9 %
Experience and expertise of the project manager	7	14.9 %
Adequate risk management	5	10.6 %
Ability to handle unexpected problems	15	31.9 %
Communication and consultation with stakeholders	19	40.4 %
Provision of timely data to key players	2	4.3 %
Client acceptance of the results	11	23.4 %
Stakeholders satisfaction	6	12.8 %
Owner involvement within the project	1	2.1 %
Sponsor involvement within the project	3	6.4 %
Top management support	7	14.9 %

2.6.6 Jelodar, Yiu and Wilkinson's Critical Success Factors

"Jelodar, Yiu and Wilkinson (2016) explored the relationship quality attributes within New Zealand construction industry due to the fact that relationship status between parties may have a direct impact on project success and performance" (Jelodar et al., 2016; Meng, 2012). They carried out "Practical Exhaustive Investigation" through interviews with different groups of stakeholder such as director, project manager, contractor, client, consultant, lawyer, mediator, adjudicator, negotiator, general and commercial manager. Among their interviewees, the respondent with most working experienced is more than 40

years while the least experienced respondent is more than 10 years. They classified relationship quality as five general groups with the positive and negative attributes relationship quality within the five general groups (as shown in Table 2.10). “Jelodar et al. (2016) conclude that all the construction experts unanimously believe that relationship quality attributes are essential to any relationship venture and should be incorporated into project relationship”.

Table 2.10: Relationship conceptualisation through exhaustive interviews

Positive attributes of relationship quality	Negative attributes of relationship quality	Theme of the relational determinant
Honesty, trust (cannot exist without honesty and clear communication)	Not being able to address the issue quickly, honestly and openly	Trust and opportunism
Trust is essential in all on-going relationship	Hiding issues with the hope that they will go away	
Trust is important to all relationships	Opportunism and self-interest	
Trust is good	Indecent behaviour fraud opportunism	
Direct but honest claiming obviously tied with responses and decision making	Not being honest and transparent	
Earned trust which cannot be mandated	Opportunism	
Clear communication	Communication issues	Teamwork (communication and collaboration)
Communication (as a facilitators)	Lack of collaboration	
Listening and communication skill, collaborative approach and team perspective	People refuse to listen	
Transparency of information	A confrontational and dogmatic environmental setting and culture	
Effective communication		
Team efforts to resolve problems		
Sophisticated experience of the parties	Rigid thinking in terms of attitude	Performance satisfaction
Attitude, big construction players and companies have had to learn to be successful thus their experience has evolved their attitude.	Behavioural issues and lack of connection are significant	
Performance	Performance issues where requirements are not met	
Assuming that the parties are performing well	Personality there are people who are minded to be cooperative and some people who minded to wrench the last drop of money	
Personality, skills to build good relations	Poor management	
Good management and performance in situations	Inappropriate behaviour	
	Turning issues to personal problems	
Understanding each other's goals and expectations	Non-alignment of parties' interests	Commitment through strategy
Develop personal chemistry of some sort (sense of humour, trivia)	Element of doubt and people will try to reinvent the wheel in some way which could be harmful to relationships	
Fair barging in profit and risk sharing	Uncommitted parties	
Understanding and empathise with the other parties point of view		
Commitment to the project is important		
Strong will and commitment to make things work		
Well written contract with good provisions	Unbalanced contract with disproportionate risks	Strategy and action
Vigorous selection partners specially contractors	Harsh contract conditions	
Fair and balanced contract	Unforeseen provisions opening the way for opportunism and shortcuts	
Clear decision making, problem solving environment governed by defined processes not personal matters	Unforeseen risks and contract implications	
Win–win and sharing culture		
Clear framework for accountability and expectations		

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Overview

This chapter sets out survey findings which allow this assessment to explore the project success factor of different industries in Malaysia. The work presented here first investigates quantitatively which factors play the most important role in defining success of a project and product within the context of Malaysia project managers. Additionally, this study also aimed to analyse the project success in different industry sector and whether the opinions between Malaysia project managers are aligned. This section covers the methodology of this research effort and presents the framework, hypothesis, population, sample, research design. Data collection procedures and data analysis techniques used in this study will be discuss below.

3.2 Conceptual Framework

The conceptual framework comprised 22 independent variables, one moderating variable and one dependent variable. The success factors that are considered to be highly influence on the successfulness of project were critically discussed and drew from various literature (Belassi & Tukel, 1996; Kuen et al., 2009; Els et al., 2012; Alexandrova & Ivanova, 2013; Beleiu et al., 2015; Jelodar et al., 2016).

With inputs from a literature review, a conceptual framework model was developed as in Figure 3.1. From the research framework, the variable to be tested upon are as follows:

- Independent variable (Ability to coordinate, application of project management techniques, client acceptance, client consultation, communication, executive commitment, external environment, and etc)
- Moderating variable (Construction, Manufacturing and Utilities, Services, Information Technology and Telecommunication and Others)
- Dependent variable (Project success)

Respondents were asked to rate the degree of importance each of success factors to project success. Noted that there is only one dependent variable in this framework but there are eight criteria to measure project success in the survey questionnaire (Section C, question 15-22 as in Appendix A). This is due to the overall project success must not only constitute of time, cost and scope measures but also satisfaction measure from all stakeholders including the project manager himself/herself. The measures of project success were defined in Table 3.1 below.

Table 3.1: Measure of project success

Scale	Description	Total points in Section C
1	Failure	8 – 15
2	Not fully successful	16 – 23
3	Mixed	24 – 31
4	Successful	32 – 39
5	Very successful	40 – 46

Figure 3.1: Conceptual framework for success factors in relations with project success criteria

3.3 Research Design

The function of a research design is to construct a framework to effectively address the research questions that requires the type of evidence needed to test a theory, explain the variation of information, the study type applicable to test the relationship of data and data collection methods. This research comprises four stages. In the first stage, an extensive literature review on some of the classic success factors and the criteria to measure project success were carried out. To ensure research rigor, success factors and success criteria were compiled from various sources through data source triangulation. The hypotheses are made based on the success variables that influenced the project success in the industry. The second stage involved data collection and developed a selection of significant success factors for project. The third stage consists of analyses through various method to establish the significant success factor that determine the project success in various industry sector and the success factor of greatest influence. The analysis of this research is target to give project manager a reference of important success measure to enhance the project successfulness in different industry. The last stage interprets the results and provides recommendations for future research. The research design is presented in Figure 3.2.

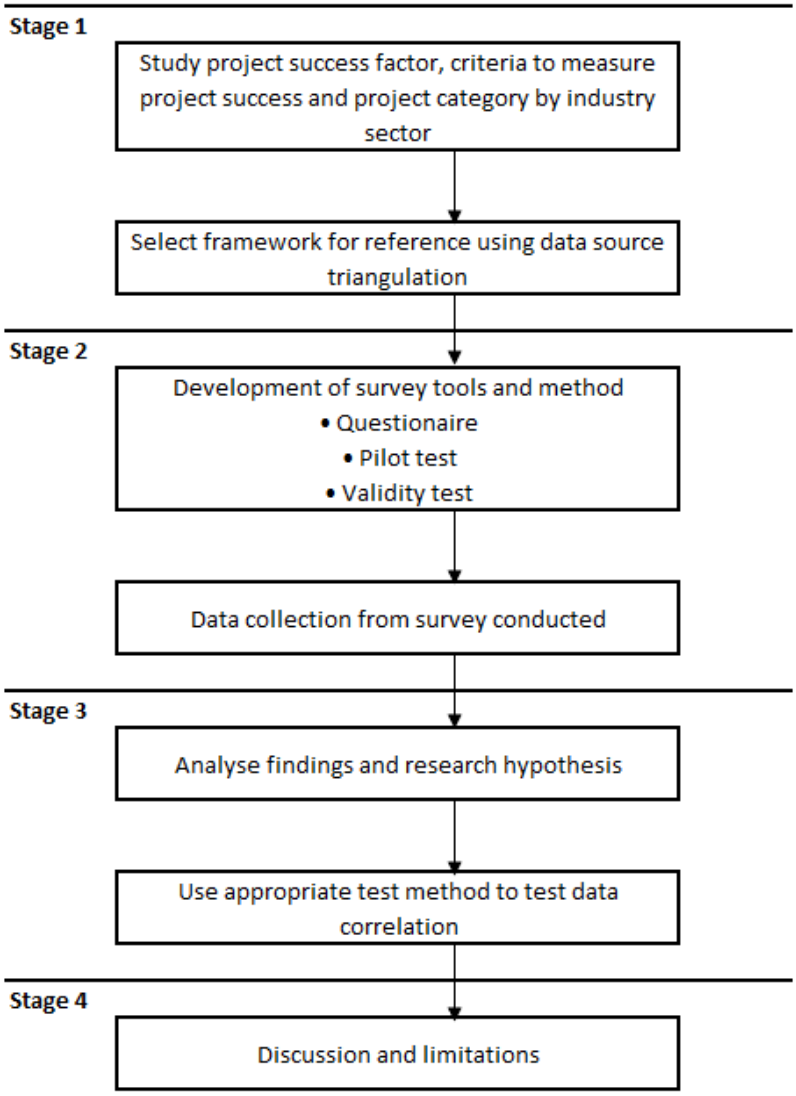

Figure 3.2: Research design

3.4 Research Question and Hypothesis

Four research questions have been formulated in this section. The research questions for this study are shown in Table 3.2. Neuman (2006) proposed that "researcher can search through collections of information with a research question and variables in mind, and then reassemble the information in new ways to address the research question". Findings of the research question were

identified in different publications and research work by using a combination of keywords such as project success factor, critical success factor, project success criteria, measure of project success and success factors in different industry. The result of the four research questions will serve to recapitulate the four research objectives. The first research question is to test the correlation between the identified success factor required for project success. The second research question aim to find out the common success factor perceived by project managers from different industry sector. The third research question attempt to find out whether the industry sector as a moderating variable affects the success factor required for project success. The last research question tends to find out the success factor in each industry sector best concerned by project managers.

Table 3.2: Research questions

Research Question 1	Is there a significant relationship between the success factors and project success in Malaysia?
Research Question 2	What are the common success factors of project success perceived by project managers in Malaysia?
Research Question 3	To what extent would the industry sector affect success factors?
Research Question 4	What are the success factors of different industry sector in Malaysia?

