A STUDY OF INTEGRATION OF RISK MANAGEMENT AND VALUE MANAGEMENT IN CONSTRUCTION PROJECT

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SUPERVISOR'S DECLARATION

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Bachelor of Project Management with Honors.

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STUDENTS' DECLARATION

I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged. The thesis has not been accepted for any degree and is not concurrently submitted for award of other degree.

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ABSTRACT

Construction industry is one the main contributors for the growth of economic in Malaysia. Meanwhile, the process of construction project involves high risk and full of uncertainties. The issues that always happen are delay, over budget, out of scope and fail to achieve the objective. Risk management and value management are the best practice management tools to reduce the probability of risk and balance the cost and value of the construction project respectively. However, applying both of the management practices separately is waste of time and resources. Therefore, this research was conducted to identify the potentiality of the integration between risk management and value management and determine the benefits of the integration to the construction projects. The data was collected from targeted respondents who working at G7 construction company at Selangor. The data was analyzed by using SPSS 2.0 software. Pearson Correlation Test was used to analyze the relationship between the similarity factors and the potentiality of the risk management and value management to be integrated. Descriptive analysis used to identify the most significant benefits to the construction project. The results and findings provide the idea of the integration of both processes to project managers.

ABSTRAK

Syarikat pembinaan adalah salah satu penyumbang kepada petumbuhan ekonomi Malaysia. Sementara itu, proses pembinaan melibatkan risiko yang tinggi dan penuh dengan ketidakpastian. Isu-isu yang selalu berlaku adalah kelewatan, kelebihan kos, luar daripada skop dan gagal untuk mencapai objektif. Pengurusan risiko dan pengurusan nilai adalah pengurusan yang terbaik untuk mengurangkan kebarangkalian risiko dan mengimbangi kos dengan nilai projek masing-masing. Walaubagaimanapun, penggnaan kedua-dua pengurusan tersebut secara berasingan adalah pembaziran masa dan sumber. Olehitu, kajian ini dijalankan untuk mengenal pasti potensi integrasi di antara pengurusan risiko dan pengurusan nilai dan menentukan manfaat integrasi untuk projek-projek pembinaan. Data telah dikumpul daripada responden yang bekerja di syarikat pembinaan G7 di Selangor. Data telah dianalisis dengan menggunakan SPSS software. Pearson Correlation digunakan untuk menganalisis hubungan antara faktor-faktor persamaan dengan potensi pengurusan risiko dan pengurusan nilai untuk diintegrasikan. Descriptive analysis digunakan untuk mengenalpasti manfaat yang paling signifikasi kepada projek pembinaan. Keputusan daripada kajian ini menunjukkan bahawa faktor-faktor persamaan adalah positif dengan kemungkinan untuk disepadukan. Manfaat yang paling signifikasi adalah manfaat kos. Kajian ini telah memberi idea integrasi kedua-dua proses kepada pengurus projek.

TABLE OF CONTENT

LIST OF TABLE

LIST OF FIGURE

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Construction industry is one of the significance contributors for the growth of GDP Malaysia (Sambasivan & Soon, 2007). It contributed to register a growth of 14.3% during the first half of 2014 (January – June 2013:12%) and expected continue to increase to 10.7% in 2015 (Economic Report 2014/2015). However, not all of the construction projects can be successfully deliver on time, within budget and quality. There are construction projects which had been terminated or abandoned due to the critical success factors like tight project schedule, limited resources, complicated process, change of scope and other external factors. These problems have come into issues and make chronic effect to construction project.

In order to overcome the issues and effects in the construction projects, it is imperative to evaluate and apply effective ways in the construction projects. Risk management and value management are recognized as best practice management tools in construction industries past few decades (Karim, Berawi, Yahya et al., 2007). Both of the management tools have their own significant and specification, yet they have the common factors like the management style, workshop format, tools and techniques and management structure.

The similarities between the risk management and value management showed that both of management tools have the potential to be integrated. Implementation of the risk management and value management in the construction project individually is time consuming and waste of resources. The integration of risk management and value

management can manage the project effectively. Thus, there is an aspiration to integrate both of the management tools in order to satisfy the requirement of stakeholders and increase the performance of the construction industries.

This research intends to provide a clear direction of the topic to be studied by focusing to the integration of risk management and value management in construction projects. This research also discusses about the potentiality and benefits of the application to the construction projects.

1.2 PROBLEM BACKGROUND

This research is to express the idea of the integration between risk management and value management in construction project. The objectives of the research are to determine the potentiality and the benefits of the integrated of risk management and value management in construction projects.