The hypothesis being considered are as follows: -

Table 3.3: Hypothesis that corresponding with research question 1

Research Question 1: Is there a significant relationship between the success factors and project success?		
	Hypothesis	
ID	**H_0**	**H_1**
SA01	Ability to coordinate is not significant to project success	Ability to coordinate is significant to project success

SA02	Application of project management techniques is not significant to project success	Application of project management techniques is significant to project success
SA03	Client acceptance is not significant to project success	Client acceptance is significant to project success
SA04	Client consultation is not significant to project success	Client consultation is significant to project success
SA05	Communication is not significant to project success	Communication is significant to project success
SA06	Executive commitment is not significant to project success	Executive commitment is significant to project success
SA07	External environment is not significant to project success	External environment is significant to project success
SA08	Lesson learnt is not significant to project success	Lesson learnt is significant to project success
SA09	Monitor and control is not significant to project success	Monitor and control is significant to project success
SA10	Organisation structure is not significant to project success	Organisation structure is significant to project success
SA11	Organisational adaptability is not significant to project success	Organisational adaptability is significant to project success
SA12	Personnel is not significant to project success	Personnel is significant to project success
SA13	Project manager leadership and competencies is not significant to project success	Project manager leadership and competencies is significant to project success
SA14	Project mission is not significant to project success	Project mission is significant to project success
SA15	Project schedule and plan is not significant to project success	Project schedule and plan is significant to project success
SA16	Quality management is not significant to project success	Quality management is significant to project success
SA17	Relationship quality is not significant to project success	Relationship quality is significant to project success
SA18	Risk management is not significant to project success	Risk management is significant to project success
SA19	Synergy of team is not significant to project success	Synergy of team is significant to project success
SA20	Technical tasks ability is not significant to project success	Technical tasks ability is significant to project success
SA21	Top management support is not significant to project success	Top management support is significant to project success
SA22	Trouble-shooting is not significant to project success	Trouble-shooting is significant to project success

Table 3.4: Hypothesis that corresponding with research question 3

Research Question 3: To what extent would the industry sector affect success factors?		
	Hypothesis	
ID	**H_0**	**H_1**
SC01	Ability to coordinate is not significantly affected by organisation industry sector	Ability to coordinate is significantly affected by organisation industry sector
SC02	Application of project management techniques is not significantly affected by organisation industry sector	Application of project management techniques is significantly affected by organisation industry sector
SC03	Client acceptance is not significantly affected by organisation industry sector	Client acceptance is significantly affected by organisation industry sector
SC04	Client consultation is not significantly affected by organisation industry sector	Client consultation is significantly affected by organisation industry sector
SC05	Communication is not significantly affected by organisation industry sector	Communication is significantly affected by organisation industry sector
SC06	Executive commitment is not significantly affected by organisation industry sector	Executive commitment is significantly affected by organisation industry sector
SC07	External environment is not significantly affected by organisation industry sector	External environment is significantly affected by organisation industry sector
SC08	Lesson learnt is not significantly affected by organisation industry sector	Lesson learnt is significantly affected by organisation industry sector
SC09	Monitor and control is not significantly affected by organisation industry sector	Monitor and control is significantly affected by organisation industry sector
SC10	Organisation structure is not significantly affected by organisation industry sector	Organisation structure is significantly affected by organisation industry sector
SC11	Organisational adaptability is not significantly affected by organisation industry sector	Organisational adaptability is significantly affected by organisation industry sector

SC12	Personnel is not significant is not significantly affected by organisation industry sector	Personnel is significantly affected by organisation industry sector
SC13	Project manager leadership and competencies is not significantly affected by organisation industry sector	Project manager leadership and competencies is significantly affected by organisation industry sector
SC14	Project mission is not significantly affected by organisation industry sector	Project mission is significantly affected by organisation industry sector
SC15	Project schedule and plan is not significantly affected by organisation industry sector	Project schedule and plan is significantly affected by organisation industry sector
SC16	Quality management is not significantly affected by organisation industry sector	Quality management is significantly affected by organisation industry sector
SC17	Relationship quality is not significantly affected by organisation industry sector	Relationship quality is significantly affected by organisation industry sector
SC18	Risk management is not significantly affected by organisation industry sector	Risk management is significantly affected by organisation industry sector
SC19	Synergy of team is not significantly affected by organisation industry sector	Synergy of team is significantly affected by organisation industry sector
SC20	Technical tasks ability is not significantly affected by organisation industry sector	Technical tasks ability is significantly affected by organisation industry sector
SC21	Top management support is not significantly affected by organisation industry sector	Top management support is significantly affected by organisation industry sector
SC22	Trouble-shooting is not significantly affected by organisation industry sector	Trouble-shooting is significantly affected by organisation industry sector

3.5 Research Approach

One of the most common and well-known study designs is the cross-sectional study design. In the cross-sectional research study, either the entire population

or a subset thereof is selected, and from these individuals, data are collected to help answer research questions of interest. This study uses cross-sectional research because it generalizes results from a larger sample population and the information that is gathered represents what is going on at only one point in time. Qualitative and quantitative are the two descriptive terms that used for different data analysis, whereby both primary and secondary data can be used either qualitative or quantitative methods. Quantitative data collection methods are much more structured than qualitative data collection methods. The main difference between these two methods is that qualitative do not seek statistical significance whilst quantitative focus on statistical analysis. This study will be conducted using quantitative research approach "as it seeks to quantify the data based on representative samples and applies some form of statistical analysis in general" (Malhotra, 2002). The descriptive research survey method will be utilised through the collection of quantitative data to assess if these findings are valid in Malaysia.

3.5.1 Quantitative Research Method

Quantitative research aimed to quantify the collected information by way of generating numerical data or result, whereby the data can be presented by useable statistics, tables, or graphs to be analysed numerically. It is used to quantify attitudes, perceptions, behaviours, and other defined variables. Quantitative Research uses scientific measurement to formulate facts and uncover patterns in research through measurable data as the quantitative data is numeric. Quantitative data collection methods include various forms of surveys

– web-based questionnaires, survey questionnaires, mobile surveys and kiosk surveys, face-to-face interviews, telephone interviews, longitudinal studies, website interceptors, online polls, and systematic observations. Lastly, quantitative research can be used to test pre-determined hypotheses and produce generalize results. The test result can either confirm or reject hypotheses of a described set of observations and ultimately demonstrate or suggest causal relationships between the subjects.

3.6 Sampling

3.6.1 Sampling Method and Population

In this research, random sampling method was used based on snowball sampling technique. Random sampling is defined as the probability of choosing people or thing in a random manner, without any criteria with the aim of eliminating bias. The target population was based on the research objectives. The target population for this research are project managers from different industry in Malaysia. This research exerts snowball sampling technique to penetrate into multiple industry. Snowball sampling is a non-probability sampling technique where initial study subjects help to recruit other participants who meet the eligibility criteria and could potentially contribute to this study through their acquaintances. This method is especially useful in a situation where researcher industry field is not associated to the target population field.

3.6.2 Sampling Size

Stutely (2003) opine that "the sampling should have a minimum of 30 respondents for statistical analyses to present a reliable sampling distribution. This is due to when $n \geq 30$, the value of *t* is quite close to the value of *z* that we would get if we ignored the distinction between the normal and *t* distributions. Researchers often ignore that distinction and just use the *z* value, e.g. 1.96 for 95% confidence interval". A similar Malaysian study by Kuen et al. (2009), had received a total of 79 valid responses to their questionnaire. In this paper, the author targeted to receive a minimum of 79 valid responses for the questionnaire as guided by past surveys in Kuen et al. (2009) research.

3.7 Data Collection

Data collection is the process of gathering and collecting information in an established systematic manner for data evaluation, which then contribute to the objectives of the study. Unsystematic or inaccurate data collection may impact the results of a study and ultimately lead inaccurate data analysis and invalid results. This study is based on primary data collection to capture quality evidence that will allows the researcher to generate results for translate into credible answer to research questions.

3.7.1 Primary Data

Primary data refers the first-hand investigation or survey obtained by the original researcher in his or her study while a primary research involves collecting data about a given subject directly from the real world. The collection mode can be through emails, personal interview, phone interview, observations, ethnographic research and self-administered survey. A good researcher should know how to use both primary and secondary sources in his/her writing and to integrate them in a cohesive fashion. Primary research is necessary as it can supplement your research in secondary sources, such as journals, magazines, or books.

Online survey questionnaire was administered through google form as primary data collection method in virtue of the quantitative nature of our study. "Online survey is one of the method that able to reach out to a wide target population and provides a faster response time" (Llieva, Baron, & Healey, 2002; Naoum, 2007). The questionnaire allowed respondents to complete on their own without obliquely alluded by the researcher on the subject matter. The questionnaire invitations were sent to respondents through email and messenger with a uniform resource locator (URL) link that will direct to the google form survey. The survey was opened online for 21 days (21 February 2017 until 14 March 2017) for the respondents to participate. This duration was due to the author had have sufficient valid responses for data analysis. The author had distributed 183 questionnaires through means of electronic mail, Whatsapp and Facebook messenger to the author's colleagues and friends who are project managers working in different industries. After observing the initial subject, the author asks for assistance from his colleagues and friends to help sent out

invitations to similar subjects of interest which happens to be project manager from different industry in Malaysia to broaden the sampling size. Additional invitations were sent out thru referrals.

3.7.2 Questionnaire Development

For purpose of this research, a questionnaire survey was developed in order to determine the perception of project managers in Malaysia regarding project success factor. The proposed questionnaire consists three sections. Section A had 13 questions which study on the respondents' background information and profile such as their gender, age, type of organisation, working experience and etc. Respondents were required to choose only one option that most suitably described or answered the question.

The section B of the questionnaire comprised of one question which required respondent to rank each of the success factors on a five-point Likert scale whereby "1" represented "Strongly Disagree" and "5" represented "Strongly Agree". Respondents were required to rate all the 22 success factors according to the range on the Likert scale.

Lastly, the remaining section in the questionnaire comprised of eight questions in which three questions required respondent to rate based on seven-point Likert scale while another five questions required respondent to rate based on five-point Likert scale as shown in Table 3.5 below.

Table 3.5: Likert scale

Failure	Not fully successful	Mixed	Successful	Very successful
1	2	3	4	5

Where:

1 = Failing to deliver the project

2 = Successfully delivered the project with many criticism and complaint from stakeholders'

3 = Successfully delivered the project with some criticism or complaint from stakeholders'

4 = Successfully delivered the project without criticism or complaint from stakeholders'.

5 = Successfully delivered the project with good commentary from stakeholders'.

The questions meanwhile invited the respondent to measure their project success rating as influenced by the success factors from previous section. Sample of the survey questions are shown in Table 3.6. We asked the respondents to judge success in three sections:

- Project efficiency in meeting all internal requirements (time, cost and scope as efficiency measures)
- Other stakeholders' (project sponsor, project team, client and end user) satisfaction as perceived by the project managers.
- Overall project success as perceived by the project managers.

Table 3.6: Questions in the survey

Question	Response	Reference
Project success: meeting timeline goals. How successful was the project in meeting project time goals?	7 point scale: 1) >60% over time 2) 45-59% over time 3) 30-44% over time 4) 15-29% over time 5) 1-14% over time 6) on time 7) ahead of schedule	(Dvir, Raz, & Shenhar, 2003); (Zwikael & Globerson, 2006)
Project success: meeting budget goals. How successful was the project in meeting project budget goals?	7 point scale: 1) >60% over budget 2) 45-59% over budget 3) 30-44% over budget 4) 15-29% over budget 5) 1-14% over budget 6) on budget 7) under budget	Dvir et al (2003); Zwikael and Globerson (2006)
Project success: meeting scope/ requirements goals How successful was the project in meeting scope and requirements goals?	7 point scale: 1) >60% requirements missed 2) 45-59% requirements missed 3) 30-44% requirements missed 4) 15-29% requirements missed 5) 1-14% requirements missed 6) requirements met 7) requirements exceeded	Dvir et al (2003)
Project success rating: project sponsor assessment How do you rate the project sponsor's satisfaction with the project's deliverables?	5 point scale: 1) failure 2) not fully successful 3) mixed 4) successful 5) very successful	(Serrador & Turner, 2014)
Project success rating: project team assessment How do you rate the project team's satisfaction with the project?	5 point scale: 1) failure 2) not fully successful 3) mixed 4) successful 5) very successful	(Müller & Turner, 2007b)
Project success rating: client assessment How do you rate the client's satisfaction with the project's results?	5 point scale: 1) failure 2) not fully successful 3) mixed 4) successful 5) very successful	Müller and Turner (2007b)
Project success rating: end user assessment How do you rate the end user's satisfaction with the project's product?	5 point scale: 1) failure 2) not fully successful 3) mixed 4) successful 5) very successful	(Serrador & Turner, 2014)
Overall project success rating: How do you rate the overall success of the project?	5 point scale: 1) failure 2) not fully successful 3) mixed 4) successful 5) very successful	Shenhar and Dvir (2007)

We conducted survey questionnaire on project managers from various industries to help us document a framework of success factors and how their practice affecting success in the studied firms. Respondents to the survey were widely varied in respect of age, length of project experience, sectors, types and values of project. However, there was particularly strong representation of middle-aged and older respondents who worked in senior positions on high value projects, thus it was construed that the responses provided were mainly based on experience of the respondents.

3.7.3 Pilot Study

Pilot study, which also known as feasibility study, is a research study conducted before the intended study to pre-test the original questionnaire on a small scale trial where a few examinees take the test and point out any problems on the mechanics of the test such as the test instructions, formatting of the questionnaire, typographical errors/issues and also on items that are not clear or comprehensible by examinees. Pilot testing aimed to cross-check the questionnaire drawbacks or flaws which then allow the author to make minor adjustments on the questions based on the feedback from respondents. According to Connelly (2008), "a formal pilot study sample size should be 10% of the sample projected for the larger parent study". Nonetheless, "Isaac and Michael (1995) suggested 10 – 30 participants". The importance of pilot studies is to inform feasibility and identify modification before embarking the main study.

Pilot surveys were sent to 30 respondents to ensure the questions are understood by respondents. All 30 respondents in the pilot study came to reach consensus on the appropriateness and adequateness of the content and apprehend no immediate difficulties with the questions in questionnaire. “In case where the pilot study fails the reliability test, and the question(s) in the questionnaire has to be modified, the 30 collected responses should then be discarded” (Huan, 2016).

3.8 Data Analysis Method

The data collected from the questionnaire will be analyse by using IBM Statistical Package for Social Science (SPSS) version 24 as the software platform. Reliability analysis, normality tests and correlation tests will be conducted through SPSS. Since this quantitative research involved non-parametric ranking data, bivariate correlation test and Kruskal-Wallis test are undertaken to analyse the data.

3.8.1 Descriptive Statistics

Frequency distributions were used to convey the data properties of the distributions. Frequency distribution showed the frequency or occurrence of the scores in the data set. Data distribution comes in many types such as normal distribution, skewed distributions, leptokurtic distribution and platykurtic. The success factors will be summarised with statistical mean and then be used for the

reliability, correlation and to compare means tests. Statistical mean is useful to describe the collected data by generating the information into numerical factors. The mean generated from the central tendency of variable will be used to arrange the ranking of success factors.

3.8.2 Kendall's W

Kendall's W test also known as Kendall's Coefficient of Concordance, is a non-parametric statistic. Non-parametric tests are sometimes known as assumption-free tests because they make fewer assumptions about the type of data on which they can be used. Non-parametric statistic is also known as distribution free statistics which the data does not require to fit a normal distribution. Kendall's W test allows for the analysis of categorical variable (nominal variable) as well as ordinal variable. Kendall's Coefficient of Concordance have a range from 0 to 1 where the higher value represents higher agreement among judges.

The mean rank as computed using SPSS in Kendall's W work on the principle of ranking the data. The algorithm begins by arranging the scores of all the variable groups given by individual respondent in ascending order and assign potential ranks starting with 1 to the lowest score and next potential rank (e.g. 2, 3, 4…) to the next highest score. In the case when the same score (by individual respondent) occurs more than once in a data set, the actual rank will be computed by averaging the potential ranks belong to those same scores. Then move onto the next respondent data by sorting the score and again assign potential ranks to all the variable groups starting from the lowest score with the lowest potential

rank. The mean rank of the variable group is obtained by sum up all the actual ranks from different respondents and divide by the total number of respondents.

3.8.3 Validity Test

Validity test ensures the survey question conform to what it's set out measure. Validity test was conducted based on content validity with self-report measures through feedback from industry experts and literature review.

3.8.4 Reliability Test

Reliability of the questionnaires were demonstrated through reliability test. Reliability means that a measure should consistently reflect the construct that it is measuring. "Cronbach (1951) came up with a measure that is loosely equivalent to splitting data in two in every possible way and computing the correlation coefficient for each split. The average of these values is equivalent to Cronbach's alpha, α, which is the most common measure of scale reliability". Cronbach's alpha, α, is based on the following formula: -

$$\alpha = \frac{N^2\overline{Cov}}{\sum s_{item}^2 + \sum Cov_{item}}$$

(Cronbach, 1951)

Where:

N = Number of items
Cov = Covariance
s = Standard deviation

Cronbach's alpha ranges between zero to one. Kline (1999) notes that "although the generally accepted Cronbach' Alpha value of 0.80 is appropriate for cognitive tests such as intelligence tests, for ability tests a cut-off point of 0.70 is more suitable. He goes on to say that when dealing with psychological constructs values below even 0.70 can realistically be expected because of the diversity of the constructs being measured". "The rule of thumb for commonly accepted scores is based on the alpha value which are above 0.70" (Nunnally & Bernstein, 1999). In the case that if Cronbach's alpha value is lower than 0.70, factors with the highest value in "Cronbach's Alpha if Item Deleted" will be removed from the further analysis. In this research, the reliability tests will be conducted for each of the success factors.

3.8.5 Normality Test

Exploratory analysis on the data was conducted to summarise the main characteristics of a dataset. The Kolmogorov–Smirnov test that whether a sample was from a normally distributed population. "This test is most useful when sample sizes are less than about 25 per group, and so is worth selecting if that's the case" (Field, 2009). The distribution can be concluded as not normal when the significant value is less than 0.05.

3.8.6 Bivariate Correlation Test

Bivariate correlations were used to check the correlativity between the success factor variable and the project success variable. Pearson's correlation is meaningful only for parametric data while Spearman's rho correlation is specifically for non-parametric data. Both of these correlations can apply to test directional hypothesis or non-directional hypothesis.

Spearman's correlation is a non-parametric test that can be use when the data is non-normally distributed data. It is also referred to as Spearman's rho test. The calculations are based on deviations and usually have larger values than Kendall's tau. Spearman's Rank correlation coefficient is a technique which can be used to summarise the strength and direction (negative or positive) of a relationship between two variables. The coefficient result will always be between plus 1 and minus 1.

Kendall's tau, τ, is another non-parametric correlation similar to Spearman's correlation that measures the strength of dependence between two variables. It is appropriate to use when the data set is small and with many scores fall on certain rank. This means that the data should have many scores at the same rank. Hence, the *p* values are more accurate with smaller size.

3.8.7 Kruskal–Wallis Test

Kruskal-Wallis test is based on a comparison of the relative rankings of the data in the observed samples to compare median, and for this reason is called a rank test. The term non-parametric test also is used to describe this test because there are no assumptions made about a specific distribution for the population of measurements. The general idea is that values in the total dataset of N observations are ranked from lowest to highest (e.g. lowest = strongly disagree). The ranks of the values are averaged for each group, and the test statistic measures the variation among the average ranks of the groups. If most of the small data values were in one particular group, for example, that group would have a lower average rank than the other groups. A p-value can be determined by finding the probability that the variation among the set of rank averages for the groups would be as large as it is if the null hypothesis is true.

CHAPTER 4

RESULTS

4.1 Overview

In this chapter, the empirical data collected from 82 respondents will be analysed and generate results that translate into quality information for this study.

4.2 Pilot Survey

A pilot survey was carried out to construct the test validity and reliability of the questionnaire. The pilot survey questionnaires were sent to 30 respondents which are the author's colleague and friends who are project manager in Malaysia. All 30 surveys were sent out and response were received. Some commented that the success factors were rather ambiguous and not properly explained. The author took the effort to elucidate the matter by describing each of the success factor as shown in Appendix B. The reliability test was subsequently carried out. Cronbach's Alpha value of 0.916 (refer Table 4.1) was obtained. This showed that the pilot survey was highly reliable ($\alpha \geq 0.70$).

Table 4.1: Cronbach's Alpha test for pilot survey

Cronbach's Alpha	N of Items
0.916	27

4.3 Respondents Attribute

According from survey questionnaire, the statistics for respondent background is shown in Table 4.2 below.