Based on the previous researches which done by Hiley & Paliakostas (2001); Dallas (2006); Project Management Institute (2008); Cole (2010), there were a positive result against the research of the integration between the risk management and value management. The positive result indicated that the risk management and value management can be applied in parallel in the same time. So, the similarities and the common factors between the risk management and value management had justified the potential to integrate both processes. For instances, the methods, tools, management style and process existed in both disciplines enhance the integration process. This is because the integration always results in duplicated efforts. It can improve the performance of the construction project and reduce the negative impacts like cost overrun, delay to the construction projects.

Furthermore, the previous research (Ranesh & Zillante, 2012) had proved that how the integrated of risk management and value management had increased the success of construction projects. It helped to achieve the project objectives by satisfying the customers' need. The main purpose for the integration of risk management and value management is to reduce the occurring of risk and maximize the value of the

project. Therefore, there is an increasing need of the integration of risk management and value management, especially in construction projects.

There is a finding that the integration of risk management and value management framework will come out with a better value for money to all stakeholders in the Public Private Partnership project (PPP) (Ranesh, Zillante et al. 2012). They achieved the best value for money in Public Private Partnership project by integrating the risk management and value management. The integration of the risk management and value management effectively assist project manager to minimize the likelihood and probability of risk occurrence while optimize the value and return of investment (Dallas, 2006). Both of the management techniques are interconnected and should be applied concurrently (OGC, 2003) because it can save the time and cost.

Most of the project manager may concern about the value and the risks that involve in the construction project, but few of them could apply the appropriate management to balance the value and risk effectively to increase the project performance. The project managers always apply the risk management and value management separately. Throughout this study, there is a view on the potentiality and the benefit for the integration between the risk management and value management in construction project.

1.3 PROBLEM STATEMENT

In construction project, the process is complex and require large amount of capital to invest. It is important to reduce the risk associated, while at the same time, improving the value of the project to meet the customers' need are increasingly undertaken by many construction industries. Instead of manage the risk in the project, the value of the project need to be optimized as well. Othman (2005) stated that the risk management and value management are two complimentary disciplines, the best value could not be optimized only if the key risks have been managed. In order to obtain the balance between risk and value in the construction project, integration of risk management and value management are inevitable to be implemented in the construction project.

Based on the researches like Paliokostas (2000), Smith (2006) and Thompson (2004), there is a need to integrate the risk management and value management. The factors between the risk management and value management like the utilization of the same resources, involvement of the main stakeholders in the workshop, team oriented management style and the use of brainstorming technique to identify solutions are similar. These examples had shown that risk management and value management share the same common structured based and goals in managing projects. They considered as group activities. The similarities between the risk management and value management indicate that there is a potentiality to be integrated.

Furthermore, the integration of the risk management and value management will bring significant benefits to the construction project. According to the Othman (2008), the most significant benefits of the integration are better understand the customers' need and requirement, avoid unnecessary cost, shorten the duration of the project, improve team working and improve the communication among the project teams and external stakeholders. All those benefits may occur once the integration of risk management and value management is success implement in the construction project. Those benefits may help to improve the performance of the projects effectively. A construction project should concern on integration of risk management and value management and implementing it.

Nevertheless, there are some problems with the concept of the integration of risk management and value management when recognized in construction project. People have the misconception with the idea of integration of risk management and value management. Most of the construction project managers and project teams viewed them as a separate discipline in terms of theoretical and structure and should implement them individually in project. They believed that the risk management is focused on negative elements while value management is focused on positive element (Ranesh, Zillante and Chileshe, 2012) which has no potential to be integrated. They apply the technique sseparately in construction projects. They do not realize with the similar factors between the risk management and value management. Thus, they spent much times and efforts to implement both of the management tools properly in order to achieve the objective and

yet it was just waste of time and resources. This might influence the process and outcome of project.

Besides that, the risk management and value management cannot bring the most significant benefits to the construction projects once the two processes are implemented individually. Paliokostas (2009) stated that the combination of the two processes are compatible and complementary, separately apply the techniques could waste of time and resources. The construction projects might face with the constraints in cost, time, scope and quality. It causes the construction projects to be delayed and affect the viability of the project. If the project manager plans to apply in different time, the benefits of the risk management and value management would be buried. The construction projects which are lack of effective planning and management tools cannot achieve the objectives.

Hence, the aims of this study are to identify the potentiality and benefits for integration between risk management and value management in the construction projects. The project managers are lack of the awareness and information with the integrated technique and apply the techniques separately in construction projects. The application of the risk management and value management increase the effectiveness and efficiency.

1.4 RESEARCH OBJECTIVES

RO1: To identify the potentiality for integration between risk management and value management in construction project

RO2: To determine the benefits of the integration of the risk management and value management in construction project.

1.5 RESEARCH QUESTIONS

RQ1: What are the potentialities for the integration between risk management and value management in construction projects?

RQ2: What are the benefits of the integration of the risk management and value management in construction projects?