Table 4.2: Respondents attribute

Gender	**Number of Respondent(s)**	**Percentage (%)**
Male	55	67.1
Female	27	32.9
Age Group	**Number of Respondent(s)**	**Percentage (%)**
Less than 20	0	0
20 - 29	29	35.4
30 - 39	40	48.8
40 - 49	11	13.4
50 and above	2	2.4
Organisation Type	**Number of Respondent(s)**	**Percentage (%)**
Project sponsor	26	31.7
Consultant	16	19.5
Main contractor	17	20.7
Sub-contractor	14	17.1
Outsource service provider	9	11.0
Project Base	**Number of Respondent(s)**	**Percentage (%)**
National	56	68.3
International	26	31.7
Qualification	**Number of Respondent(s)**	**Percentage (%)**
Certified Project Manager	7	8.5
Trained Project Manager	32	39.0
Neither certified nor trained	43	52.4
Project experience	**Number of Respondent(s)**	**Percentage (%)**
Less than 2 years	23	28.0
2 – 5 years	29	35.4
6 – 9 years	17	20.7
10 years and more	13	15.9
Number of Project	**Number of Respondent(s)**	**Percentage (%)**
Less than 5	30	36.6
5 – 10	15	18.3
11 – 15	8	9.8
More than 15	29	35.4

Past project size	Number of Respondent(s)	Percentage (%)
Less than 100 activities	67	81.7
More than 100 activities	15	18.3
Project sum	**Number of Respondent(s)**	**Percentage (%)**
Not exceeding RM 200,000	16	19.5
Not exceeding RM 500,000	12	14.6
Not exceeding RM 1 million	14	17.1
Not exceeding RM 3 million	14	17.1
Not exceeding RM 5 million	9	11.0
Not exceeding RM 10 million	6	7.3
Exceeding RM 10 million	11	13.4
Concurrent project handling	**Number of Respondent(s)**	**Percentage (%)**
Yes	63	76.8
No	19	23.2
Organisation industry sector	**Number of Respondent(s)**	**Percentage (%)**
Construction	17	20.7
Manufacturing and Utilities	25	30.5
Services	25	30.5
IT & Telecommunication	8	9.8
Others	7	8.5
Public or private sector	**Number of Respondent(s)**	**Percentage (%)**
Public Sector	8	9.8
Private Sector	74	90.2

4.3.1 Summary on Respondent Attribute

This questionnaire has been completed by project managers in Malaysia as the only targeted respondent group for this study. In this survey 35.4% of respondents are between 20 to 29 years old, 48.8% of them are 30 to 39 years old, 40 to 49 years old project managers are just 13.4%, lastly 50 years old and above consists only 2.4%. Majority of the respondents have 2 to 5 years of working experience in project management (35.4%) followed by less than 2 years (28.0%) and 6 to 9 years (20.7%). Only a minority had 10 years and more (15.9%) working experience in project management. Project manager traits

contribute as one of the factor for project success or even failure. From the respondent, 8.5% of them were certified project manager, follow by 39.0% of trained project manager while 52.4% of the rest project managers were neither certified nor trained. The term “neither certified nor trained” indicate for any project manager with working experience in project management without undergoing any training or possessed any project management related certification by any official project management institute/body. According to a research by Saadé et al. (2015), they found that “Engagement Traits, Education, and Experience are three project manager constructs that need to be considered for project success analysis”. From the data collected there are 67.1% of male, and 32.9% female. On top of that, the organisation role can be one of the critical factors that influence project implementation due to limited authority and control over other working parties. According to the data collected, 31.7% of project managers are from organisation that plays the role of project sponsor or developer, whereby main contractor role consists of 20.7%, follow by 19.5% consultant organisation, and 17.1% sub-contractor role and 11.0% as outsource service provider role.

It was expected by project managers that handled multiple projects concurrently will focus considerably on the efficiency of project while project managers that focus only one project at a time focuses more on the stakeholder satisfaction. From the survey shows that 76.8% of project managers handle project concurrently while only 23.2% of project managers handle single project at one instance. This can be interpreted as most projects are considered parallel project which you can work on multiple things at the same time while a small

percentage of the projects are sequential projects whose actions must be performed in a certain order.

The respondents handled less than 5 projects make up of 36.6% of the total number of respondents. Respondents handled more than 15 projects took a portion of 35.4% meanwhile respondents handled 5 to 10 projects makes up a small part of the total respondents at 18.3% and only 9.8% of respondent handled 11 to 15 projects in their experience. As 81.7% of projects have less than 100 activities, it can be inferred that most of the projects are handled with small team size. Majority of the organisation (68.3%) only handles national project while a small minority of the organisation (31.7%) also handles international project. This could possibly due to minority of the organisation are from large multi-national organisation.

According to the success factor literature review, industry sector is one of the moderating variable that strengthen or weaken the correlation between success factor and project success. In this survey 20.7% of respondents are from the construction sector, followed by 30.5% of them from manufacturing and utilities sector, services sector consists 30.5%, 9.8% respondents are from IT and telecommunication sector and lastly 8.5% respondents from other industries which is not in our categorisation list. These showed that respondents came from different background and industry sectors to answer this survey questionnaire.

4.4 Internal Consistency Reliability

Reliability test was performed to ensure that all variables correlate well to one another and were compute to have Cronbach's Alpha value of 0.932 as shown in Table 4.3. In this case, reliability assessment showed that the project success factors had the good internal consistency and were highly reliable ($\alpha \geq 0.70$).

Table 4.3: Cronbach's Alpha test

Cronbach's Alpha	N of Items
0.932	27

4.5 Assess Distribution Normality within Different Groups

Appendix C shows the Kolmogorov–Smirnov test on most of the data were significantly different from normal ($p < 0.05$). Some of these data do appear to be normally distributed, however the Kolmogorov–Smirnov test suggest highly significantly different from normal, indicating that all independent variable distributions are not normal distributed. These tests confirm that the data are non-parametric and not normally distributed.

4.6 Relationship between Project Success and The Various Success Factors

In this study, we will use Kendall's tau correlation analyses to test for associations in hypothesis testing. Table 4.4 shows the output for Spearman's rho correlation and Kendall's tau correlation on both Success Factor and Project

Success variables. Note that the relationship is negative for Client acceptance and Top management support. The negative correlation means that as Client acceptance or Top management support increased, project success decreased. However, both Client acceptance and Top management support gave a significance value higher than 0.05 therefore they are not significant to project success.

The result displayed giving the significance value of the coefficient of less than 0.05 showed that there is a significant relationship. Ability to coordinate, Monitor and control, Organisational adaptability, Personnel, Project mission and Project schedule and plan were found to have significant relationship with project success. Meanwhile, the other 16 variables do not have any significant relationship with project success.

The hypotheses were used as a way of determining whether the success factor variables were significantly related to project success (refer Tables 4.5). Based on the correlation analysis, six factors were extracted from the independent variable and from the initial 22 factors of the independent variables, 16 factors will be discarded. As a result, the revised success factors were shown in Table 4.6.

Table 4.4: Spearman's correlation test

ID	Spearman's rho		Kendall's tau	
	Correlation coefficient	Sig. (2-tailed)	Correlation coefficient	Sig. (2-tailed)
SF01	0.274	0.013	0.260	0.013
SF02	0.156	0.162	0.146	0.152
SF03	-0.004	0.971	-0.002	0.986
SF04	0.027	0.809	0.027	0.793
SF05	0.194	0.080	0.187	0.077
SF06	0.212	0.056	0.196	0.056
SF07	0.073	0.517	0.069	0.498
SF08	0.184	0.098	0.170	0.093
SF09	0.342	0.002	0.325	0.002
SF10	0.150	0.180	0.135	0.181
SF11	0.258	0.019	0.237	0.020
SF12	0.224	0.043	0.210	0.037
SF13	0.176	0.113	0.166	0.106
SF14	0.243	0.028	0.227	0.025
SF15	0.235	0.034	0.221	0.032
SF16	0.180	0.105	0.170	0.099
SF17	0.170	0.128	0.155	0.124
SF18	0.104	0.353	0.097	0.341
SF19	0.206	0.063	0.193	0.059
SF20	0.071	0.525	0.066	0.522
SF21	-0.007	0.949	-0.006	0.956
SF22	0.166	0.135	0.155	0.126

Table 4.5: Hypothesis result for success factor correlation

Research Question 2: Is there a significant relationship between the success factors and project success in Malaysia?		
	Hypothesis	
ID	**H_0**	**H_1**
SA01	REJECTED	Ability to coordinate is significant to project success
SA02	Application of project management techniques is not significant to project success	REJECTED

SA03	Client acceptance is not significant to project success	REJECTED
SA04	Client consultation is not significant to project success	REJECTED
SA05	Communication is not significant to project success	REJECTED
SA06	Executive commitment is not significant to project success	REJECTED
SA07	External environment is not significant to project success	REJECTED
SA08	Lesson learnt is not significant to project success	REJECTED
SA09	REJECTED	Monitor and control is significant to project success
SA10	Organisation structure is not significant to project success	REJECTED
SA11	REJECTED	Organisational adaptability is significant to project success
SA12	REJECTED	Personnel is significant to project success
SA13	Project manager leadership and competencies is not significant to project success	REJECTED
SA14	REJECTED	Project mission is significant to project success
SA15	REJECTED	Project schedule and plan is significant to project success
SA16	Quality management is not significant to project success	REJECTED
SA17	Relationship quality is not significant to project success	REJECTED
SA18	Risk management is not significant to project success	REJECTED
SA19	Synergy of team is not significant to project success	REJECTED
SA20	Technical tasks ability is not significant to project success	REJECTED
SA21	Top management support is not significant to project success	REJECTED
SA22	Trouble-shooting is not significant to project success	REJECTED

Table 4.6: Hypothesis result for success factor correlation

ID	Success Factors
SF01	Ability to coordinate
SF09	Monitor and control
SF11	Organisational adaptability
SF12	Personnel
SF14	Project mission
SF15	Project schedule and plan

4.7 Comparing Mean Rank on Project Success Factor

The main purpose of this section is to explore the common success factors perceived by project managers from all industry sector in Malaysia. Kendall's Coefficient of Concordance (as known as Kendall's W) is a measure of agreement among raters. From Table 4.7 it showed that the factor with the highest mean rank is Ability to coordinate at 4.00 mean rank as perceived by 82 project managers. Followed by Project schedule and plan at 3.90 mean rank, Monitor and control at 3.82 mean rank, Personnel at mean rank 3.19 and Project mission at mean rank 3.18. On the other hand, the factor with the lowest mean rank score of 2.92 is Organisational adaptability. Therefore, we can conclude that the top three common success factors perceived by project managers in Malaysia are Ability to coordinate, Project schedule and plan and Monitor and control.

Table 4.7: Ranking of success factors

ID	Project success factor	Mean rank	Rank
SF01	Ability to coordinate	4.00	1
SF15	Project schedule and plan	3.90	2
SF09	Monitor and control	3.82	3
SF12	Personnel	3.19	4
SF14	Project mission	3.18	5
SF11	Organisational adaptability	2.92	6
N = 82; Kendall's W = 0.105			

4.8 Role of Industry Sector in Manipulating Success Factor

Table 4.8 showed the test statistic for the Kruskal–Wallis test which have Chi-square goodness-of-fit and significance p value. The crucial thing to look at is the variable Ability to coordinate was found to have significance value of less than 0.05. The null hypothesis for Ability to coordinate was rejected (as shown in Table 4.9). Thus, Ability to coordinate is significantly affected by industry sector.

Table 4.8: Kruskal–Wallis test

		Industry Sector	
ID	Success Factors	Chi-square	*p* value
SF01	Ability to coordinate	9.646	0.047
SF15	Project schedule and plan	3.479	0.481
SF09	Monitor and control	3.202	0.525
SF12	Personnel	0.873	0.928
SF14	Project mission	4.063	0.398
SF11	Organisational adaptability	3.892	0.421

Table 4.9: Hypothesis result for industry sector influence

Research Question 3: To what extent would the industry sector affect success factors?		
	Hypothesis	
ID	**H_0**	**H_1**
SC01	REJECTED	Ability to coordinate is significantly affected by organisation industry sector
SC09	Monitor and control is not significantly affected by organisation industry sector	REJECTED
SC11	Organisational adaptability is not significantly affected by organisation industry sector	REJECTED
SC12	Personnel is not significant is not significantly affected by organisation industry sector	REJECTED
SC14	Project mission is not significantly affected by organisation industry sector	REJECTED
SC15	Project schedule and plan is not significantly affected by organisation industry sector	REJECTED

Based on the conclusion from hypothesis, a follow-up test was conducted to find out which industry sector causes the difference. The Mann-Whitney U test is used to compare differences between industry sectors. Mann–Whitney test works by looking at differences in the ranked positions of scores in different groups. Appendix D showed the result of the Mann-Whitney U test. Table 4.10 shows a summary of the industry sector data in relation to Ability to coordinate. Since the significance of the Mann-Whitney U test is less than 0.05, the null hypothesis is rejected. Therefore, Ability to coordinate have a significant effect on Manufacturing and Utilities sector.

Table 4.10: Industry sector effect to success factor

Industry sector	Ability to coordinate	
	Mann-Whitney U	***Sig. (2-tailed)***
Construction	449.500	0.187
Manufacturing & Utilities	528.500	0.038
Services	588.500	0.162
IT & Telecommunication	204.000	0.108
Others	191.500	0.187

4.9 The Success Factors that are Applicable to Different Industry Sector in Malaysia

The statistical results in Appendix E showed the mean rank of success factor in all industry sector and the number of project managers (N) from each industry sector. Appendix E was transposed into Table 4.11 to Table 4.15 to present the mean rank of all success factors in different industry. Monitor and control was found to have highest mean rank in both construction sector and others sector. Organisation adaptability, Project mission and Ability to coordinate had the highest mean rank in Manufacturing and Utilities sector, Services sector and Information technology (IT) and telecommunication sector. Meanwhile, the lowest mean rank in all industry sector was found to be Organisational adaptability with a mean rank of 27.75 in Information technology and telecommunication sector.

Table 4.11: Ranking of success factor in construction sector

ID	Success factor	Mean rank	Rank
SF09	Monitor and control	42.76	1
SF11	Organisational adaptability	41.53	2
SF14	Project mission	40.24	3
SF12	Personnel	38.74	4
SF01	Ability to coordinate	35.44	5
SF15	Project schedule and plan	35.26	6
N = 17			

Table 4.12: Ranking of success factor in manufacturing and utilities

ID	Success factor	Mean rank	Rank
SF11	Organisational adaptability	42.04	1
SF12	Personnel	40.20	2
SF15	Project schedule and plan	40.16	3
SF09	Monitor and control	37.02	4
SF14	Project mission	35.52	5
SF01	Ability to coordinate	34.14	6
N = 25			

Table 4.13: Ranking of success factor in services

ID	Success factor	Mean rank	Rank
SF14	Project mission	47.92	1
SF01	Ability to coordinate	46.46	2
SF11	Organisational adaptability	44.82	3
SF12	Personnel	44.60	4
SF15	Project schedule and plan	44.20	5
SF09	Monitor and control	41.42	6
N = 25			

Table 4.14: Ranking of success factor in information technology and telecommunication

ID	Success factor	Mean rank	Rank
SF01	Ability to coordinate	53.00	1
SF14	Project mission	43.94	2
SF09	Monitor and control	42.81	3
SF15	Project schedule and plan	41.56	4
SF12	Personnel	40.50	5
SF11	Organisational adaptability	27.75	6
N = 8			

Table 4.15: Ranking of success factor in others sector

ID	Success factor	Mean rank	Rank
SF09	Monitor and control	53.21	1
SF15	Project schedule and plan	51.71	2
SF01	Ability to coordinate	51.64	3
SF11	Organisational adaptability	43.36	4
SF12	Personnel	42.93	5
SF14	Project mission	40.21	6
N = 7			

CHAPTER 5

DISCUSSIONS

5.1 Overview

This chapter discusses the detail analysis of the data correspond to the research questions. Kendall's tau correlation tests provide answers for research question 1. Mean rank test is used to validate research question 2. Lastly, Kruskal–Wallis tests provides explanation for research question 3 and research question 4.

5.2 Research Questions

5.2.1 Research Question 1: Is there a significant relationship between the success factors and project success in Malaysia?

The success factors were shortlisted and selected after conducting extensive literature review on success criteria, critical success factor and project success factor. Many journals and researches in the discipline of success factors on projects were considered and added on to the developed list. The list of success factors was then validated by industry experts. The internal consistency reliability was conducted on all success factors and Cronbach's Alpha α was observed to be more than 0.70 inferring that the measuring variables were deemed reliable. However, Cortina (1993) notes that "as the number of items on

the scale increases, α will increase. Therefore, it's possible to get a large value of Cronbach's Alpha α if there are a lot of items on the scale, and not because the scale is reliable". This explains the high Cronbach's Alpha α from our test.

Correlation test was carried out to assess whether the various success factors can be associate with project success. SPSS software was used to test the individual success factor to determine the strength of the correlation and also determine if the success factors are statistically significant. Based on the Table 4.4, ability to coordinate, monitor and control, organisation adaptability, personnel, project mission and project schedule and plan correlate significantly ($p < 0.05$) with project success. The result demonstrates that Monitor and control had strongest positive correlation with project success ($r = 0.325$, $p = 0.002$) among the six factors, followed by ability to coordinate ($r = 0.260$, $p = 0.013$), organisational adaptability ($r = 0.237$, $p = 0.020$), project mission ($r = 0.227$, $p = 0.025$), project schedule and plan ($r = 0.221$, $p = 0.032$) and personnel ($r = 0.210$, $p = 0.037$). A strong correlation in monitoring and control denotes that the greater project managers monitor and control their project performance, the higher chance that the project will be successful. Project monitoring and control includes the continuous oversight, reporting of project performance, project quality and change control process.

Similarly, the greater a project manager's ability to coordinate, the higher probable that the project will be successful. When coordinating the project team, the halo effect can have a great effect on project. The halo effect is a type of cognitive bias in which the positive feelings about one characteristic (e.g.

intelligent, physical appearance, leadership or dependability) of a person influences his or her other unrelated characteristic (e.g. performance, technical task ability). High ratings of a particular quality correlated to high ratings of other characteristics, while negative ratings of a specific quality also led to lower ratings of other characteristics. Coordinating also includes determining priorities, logistic and assigning project resources.

Organisational adaptability refers to the organisation's ability to adjust its structure and business processes to respond quickly and effectively to successfully achieve its goals in the dynamic environments of marketplace. "The decision to go for either formal or informal project management and implementation depends on the scope and size of the project, the cost of the project, the availability of experienced personnel for the project and also the maturity of the concept of utilising project in an organisation" (Kuen et al., 2009). With that in mind, organisational adaptability therefore became key factors to succeed in different industry sectors due to the diverse nature of project nowadays.

Project mission is important to align the interests of the key project team with the project mission so that project members have a clear direction of what the project needs to achieve. For example, a sustainable development project, 3R (Reuse, reduce and recycle) practice or lean manufacturing culture.

Project schedule and plan is often initiate at the project phase level so that the project manager know which day contain slack time or slack resources which can be utilised in other time when necessary.

Lastly, project team personnel that possessed adequate technical, interpersonal and administrative skills can enhance project success.

5.2.2 Research Question 2: What are the common success factors of project success perceived by project managers in Malaysia?

Kendall's W test was conducted to perform the study. The aim of the study is to explore the common success factor he/she thinks important if a project is to be successful. As can be seen in Table 4.7, the top three common success factors most perceived by project managers of different industry in Malaysia are ability to coordinate, project schedule and plan and monitor and control.

Each person is uniquely capable of performing their job. Building on that theory, project managers were more interested in their ability to coordinate due to there is an intersection of talent in every organisation. Kim and Choi (2013) contends that "effective communication and coordination among stakeholders would result in enhanced project performance". The result from this study in line with Saadé et al. (2015) findings where "the top three critical factors as relevant to project success is ability to communicate at multiple levels, ability to coordinate and effective leadership". Saadé et al. (2015) also point out that "coordination is a logistics trait which can be trained and acquired completely

through experience. Every great project success is the product of worthwhile talent, but it takes a team with many different talents to bring those efforts to fruition. That is why getting the right people doing the right job is essential to a project success". Project manager plays the utmost important role to recognise every personnel ability, skill and talent, then develop them, and coordinate them for handling the suitable tasks in a project. Other than that, project managers should focus their attention and set priorities on important work. A project's success would not be possible if without every individual's contribution.

"Mishra and Mahanty (2016) research results show that there is a potential to save project cost by being flexible in project schedule". A study by Els et al. (2012) showed that "the South African respondents assert scheduling and planning as the most important elements for process". Project manager should place simultaneous attention in timely scheduling and planning in the project implementation phase to ensure complete projects within the specified time while meeting quality and cost requirements.

"From a Malaysian study by Abdullah and Ramly (2009) showed that Control and monitoring is the highest ranked element for process with regard to project success factors". Successful projects with good monitoring and control systems allowed project to stay within a realistic budget. In addition, adequate project control enabled project manager to anticipate problem that could arise and make sure that no details are overlook.