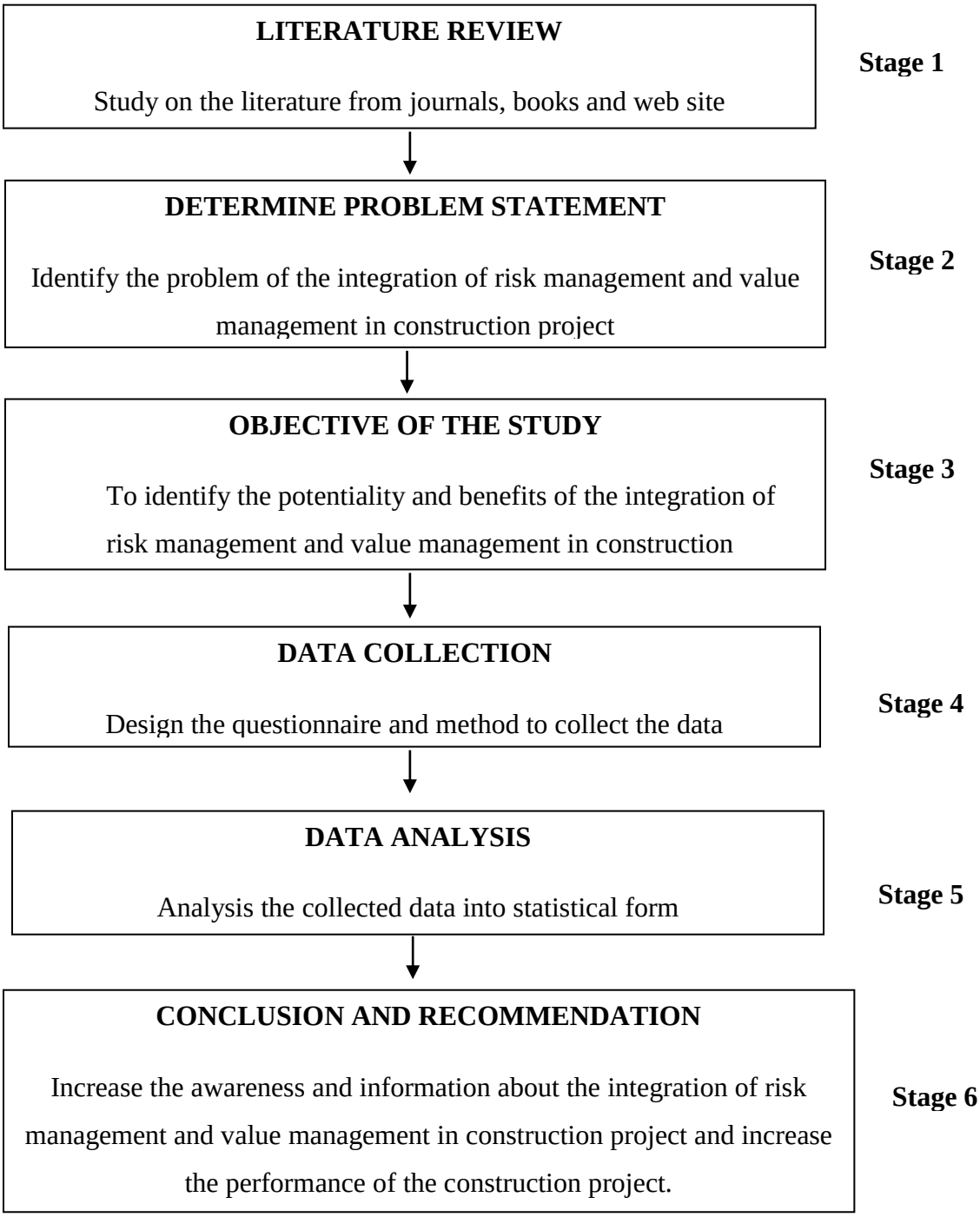
1.6 SCOPE OF RESEARCH

This research was focused on the potentiality and the benefits of the integration of risk management and value management in construction projects. The scope of this research included the risk management and value management methodologies. Studying the significance and similarities between the risk management and value management can identify the potentiality to integrate the risk management and value management. Then, it can determine the benefits of the integration of risk management and value management. Furthermore, it focused on the contractor companies which was Grade 7 and registered under Construction Industry Development Board (CIDB) Malaysia. Construction project was involved with complex process, resources and capital investment. So, it might have the experiences in applying the integration of risk management and value management. Thus, the results from the perspective of project manager in construction sector are more accurate.

1.7 EXPECTED OUTCOME

In the end of the research study, it is expected to achieve the objectives that had been stated. Besides that, by determine the potentiality and the benefits of the integration of risk management and value management, it is expected to increase the awareness and knowledge of the concept and the application of integrated of risk management and value management in construction project. Thus, it can increase the effectiveness of the project by applying the integrated risk management and value management in construction project.