5.2.3 Research Question 3: To what extent would the industry sector affect success factors?

Among the different industry sectors requiring different skills, ability or talent in performing the given job. This may explain why ability to coordinate was found to vary according to industry sector (refer Table 4.9) as project implementation in different industry sectors involved different rules, regulations, legislation and protocols to followed. Long service project manager may have possessed the tacit knowledge and expertise in some particular industries, yet nonetheless they might not possess the relevant expertise in handling projects in unfamiliar industry. The findings proved that industry sectors significantly affect the causal relationship between success factor and project success. This is in line with the findings of Hyväri (2006) whereby she found "there is variation both across industry sectors and project phases as to the relative importance of factors".

From Table 4.10, it showed that ability to coordinate heavily influences the Manufacturing and utilities sector. In contrast to the other four industry sectors, Manufacturing and utilities sector mainly relies on economies of scale to gain a competitive advantage. Whereas industry sectors such as construction, services and IT and telecommunication influenced more by the business environment and project managers must be mindful at delivering the business case with lesser time and budget to achieve competitive advantage. This clearly shows that the skills, experience and the technical know-how of human capital in Manufacturing and utilities industry gain economic value with time. As a result, effective project coordination and management will significantly enhance

the project success in Manufacturing and utilities industry. On the contrary, inadequate coordination not only reflects badly on project manager but also affecting the overall performance and efficiency of the project team members. “It is mentioned that the right combination of people can make the worst documented contract work successfully; equally the poor management of the best documented contract can result in unconstructive behaviour; twisting the relationship in a manner that it is no longer productive” (Jelodar et al., 2016).

5.2.4 Research Question 4: What are the success factors of different industry sector in Malaysia?

In this section, the six success factors that are significant to the successful implementation of project were selected from each industry sector. Table 4.11 to Table 4.15 give the ranking of success factors in each industry sector. The most commonly selected success factor according industry sectors is monitor and control. Granted that Monitor and control was ranked highest in the Construction sector and Others sector, overall trend on the importance of success factors somehow reveal distinct differences among all industry sectors. This interpretation stems from the fact that project managers perceived importance of success factors varies by industry sectors. “Shenhar and Dvir (2007) have empirically shown that projects are managed, planned, organised, and controlled in different ways”. It is necessary to understand the project traits based on different industry sector to find out what factor contributes to success and in which sector perceptions of success are most perceived. This concludes that the relative importance of most of the success factors change significantly based on

the industry sectors. This showed that success factors were not of equal importance throughout the industry sectors.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This research points to the absence of empirical evidence on the project success factors perceived by the project managers in different industry sectors. From this study, six success factors such as ability to coordinate, monitor and control, organisational adaptability, personnel, project mission and project schedule and plan were identified to be strongly correlated with project success. These success factors were then being ranked in terms of mean rankings. On the basis of the responses received, the top three common success factors most perceived by project managers of different industries in Malaysia are ability to coordinate, project schedule and plan and monitor and control. In contrast to some prior studies, communication was ranked highest in most project success researches. This study also found that industry sector played a moderating role on factors that affect the successfulness of project. In fact, ability to coordinate is the only factor among other six factors that significantly influenced the manufacturing and utilities sector. Lastly, monitor and control is ranked the highest in most of the industries.

6.2 Implication of Research

The contribution of this empirical research provides as a reference that may help future project managers to identify the specific factors to focus on when engaging projects in different industry sector. The criteria to measure project success should not only confine to the traditional project efficiency measure such as time, cost and quality but should also consider the appreciation by stakeholders such as project sponsor, project team, client, end user and project manager. The importance of a project manager's ability to coordinate by taking the top-down approach to coordinate the right staffs and resources into critical project positions was found to be a strong factor to enhance project successfulness. Project managers often neglect the competency of human factor and blamed the external factor when problem arising. In fact, it's all down to project manager in recruiting, selecting, training and managing the competent project team members. This study offers new knowledge on how project success in different industries appear to relate and may well contribute to a better understanding and improvement in the discipline of project success.

6.3 Limitations and Future Research

This study has explored the local situation of Malaysia projects, albeit with a small sample and the difficulties arising from the time, cost and research dimensions. The first limitation is the sample may not be large enough to be able to represent the targeted population, there was still a large portion of project managers in society at large that were left unaccounted. Secondly, most of our

targeted respondents are from three industry sectors that are the Construction sector (20.7%), Manufacturing and utilities sector (30.5%) and Services sector (30.5%). This means that the result in this research was largely based on these three dominant groups. Lastly, there was very limited literature and journal material on project success factors based on different industry sectors. Moving in this direction, future studies should be conducted to involve other moderating variables such as project life cycle, organisational role, traits of project manager and attributes of projects into research parameter.

The outcome of this study suggest differently compared to the research by Belassi and Tukel (1996). “Belassi and Tukel (1996) found that in most industries, top management support and the availability of resources were ranked the highest”. They also found that the factors which are related to the project managers usually ranked lower while project managers in this study responded quite differently. It is important to note that the purpose of this study is not to make a direct comparison with the previous study because the respondents from these two studies differ in many dimensions such as geographical, cultural and environment. The purpose is to call for further research to explore different stakeholder perception that may open new avenue to increase stakeholder satisfaction and relationship value.

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APPENDICES

APPENDIX A: Survey questionnaire

Section A: Company and Respondent's Profile

INSTRUCTION: Please provide the following information by placing a tick "√" in the box provided. Respondent were required to choose only one answer that most suitable and correlated to them.

1 Gender

- ☐ Male
- ☐ Female

2 Age

- ☐ Less than 20
- ☐ 20-29
- ☐ 30-39
- ☐ 40-49
- ☐ 50 and above

3 Type of organisation

- ☐ Project Sponsor (developer)
- ☐ Consultant
- ☐ Main contractor
- ☐ Sub-contractor
- ☐ Outsource service provider

4 Where is your project base in?

- ☐ National
- ☐ International

5 Are you a certified or trained Project Manager?

- ☐ Certified Project Manager
- ☐ Trained Project Manager
- ☐ Neither certified nor trained

6 How many years of working experience in the context of project management?

- ☐ Less than 2 years
- ☐ 2-5 years
- ☐ 6-9 years
- ☐ 10 years and more

7 How many projects your experience contain?

☐ Less than 5
☐ 5 – 10
☐ 11 – 15
☐ More than 15

8 To what extent was your past project size managed?
☐ Less than 100 activities
☐ More than 100 activities

9 What is the largest project involved based on contract sum?
☐ Not exceeding RM 200,000
☐ Not exceeding RM 500,000
☐ Not exceeding RM 1 million
☐ Not exceeding RM 3 million
☐ Not exceeding RM 5 million
☐ Not exceeding RM 10 million
☐ Exceeding RM 10 million

10 Are you handling more than one project concurrently?
☐ Yes
☐ No

11 Industry Sector of your organisation
☐ Construction
☐ Manufacturing and Utilities
☐ Services
☐ IT & Telecommunication
☐ Others

12 Is your organisation in the public (government) or private sector?
☐ Public Sector (Government)
☐ Private Sector

13 What are the main application area of projects undertaken by your organisation?
☐ Construction
☐ Manufacturing and Utilities
☐ Services
☐ IT & Telecommunication
☐ Others

Section B: Importance of project success factor to project successfulness

INSTRUCTION: Please rate the importance of each success factors by choosing only one of the number from 1 to 5 according to the followed range. It is mandatory to rank all of the success factors.

Extremely Unimportant	Of Little Importance	Moderately Important	Often Important	Most important
1	2	3	4	5

14	**To what extend do you think the following success factors contributed to the successfulness of your most recent project?**				
Ability to coordinate	1	2	3	4	5
Application of project management techniques	1	2	3	4	5
Client acceptance	1	2	3	4	5
Client consultation	1	2	3	4	5
Communication	1	2	3	4	5
Executive commitment	1	2	3	4	5
External environment	1	2	3	4	5
Lesson learnt	1	2	3	4	5
Monitor and control	1	2	3	4	5
Organisation structure	1	2	3	4	5
Organisational adaptability	1	2	3	4	5
Personnel	1	2	3	4	5
Project manager leadership and competencies	1	2	3	4	5
Project mission	1	2	3	4	5
Project schedule and plan	1	2	3	4	5
Quality management	1	2	3	4	5
Relationship quality	1	2	3	4	5
Risk management	1	2	3	4	5
Synergy of team	1	2	3	4	5
Technical tasks ability	1	2	3	4	5

Top management support	1	2	3	4	5
Trouble-shooting	1	2	3	4	5

Section C: Measure of project success

INSTRUCTION: Please rate by choosing only one number from 1 to 7 according to the followed range:

>60% over time	45-59% over time	30-44% over time	15-29% over time	1-14% over time	On time	Ahead of schedule
1	2	3	4	5	6	7

15	**How successful was the project in meeting project time goals?**						
Project success: meeting timeline goals	1	2	3	4	5	6	7

INSTRUCTION: Please rate by choosing only one number from 1 to 7 according to the followed range:

>60% over budget	45-59% over budget	30-44% over budget	15-29% over budget	1-14% over budget	On budget	Under budget
1	2	3	4	5	6	7

16	**How successful was the project in meeting project budget goals?**						
Project success: meeting budget goals	1	2	3	4	5	6	7

INSTRUCTION: Please rate by choosing only one number from 1 to 7 according to the followed range:

>60% requirements missed	45-59% requirements missed	30-44% requirements missed	15-29% requirements missed	1-14% requirements missed	requirements met	re
1	2	3	4	5	6	

17	**How successful was the project in meeting scope and requirements goals?**						
Project success: meeting scope/ requirements goals	1	2	3	4	5	6	7

INSTRUCTION: Please rank the successfulness by choosing only one number from 1 to 5 according to the followed range:

Failure	Not fully successful	Mixed	Successful	Very successful
1	2	3	4	5

18	How do you rate the project sponsor's satisfaction with the project's deliverables?					
Project success rating: sponsor assessment		1	2	3	4	5

INSTRUCTION: Please rank the successfulness by choosing only one number from 1 to 5 according to the followed range:

Failure	Not fully successful	Mixed	Successful	Very successful
1	2	3	4	5

19	How do you rate the project team's satisfaction with the project?					
Project success rating: project team assessment		1	2	3	4	5

INSTRUCTION: Please rank the successfulness by choosing only one number from 1 to 5 according to the followed range:

Failure	Not fully successful	Mixed	Successful	Very successful
1	2	3	4	5

20	How do you rate the client's satisfaction with the project's results?					
Project success rating: client assessment		1	2	3	4	5

INSTRUCTION: Please rank the successfulness by choosing only one number from 1 to 5 according to the followed range:

Failure	Not fully successful	Mixed	Successful	Very successful
1	2	3	4	5

21	How do you rate the end user's satisfaction with the project's product?					
Project success rating: end user assessment		1	2	3	4	5

INSTRUCTION: Please rank the successfulness by choosing only one number from 1 to 5 according to the followed range:

Failure	Not fully successful	Mixed	Successful	Very successful
1	2	3	4	5

22	**How do you rate the overall success of the project?**				
Overall project success rating:	1	2	3	4	5

APPENDIX B: Success factor description

SF01	Ability to coordinate
1.	Project was cross functionally coordinated (team members come from different areas of an organisation and have different skill sets.)
2.	The project was well described and coordinated with activities to enhanced project performance.
3.	Project leader had provide a means to coordinate information from multiple widely dispersed data.
4.	Project manager took a top-down approach to coordinate the right staffs and resources into critical project positions.
5.	Project was managed in a coordinated way, either to achieve a common goal or to extract benefits which would otherwise not be realized if they were managed independently
SF02	**Application of project management techniques**
1.	Project leader had plan communications; performed integrated change control; plan procurement; plan risk analysis and risk management; define and control scope, budget, cost; acquire and manage project team; developed project charter; identify stakeholders; create work breakdown structure (WBS); create project management plan and etc.
SF03	**Client acceptance**
1.	There was adequate documentation of the project to permit easy use by the clients instructions, etc.)
2.	Potential clients have been contacted about the usefulness of the project
3.	An adequate presentation of the project has been developed for clients.
4.	Clients knew who to contact when problems or questions arise.
5.	Adequate advanced preparation has been done to determine how best to "sell" the project to clients.
SF04	**Client consultation**

	1. The clients were given the opportunity to provide input early in the project development stage. 2. The client (intended users) was kept informed of the project's progress 3. The value of the project has been discussed with the eventual clients 4. The limitations of the project have been discussed with the clients (what the project is not designed to do) 5. The clients were told whether or not their input was assimilated into the project plan.
SF05	**Communication**
	1. The results (decisions made, information received and needed, etc.) of planning meetings were published and distributed to applicable personnel. 2. Individuals/groups supplying input have received feedback on the acceptance or rejection of their input. 3. All groups affected by the project know how to make problems known to the project team.
SF06	**Executive commitment**
	1. Project had visible support and commitment by executive management. 2. Project sponsor helped in managing interference that exist for the project manager. 3. Had ongoing and positive executive involvement in leadership capacity throughout the life-cycle of the project.
SF07	**External environment**
	1. Project had achieved success under the influence of political, economic, socio, natural, legal or regulatory environments. 2. Project had gained support or assist due to national policy or development 3. The project delivery and provision environment had received social support or had not faced biases from community 4. The project has benefitted economically and received incentives either in financial or non-financial forms from government's program. 5. The project had complied with national sustainable development policy in an effort to reduce carbon footprint; support for energy efficient practice; mitigate the effects of global warming through transformation; or adopt 3R (Reduce, Reuse, Recycle) directive/standard.

SF08	Lesson learnt
1.	Project information was documented and archived for lesson learnt.
2.	Organisation had shared the lessons learned from previous and current projects in their internal database despite compressed project schedules.
3.	Project leader realized that the concerned lesson learnt information can be used as evidence of admission of guilt in future litigation against himself.
4.	Documents of previous processes were reviewed; the main lessons learnt were highlighted and categorized accordingly to be used for later similar projects to improve the process.
5.	Contingency discussion at the project level was held to provide lesson learnt to serve as indications for the subproject level.
6.	Close-out meetings were held at the end of projects in order to capture lessons learned for use to improve future projects.
7.	The lesson learnt model worked as a guiding tool and also used as a diagnostic tool to evaluate cases of projects implemented during national crisis.
SF09	**Monitor and control**
1.	All important aspects of the project were monitored, including measures that will provide a complete picture of the project's progress (adherence to budget and schedule, manpower and equipments utilization, team morale, etc.
2.	Regular meetings to monitor project progress and improve the feedback to the project team were conducted.
3.	The results of project reviews were regularly shared with all project personnel who then control budget and schedule.
4.	Cost control was meticulously adjusted according project type and size and taking into account any changes and feedback from project performance.
SF10	**Organisation structure**
1.	The organisational structure (projectised, functional or matrix) had influenced project success.
2.	The organisational structure had given project manager adequacy of authority, power and control.
3.	The organisational structure foster qualified candidate for project team as well as allows project manager to better focus on a single set of goals instead of each group working towards its own agenda.

SF11	Organisational adaptability

1. Organisation had ability to respond quickly and effectively to changes in the marketplace.
2. The management of the subproject level was adapted to the unique characteristics of each project component.
3. Project staffs were able to adapt with differences in regulatory frameworks and applied methodology into practice to improve project management effectiveness.
4. Project staffs were able to adapt the company project management standards used/developed by the given company.
5. Adaptation of project management practice, method, process and tools according to project diversity and the particular needs of each type of project.
6. Adaptation of the organisation, its personnel and tools and techniques to the needs of the mandate.
7. Adaptation of organisation management styles to different social and ecological contexts.
8. Organisation put a high priority on adaptation to changing business demands or lines of business due to environmental pressures or global economic downturns through build organisational capability, research and development, etc.
9. Organisation managerial effort required for adaptation and control of changing environment must also be realistic.

SF12	Personnel

1. Project team personnel understood their role on the project team.
2. There was sufficient manpower to complete the project.
3. The personnel on the project team understood how their performance will be evaluated.
4. Job description for team members have been written and distributed and were understood.
5. Adequate technical and /or managerial training (and time for training) was available for members of the project team.
6. The project leader possessed adequate technical skills.
7. The project leader possessed adequate interpersonal skills.

8. The project leader possessed adequate administrative skills
9. The project leader maintained a high profile (is visible and involved) on the project team.
10. The project leader has the ability to motivate team members and maintain a cohesive project team.

SF13	Project manager leadership and competencies

1. Project manager leadership styles had led to successful outcome on different types of project.
2. Project manager leadership style had influenced the performance of the project team and led to successful implementation of projects.
3. Project manager had maintained a leadership style that adapts to each employee assigned to the project.
4. The project manager was competent and possessed with the necessary skills, experience and qualification.

SF14	Project mission

1. The goals of the project were in line with the general goals of the organisation.
2. The basic goals of the project were made clear to the project team.
3. The results of the project benefited the parent organisation.
4. I am enthusiastic/confidence about the chances for success of the project.
5. I was aware of and can identify the beneficial consequences to the organisation of the success of the project.

SF15	Project schedule and plan

1. We know which activities contain slack time of slack resources which can be utilized in other area during emergencies.
2. There was a detailed plan (including time, schedules, milestones, manpower requirements, etc.) for the completion of the project.
3. There was a detailed budget for the project.
4. Key personnel needs (who, when) were specified in the project plan.

SF16	Quality management

1. Organisation had developed quality plan which identify project technical quality standards, quality assurance processes, quality standards, and

	quality control processes led by project managers who monitor project quality and drive changes to achieve expected quality. 2. Owners, suppliers, contractors, and all tiers of sub-contractors conform to quality management process and practices. 3. There was a proper documenting and tracking procedure for the quality performance of contractors, sub-contractors and suppliers. 4. There was a mechanism of evaluating and confirming the competence of the second hand contractors before signing the contract. 5. There was a system of processes and practices applied to ensure that the quality of fabricated materials and equipment meet the project's requirements and specifications. 6. The project leader conducted necessary quality control work in practice to ensure quality outcome.
SF17	**Relationship quality**
	1. Genuine intent is placed to take the relationship beyond formalities by trying to achieve the attributes such as commitment, teamwork, performance satisfaction and ultimately trust. 2. There was some informal alignment of goals and agreements outside the contractual setting based on "gentleman's agreement" or spirit of mutual trust and cooperation. 3. Contractual circumstances, behavioural issues, and even organisational and work cultures between parties have a direct impact on project success and performance. 4. Contract was formulized to achieve fit for purpose relationships within culture of transparency while avoid the blame culture where there is liability. 5. Subcontractor was involved in some decision making processes. 6. Project composed certain relational arrangements and dependency on contractual provisions is minimum. 7. Parties have put effort to assess and evaluate the contracting parties' performance according to benchmarking standard. 8. A certain level of commitment such as risk sharing, incentive regime and empowerment of the parties were imposed in the contract. 9. Reliance to the contract adequacy was limited while a lot of work is performed through charters and mutual agreements.
SF18	**Risk management**

	1. Project plan had included risk analysis to identify threats and evaluate risks in the project and how risk can affect project performances. 2. Project leader had implemented risk control to reduce or eliminate potential threats. 3. In the event that an incident occurred, project member knew what the actions of mitigation are. 4. Risk assessment was carried out to identify the likelihood and severity of risk/hazard. 5. Continuous assessment was held on decisions taken during project life cycle which leads to project risk enhancement.
SF19	**Synergy of team**
	1. Project team has feelings of belonging in the team. 2. High team motivation and teamwork in project team. 3. Project team met team productivity target. 4. Project team had clear effort to collaborate, cooperate, communicate and resolve problem as a team. 5. Project team enthusiastic/keen in any team building or team development activities. 6. Tacit knowledge and accumulated experience were transmitted within project team members.
SF20	**Technical tasks ability**
	1. Specific project tasks were well managed. 2. The project engineers and other technical people were competent. 3. The technology that is being used to support the project worked well. 4. The appropriate technology (equipment, training programs, etc.) has been selected for project success. 5. The people implementing the project understood it.
SF21	**Top management support**
	1. Upper management was responsive to the requests for additional resources, when the need arises. 2. Upper management shared responsibilities with project team for ensuring the project's success.

3. I agreed with upper management on the degree of my authority and responsibility for the project.
4. Upper management supported me in a crisis.
5. Upper management has granted us the necessary authority and has supported our decisions concerning the project.

SF22	Trouble-shooting

1. The project leader was not hesitant to enlist the aid of personnel not involved in the project in the event of problems.
2. “Brain storming” sessions was held to determine where problems were most likely to occur.
3. In case of project difficulties, project team members knew exactly where to go for assistance.
4. Problems that arised were solved completely.
5. Immediate action was taken when problems came to the project team’s attention.