1.8 RESEARCH PROCESS



CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

The overall of the chapter 2 is the explanation about the literature review established by the researchers and practitioners in order to get more knowledge about the study. This chapter starts with the discussion about the terms of the integration, risk, risk management, value, value management and the construction project. It also covers the reviews of the integration of risk management and value management in construction project.

2.2 RISK

It is important to determine what the risk is as risk can be implied in many means and dimensions. Understanding the risk concept can help project manager to produce better management plan. According to the *Oxford English Dictionary*, risk is the possibility of incurring misfortune or loss, expose to the chance of injury or loss; hazard. Risk always compromises with two elements which are likelihood (occurrence) and consequence (Loosemore, 2006 p10). The likelihood is the probability to happen, the percentage number which more than 1 but less than 100. The consequence is the impact of the risk to the overall of the project which can be positive or negative. The greater the chance a harm is likely to occur, the greater the risk, the higher the severity.

Based on 5th edition of PMI guide (2013, 310), risk can be defined as an unsure incident that may positively or negatively effect to project objective. The positively

impact meaning there is an opportunity while negatively impact is a threat to the project. The triple constraints which are time, scope and quality are always considered as the risk. The time, scope and quality are interrelated since the change of one of the constraints will impact to other constraints. For example, increasing the quality of the project will increase the duration and the cost of the project, shorten the duration of the project may decrease the quality and increase the cost of the project. Thus, the triple constraints are considered as major risks to any project. Risk cannot be eliminated but can minimize the likelihood of the risk to the project or transfer the risk to third party.

2.2.1 Risk Vs. Uncertainty

Risk and uncertainty are instinctive in every project. There is a different between risk and uncertainty. Perminova, Gustafsson, and Wikstrom (2008) found that the principle of risk and uncertainty are in different areas of knowledge. An uncertainty can be a risk but a risk not necessary is an uncertainty. Risk is the situation that may happen and once happen, the consequence of the risk can be positive or negative to the project. The result and severity of risk can be measured and calculated through risk matrix and risk analysis. Meanwhile, uncertainty is unpredictability. The probability of occurrence and consequence of the uncertainty is unknown and cannot be predict. There are no techniques and tools that can measure the uncertainty.

2.2.2 Threat Vs. Opportunity

When there is a construction project, there is a risk. The first impressions of people about the risk are “threat”, “danger”, “hazard” and “harms”. Most of the people have the view that risk will cause accident, risk brings negative impacts and risk will make project fail. Risk can be viewed as an opportunity (positive) and threat (negative). Positive risk is an opportunity and comes into positive result (Nokes& Kelly, 2008). An opportunity is when the project manager who has positive attitude to face the risk, desire to win and make the risk as a challenge. It is a threat when the project manager ignores to manage the risk.

2.3 RISK MANAGEMENT

Rezakhani, P. (2012) defined risk management is a process that identifying and categorize risk, analysis and evaluate the associated risk in the project. An effective risk management plan can assess the risks and propose solutions to reduce the risk. It is a key process to manage the risk in project in order to increase the project performance which includes project quality, cost and schedule. The implementation of risk management can increase the performance of the project by assuring the accomplishment of the objectives and decrease the negative impacts to the outcome.

Basically, the risk management framework consists of risk identification, risk classification, risk analysis, risk control and risk response (ISO 31.000, 2009). Understanding the risk management process facilitates the project manager to identify the risk, deal with the risk and reduce the impacts of the risk to the project. The utilization of risk management is not to eliminate the risk but to determine and manage the risk well to achieve the objective.

Uher (2003) stated that risk management is a systematic tool that identifies the risk cause, impacts of the risks and the methods used to manage the risk. The purpose of the risk management is to reduce the risk and increases the probability of the project to achieve the objective. Fail to manage the risks will bring impact to social, economic and politic. It is essential to have risk management plan to manage the risk. An effective risk management will increase the project's value and performance.

Risk management has been developed in the construction industry long time ago (Forbes et al, 2008). The construction project is known as high risk project and none of the construction projects are alike and similar. Construction projects include different kinds of process which consist of unknown, unexpected and unpredictable pressures. All of the risks will impact the objective of the project which is scope, cost and quality. Within the high risk and uncertainty, risk management is essential to be applied for the construction project to create value for profit. Risk management could provide better decision making, reduce the contingency cost, facilitate better risk allocation and achieve the goal in the construction projects.

The risk management process is shown in the figure 2.1.