APPENDIX C: Test of normality

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	NewIndustrySector	Statistic	df	Sig.	Statistic	df	Sig.
CoordinateAbility	Construction	.285	17	.001	.792	17	.002
	Others	.435	7	.000	.600	7	.000
	Manufacturing & Utilities	.302	25	.000	.784	25	.000
	Services	.375	25	.000	.693	25	.000
	Information Technology & Telecommunication	.455	8	.000	.566	8	.000
ProjectManagementTechniques	Construction	.300	17	.000	.798	17	.002
	Others	.357	7	.007	.777	7	.024
	Manufacturing & Utilities	.261	25	.000	.860	25	.003
	Services	.259	25	.000	.859	25	.003
	Information Technology & Telecommunication	.455	8	.000	.566	8	.000
ClientAcceptance	Construction	.324	17	.000	.752	17	.000
	Others	.435	7	.000	.600	7	.000
	Manufacturing & Utilities	.253	25	.000	.794	25	.000
	Services	.258	25	.000	.780	25	.000
	Information Technology & Telecommunication	.327	8	.012	.810	8	.037
ClientConsultation	Construction	.270	17	.002	.878	17	.030
	Others	.258	7	.174	.818	7	.062
	Manufacturing & Utilities	.336	25	.000	.757	25	.000
	Services	.243	25	.001	.832	25	.001

	Information Technology & Telecommunication	.325	8	.013	.665	8	.001
Communication	Construction	.331	17	.000	.738	17	.000
	Others	.504	7	.000	.453	7	.000
	Manufacturing & Utilities	.354	25	.000	.710	25	.000
	Services	.394	25	.000	.597	25	.000
	Information Technology & Telecommunication	.325	8	.013	.665	8	.001
ExecutiveCommitment	Construction	.257	17	.004	.799	17	.002
	Others	.360	7	.007	.664	7	.001
	Manufacturing & Utilities	.356	25	.000	.742	25	.000
	Services	.314	25	.000	.777	25	.000
	Information Technology & Telecommunication	.325	8	.013	.665	8	.001
ExternalEnvironment	Construction	.236	17	.013	.890	17	.046
	Others	.407	7	.001	.612	7	.000
	Manufacturing & Utilities	.264	25	.000	.837	25	.001
	Services	.305	25	.000	.841	25	.001
	Information Technology & Telecommunication	.263	8	.109	.827	8	.056
LessonLearnt	Construction	.232	17	.016	.870	17	.022
	Others	.296	7	.063	.840	7	.099
	Manufacturing & Utilities	.210	25	.006	.803	25	.000
	Services	.274	25	.000	.703	25	.000
	Information Technology & Telecommunication	.455	8	.000	.566	8	.000
MonitorControl	Construction	.324	17	.000	.752	17	.000
	Others	.435	7	.000	.600	7	.000
	Manufacturing & Utilities	.251	25	.000	.799	25	.000
	Services	.258	25	.000	.748	25	.000

	Information Technology & Telecommunication	.300	8	.033	.798	8	.027
OrganisationStructure	Construction	.292	17	.000	.862	17	.016
	Others	.504	7	.000	.453	7	.000
	Manufacturing & Utilities	.282	25	.000	.823	25	.001
	Services	.284	25	.000	.844	25	.001
	Information Technology & Telecommunication	.325	8	.013	.665	8	.001
OrganisationalAdaptability	Construction	.366	17	.000	.732	17	.000
	Others	.357	7	.007	.777	7	.024
	Manufacturing & Utilities	.284	25	.000	.801	25	.000
	Services	.220	25	.003	.846	25	.001
	Information Technology & Telecommunication	.325	8	.013	.665	8	.001
Personnel	Construction	.225	17	.022	.845	17	.009
	Others	.357	7	.007	.787	7	.030
	Manufacturing & Utilities	.239	25	.001	.859	25	.003
	Services	.279	25	.000	.816	25	.000
	Information Technology & Telecommunication	.250	8	.150	.849	8	.093
PM_LeadershipAndCompetencies	Construction	.265	17	.003	.855	17	.013
	Others	.296	7	.063	.840	7	.099
	Manufacturing & Utilities	.321	25	.000	.776	25	.000
	Services	.281	25	.000	.740	25	.000
	Information Technology & Telecommunication	.263	8	.109	.827	8	.056
ProjectMission	Construction	.206	17	.054	.817	17	.003
	Others	.214	7	.200*	.858	7	.144
	Manufacturing & Utilities	.230	25	.001	.805	25	.000
	Services	.259	25	.000	.787	25	.000

	Information Technology & Telecommunication	.228	8	.200*	.835	8	.067
SchedulePlan	Construction	.243	17	.009	.809	17	.003
	Others	.435	7	.000	.600	7	.000
	Manufacturing & Utilities	.298	25	.000	.771	25	.000
	Services	.316	25	.000	.673	25	.000
	Information Technology & Telecommunication	.300	8	.033	.798	8	.027
QualityManagement	Construction	.285	17	.001	.792	17	.002
	Others	.435	7	.000	.600	7	.000
	Manufacturing & Utilities	.246	25	.000	.809	25	.000
	Services	.281	25	.000	.740	25	.000
	Information Technology & Telecommunication	.263	8	.109	.827	8	.056
RelationshipQuality	Construction	.285	17	.001	.792	17	.002
	Others	.258	7	.174	.818	7	.062
	Manufacturing & Utilities	.248	25	.000	.876	25	.006
	Services	.249	25	.000	.812	25	.000
	Information Technology & Telecommunication	.301	8	.031	.782	8	.018
RiskManagement	Construction	.258	17	.004	.877	17	.029
	Others	.435	7	.000	.600	7	.000
	Manufacturing & Utilities	.230	25	.001	.805	25	.000
	Services	.272	25	.000	.751	25	.000
	Information Technology & Telecommunication	.250	8	.150	.849	8	.093
TeamSynergy	Construction	.292	17	.000	.776	17	.001
	Others	.435	7	.000	.600	7	.000
	Manufacturing & Utilities	.321	25	.000	.776	25	.000
	Services	.286	25	.000	.796	25	.000

	Information Technology & Telecommunication	.228	8	.200*	.835	8	.067
TechnicalTaskAbility	Construction	.285	17	.001	.792	17	.002
	Others	.332	7	.019	.869	7	.183
	Manufacturing & Utilities	.253	25	.000	.794	25	.000
	Services	.277	25	.000	.789	25	.000
	Information Technology & Telecommunication	.375	8	.001	.732	8	.005
TopManagementSupport	Construction	.244	17	.008	.815	17	.003
	Others	.345	7	.012	.732	7	.008
	Manufacturing & Utilities	.257	25	.000	.779	25	.000
	Services	.329	25	.000	.733	25	.000
	Information Technology & Telecommunication	.228	8	.200*	.835	8	.067
TroubleShooting	Construction	.295	17	.000	.812	17	.003
	Others	.357	7	.007	.777	7	.024
	Manufacturing & Utilities	.242	25	.001	.813	25	.000
	Services	.376	25	.000	.680	25	.000
	Information Technology & Telecommunication	.220	8	.200*	.917	8	.408

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

APPENDIX D: Mann-Whitney U test

Ranks

	MWU_Construction	N	Mean Rank	Sum of Ranks
CoordinateAbility	Construction Industry	17	35.44	602.50
	Not Construction Industry	65	43.08	2800.50
	Total	82		

Test Statistics[a]

	CoordinateAbility
Mann-Whitney U	449.500
Wilcoxon W	602.500
Z	-1.318
Asymp. Sig. (2-tailed)	.187

a. Grouping Variable: MWU_Construction

Ranks

	MWU_ManufacturingUtilities	N	Mean Rank	Sum of Ranks
CoordinateAbility	Manufacturing & Utilities Industry	25	34.14	853.50
	Not Manufacturing Industry	57	44.73	2549.50
	Total	82		

Test Statistics[a]

	CoordinateAbility
Mann-Whitney U	528.500
Wilcoxon W	853.500
Z	-2.073
Asymp. Sig. (2-tailed)	.038

a. Grouping Variable: MWU_ManufacturingUtilities

Ranks

	MWU_Services	N	Mean Rank	Sum of Ranks
CoordinateAbility	Servicves Industry	25	46.46	1161.50
	Not Services Industry	57	39.32	2241.50
	Total	82		

Test Statistics[a]

	CoordinateAbility
Mann-Whitney U	588.500
Wilcoxon W	2241.500
Z	-1.397
Asymp. Sig. (2-tailed)	.162

a. Grouping Variable: MWU_Services

Ranks

	MWU_ITandTelecommunication	N	Mean Rank	Sum of Ranks
CoordinateAbility	IT & Telecommunication	8	53.00	424.00
	Not IT Industry	74	40.26	2979.00
	Total	82		

Test Statistics[a]

	CoordinateAbility
Mann-Whitney U	204.000
Wilcoxon W	2979.000
Z	-1.608
Asymp. Sig. (2-tailed)	.108

a. Grouping Variable: MWU_ITandTelecommunication

Ranks

	MWU_Others	N	Mean Rank	Sum of Ranks
CoordinateAbility	Others Industry	7	51.64	361.50

	Construction, Manufacturing, Services and IT Industry	75	40.55	3041.50
	Total	82		

Test Statistics[a]

	CoordinateAbility
Mann-Whitney U	191.500
Wilcoxon W	3041.500
Z	-1.318
Asymp. Sig. (2-tailed)	.187

a. Grouping Variable: MWU_Others

APPENDIX E: Mean rank of success factor in industry sector

Ranks

	NewIndustrySector	N	Mean Rank
CoordinateAbility	Construction	17	35.44
	Others	7	51.64
	Manufacturing & Utilities	25	34.14
	Services	25	46.46
	Information Technology & Telecommunication	8	53.00
	Total	82	
SchedulePlan	Construction	17	35.26
	Others	7	51.71
	Manufacturing & Utilities	25	40.16
	Services	25	44.20
	Information Technology & Telecommunication	8	41.56
	Total	82	
MonitorControl	Construction	17	42.76
	Others	7	53.21
	Manufacturing & Utilities	25	37.02
	Services	25	41.42
	Information Technology & Telecommunication	8	42.81
	Total	82	
Personnel	Construction	17	38.74
	Others	7	42.93
	Manufacturing & Utilities	25	40.20
	Services	25	44.60
	Information Technology & Telecommunication	8	40.50
	Total	82	
ProjectMission	Construction	17	40.24
	Others	7	40.21
	Manufacturing & Utilities	25	35.52
	Services	25	47.92

	Information Technology & Telecommunication	8	43.94
	Total	82	
OrganisationalAdaptability	Construction	17	41.53
	Others	7	43.36
	Manufacturing & Utilities	25	42.04
	Services	25	44.82
	Information Technology & Telecommunication	8	27.75
	Total	82	