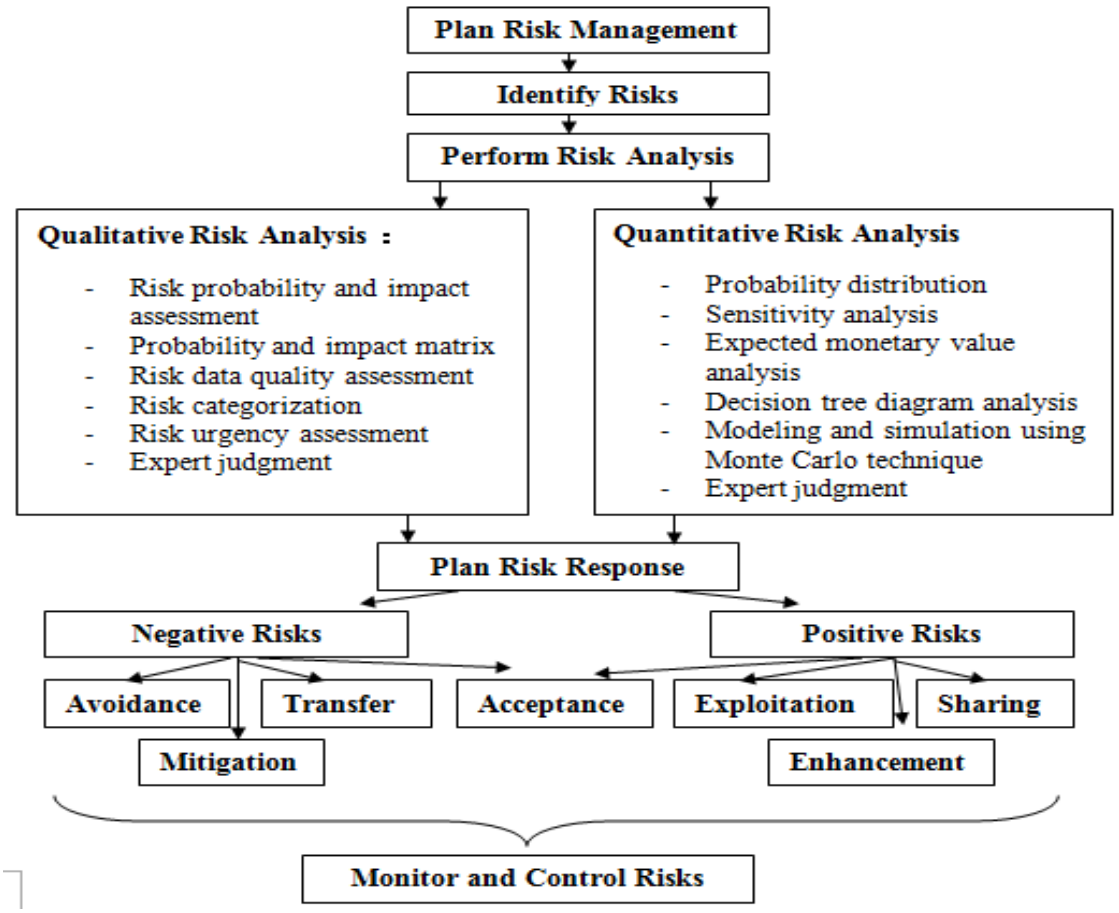


Figure 2.1: Risk Management Framework

Source: (M. Magdelena Ryor, 2013. Utilization of Risk Management Practice by Construction)

2.3.1 Risk Identification

In order to manage the risk well, the first step is to identify the risks that involve the project. It is important to determine and investigate the risk at the initiating phase of project since all the potential risks that found in the project will affect the objective of the project. All the project team members have the responsibility to participate in the risk identification process. According to (Kishan, Bhatt, & Bhavsar, A Study of Risk Factors Affecting Building, 2014) the best tools and techniques that used to identify the risk are summarized as information gathering, expert judgment, checklist analysis, SWOT analysis and diagramming techniques. The output of the risk identification is the

risk register that cover all the detailed information like source of risk, likelihood of the risk, the impact of risk and the cost of the risk incurred.

2.3.2 Risk Classification

Understanding the risks well can let the project manager to prepare a detailed risk management plans and reduce the risk to happen (De Bukker et al., 2012).The risks must be classified into different categories after identifying the risks in the project. Risk Classification sort and group the risks that exist in the project into break down structure. Different kinds of risks have to apply for different approach to manage them. The risks in the construction projects can be categorized into internal risks and external risks. The internal risks are risks within the project like design, safety, cost, quality and scope while the external risks are economic, political and social. In order to manage the risk well, it is need to classify the risks into different categories.

2.3.3 Risk Analysis

Risk analysis process is the systematic tools to analyze the cause and effect of potential risks and produce risk response strategies in order to manage the risks effectively and achieve the desired goals. The elements that include in the risk analysis are risk assessment, risk communication, risk characterization and risk management. All the elements are used to analyze the effect of risks on the parameter of the project (Kishan, Bhatt, & Bhavsar, 2014). The outcome of risk analysis help decision maker to calculate and develop a proper plan to reduce the risk in the project.

There are two types of risk analysis which are quantitative risk analysis and qualitative risk analysis. It summarized in the table below.

Table 2.1: Quantitative Risk Analysis and Qualitative Risk Analysis

Quantitative risk analysis	**Qualitative risk analysis**
a. Mathematic and statistical operation	a. Ranking operation

b. Stimulation analysis	b. Descriptive analysis
c. Numerical values evaluation	c. Subjective evaluation
d. Time consuming	d. Easy and fast to conduct
e. Required specific tools : Expected Monetary Value (EMV) analysis and Decision Tree Analysis	e. No specific tools required

2.3.4 Risk Response

Risk response is the fifth steps in the risk management plan. It considers as the action of the risk taker to the risk (Maheshbhai, P. K., Bhatt, R., & Bhavsar, J. J. 2014). Different levels of risk acquire different responses, higher priorities risks need more attention. An appropriate response to the risks can reduce the likelihood and severity of the risk. For negative risks (threat), the actions that would be taken include transfer, reduction, avoidance and acceptance while the actions that would be taken for positive risks (opportunity) are sharing, enhancement and acceptance (PMI, 2008).

- **Risk retention**

  Instead of correcting the mistake after the risks had happened, it is better to take an early action to reduce the probability and or impact of a risk happening. The examples of mitigation actions are like take on less complex processes, conducting more tests and choosing a more stable supplier.

- **Risk transfer**

  Risk transfer is to remove the risk to third party but not reduce the criticality of the risk to the project. The risk can be transferred by using additional option to reduce the loss and impact, like purchasing insurance. Risk transfer would increase the risk as the third party who is being transferred may not aware of the risk and not ready to accept it.

- **Risk avoidance**

  The project managers who reject to accept the risk are considered as risk avoidance. In order to avoid the risk involved, it needs to take specific action to

minimize the probability of the potential risk to occur or reduce its effects to zero. This action may enable the risk to be avoided or circumvented entirely. For instances, using a specific supplier might take the high risk of them going out of business during the course of the project. So, this risk should be prevented by sourcing a supplier who was larger, better established and more financially resource.

2.3.5 Risk Control

Risk control is a technique to gather the information from the risk assessment and develop a control strategy to control the risk. The strategies that will be taken to control the risk are like develop new policies and standards and implement physical change. Thus, it can eliminate and reduce the risk of the project. Any changes in the project must be documented for future reference and updated to the project teams. Furthermore, risk control is an ongoing process to evaluate the risk management plan in the project. It needs to monitor and evaluate the risk response to ensure that the actions taken are effective to manage the risk.

2.4 VALUE

Based on Liua & Leungb (2002), value can be explained in many ways, like interest, need, standard and beliefs. Different people have different views to value. In financial, value means return on money; in mathematics, value is magnitude or numbering. Every object has its own value. The value of a project is depending on the views of key stakeholders, the satisfaction of the stakeholders. The objective is considered as the stakeholders' need and desire, thus, it is the value of the project to the stakeholders.

2.5 VALUE MANAGEMENT

Value management has been implemented in number construction industries since 1980s. Based on Jaapar and Torrance (2005), Malaysia construction industries adopted the used of value management in 1986. The development and used of value

management had increase the successful of the construction projects by achieving the goals, satisfying the clients' need and expectations. It can improve the value of the project without cutting the cost as it more focus on value rather than cost. Value management indicates a brief consensus about the goals of the project and the ways to achieve it to the clients. Throughout the practice of value management, the project manager can more understand about the need of client and balance the client's need by making an effective decision. It defined the "value" of the project to the clients.

(Oke and Ogunsemi, 2011) summarized the value management is a systematic and multi-disciplinary process to analysis the function of the project for the purpose to achieve the best value and return of investment at the lowest overall life cycle cost (LCC). Value management encouraged to maximize the value of the project which include cost, time and quality and minimize the waste.

The Institute of Value Management UK (2008) stated that value management is a type of management tool that motivate people, improve the skills and innovation to maximize the overall performance of the organization. It enhances the communication between the project team and the clients. An effective communication can improve the quality of the performance.

In value management, there are three types of techniques implemented by worldwide researchers, named as value planning, value engineering and value analysis (Karim, S. B. A., et al., 2007). These techniques are the guideline to implement the value management studies. The value management study is determined from the value management job plan. The job plan is developed by Mies in 1961. The purpose of job plan is to enhance the use of value management. The table 2.2 shows the value management process.

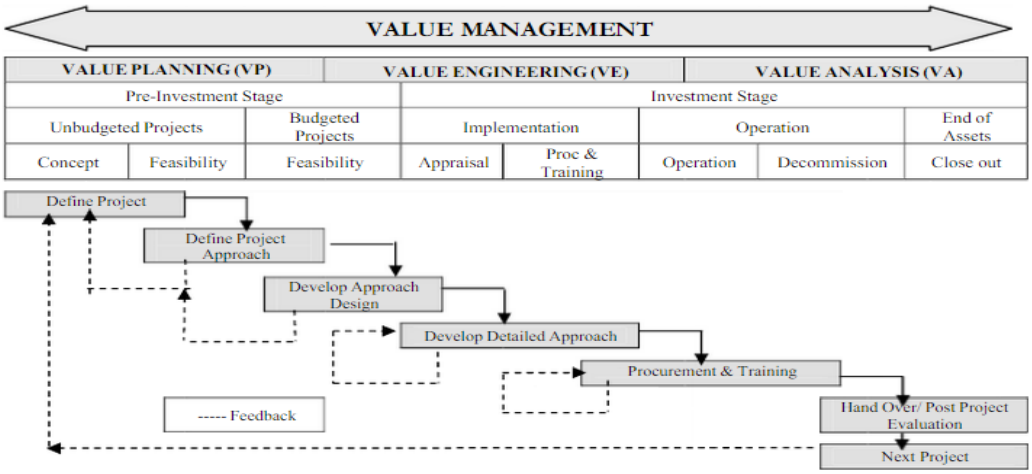


Figure 2.2: Value Management Stages

Source: (Merna & Al-Thani, 2005)

2.6 CONSTRUCTION INDUSTRY

After the independences of Malaysia in 1957, the construction industries had its significance importance when there was low tech and unskilled labor industry (Kamal, 2012). Within the advanced of the technology and changes in quality standard, construction industries are more progressive and modern. It has the ability to deliver the complex organizational structure and facilities with the highly sophisticated skills and tools. The representative construction projects that had completed in Malaysia are Petronas Twin Towers (1992-1998), Kuala Lumpur International Airport I and II (KLIA I & II), Penanag Bridge, North South Expressway (1994), Stadium Bukit Jalil, and others facilities.

Under the 10th Malaysia Plan, construction sector was distributed with total RM138 billion for physical infrastructure development, RM20 billion is distributed for the private sector of construction industries to invest (Memon, Rahman, & Aziz, 2012). It became a motivation for the public and private industries to develop in construction sector and attract other investment.

Based on the economic report 2014/2015, the projects that had done by the private sector had contributed 71.4% to the total value of construction projects. The

public sector more concentrate on the buildings like schools, universities and hospitals, shopping complex, purpose-built office (PBO). The development of the construction sector had increased the job opportunities to the residents. Therefore, construction sector had boost up the economics of Malaysia by increasing the job opportunities to residents.

2.7 THE CONCEPT OF INTEGRATION

Before discussing about the integration of risk management and value management, there is a possible to understand about the concept of integration. The term of integration can be defined in many ways. According to Austin et al. (2002), integration can be explained as merging of various disciplines or group with different objectives, requirement into a mutual and cohesive unit. In this research, the integration can be defined as the combination of different elements into an entity. The risk management and value management are different disciplines that have their specific characteristics. Both of the processes combine into a unit and apply in the construction project.

2.7 INTEGRATION OF RISK MANAGEMENT AND VALUE MANAGEMENT

The concept of the integration of risk management and value management had been recognized past decades ago (Karim, Berawi, Yahya, Abdul-Rahman, & Mohamed, 2007). It was well used in construction industries and had increased the performance of the construction projects. Since the construction projects are complex and full of uncertainties, it needs some significant management tools to achieve best value for money and better performance. While managing the risk, it has to balance the cost, time and quality in the project. It has not much beneficial results when the two processes are not to be integrated.

Besides that, the integration of risk management and value management had increased the customers' satisfaction and the probability of the project to be completed successfully. Although the risk management and value management are different

aspects, the results of the past researches had proved that the integrated of risk management and value management had the potential to be integrated and bring significance benefits. Therefore, the researchers and scholars believed that the risk and value cannot be separated. Both of the management are interrelated and must be conduct in parallel. The separately use of the integration might waste of time and resources (Paliokostos, 2000).

The purpose of the integration of risk management and value management is to identify the best way to manage the risk associated and obtain the maximum value to meet the objective and customer's need. The integration technique can reduce the negative impact to the project and increase the probability of the project to achieve objective. According to Thompson (2004), the integration of risk management and value management can be implemented in the job plan process with risk consideration. Managing value is managing the risk. The way to balance between the cost and value and minimize the risk is to integrate the risk management and value management. The table 2.1 shows the risk consideration and activities in Job Plan phases.

Table 2.2: Risk Considerations and Activities in Job Plan Phases

Job Plan Phase	Risk Considerations	RM Activities
Information Phase	Listing of known risks, issues, problems associated with the project. Project may have been initiated as a result of a problem or a risk	Identify risk issues Determine risk impact Perform risk analysis of designer cost estimate
Function Analysis Phase	Some functions may address or be influenced by know risks.	Brainstorming Risk mitigation
Creative Phase	Ideas may address how to get around known or possible risks.	
Evaluation Phase	Evaluation criteria should include risk items to eliminate ideas which have a very high risk associated with them.	Consider risk as a weighted criterion
Development Phase	Risk allowances associated with each proposal at all stages of a project, especially during the construction and operation and maintenance will give a better comparison of proposals during any cost/benefit analysis using whole life costing Time implications	Conduct RA of VA alternative design
Presentation Phase	The risk that not everyone will sign up to the preferred proposal and how to deal with it.	Present RA with suggested mitigations Recommend project cost & contingency
Implementation Phase		Perform second risk analysis of final reconciled proposal.

Sources: (Thompson, 2004)

2.7.1 Similarities Factors of Risk Management and Value Management

Risk management and value management are different management tools. However, in order to consider the potentiality of the risk management and value management to be integrated, it needs to understand the similarity and differences between both of the process. The similarity and differences that exists between the risk management and value management indicate they have potentiality to integrate. Based on the Ranesh, Zillante and Chileshe, 2012, the factors that are similar between risk management and value management are summarized as below.

Similarities Factors:

- The preparation stage is to understand and define the objective of the project.
- The process is iterative in project life cycle.
- Application of team oriented management style.
- The need for regular reviews to monitor progress.
- The involvement of the main stakeholders in the workshop.
- The use of brainstorming technique to determine the solutions
- Multidisciplinary group in creative workshop.
- Systematic process undertaken with a fixed plan.
- The development of value and risk profiles in the end of project.

2.7.2 Benefits of Integration of Risk Management and Value Management

After understanding that the risk management and value management has the potential to be combined, it is important to determine the benefits of the integrated of the risk management and value management in project. By integrating both of the management tools and using the same facilitators, the project team can get the significant outcome. The possible benefits of the integrated between risk management and value management are summarized as below (Othman, 2008). Those benefits are categorized into 4 groups which included benefits in performance, benefits in cost, benefits in time and benefits in communication.

1. Benefits in performance

   Value management clarifies the objectives of the project through the demand and expectation of the stakeholders. It is a systematic process to optimize the value of the project in order to achieve the objective. Risk management provides a process to minimize the risk by maximizing the value of the project. Thus, the integration of the both processes provides a structure route to control the risk effectively and increase the optimum performance and quality of project.

2. Benefits in cost

   The integrated of risk management and value management can remove the unnecessary cost since the duplication tasks are avoided in the project. The

resources can be assigned effectively to each task. The project can achieve the best value for money and satisfy the stakeholders' requirement. It balance the cost and the function of the project.

3. Benefits in time

   The integration of risk management and value management can simplify the construction project design and method used. Besides that, the integrated technique can manage the risks in the project well. As the process becomes simple and the risks are well managed, this will increase the probability of the project to be delivered on time and prevent the project to be delayed.

4. Benefit in communication

   The application of integration of risk management and value management improves the communication and understanding among the project manager and the stakeholders. This technique assists the project manager to understand the customers' need and objective directly. Thus, both of the parties can better understand and respect each other constraints and requirement. The used of integration also enhanced team working between project team members to produce good design and increase their awareness with their strength and weakness

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter will discuss about the research methodology that used to conduct the study. In this chapter, it will cover the elements like research design, population and sampling process, data collection method and data analysis method. Other sub topics like questionnaire design, tools and techniques to analyze the data will be discussed in detail as well.

3.2 RESEARCH DESIGN

Research design is a procedure to establish an empirical test to support a knowledge claim. According to Kothari, C. R. (2011), research design is the arrangement of the situations for collection, conceptual structure within which research is conducted, measurement and analysis of data. The research design was selected based on the appropriateness and closeness with the objectives of the study.

In this study, descriptive research will be selected. The aim of the descriptive research is to illustrate the existing state of affairs as it exist at present (Kothari, C. R., 2011). Descriptive research is focused on situations, structures, practices, differences or relationships that exist, processes that are continuously or trends that are evident. In the descriptive research, the information is obtained based on the characteristics of a particular issue and explain in more detail. Through the descriptive study, the potentiality and benefits of the integration of risk management and value management can be assessed.

The descriptive research generates the descriptive statistics through the survey. The instrument that used to conduct the survey is questionnaire. The questionnaire was designed to determine the potentiality and benefits of the integration of risk management and value management in construction project. The questionnaire will be distributed to the respondents via email.

3.3 UNIT OF ANALYSIS

Unit of analysis is the major entity that analyze in the study (William, 2006). In this study, the unit analysis is organization, grade 7 (G7) construction company which registered under CIDB Malaysia. The data collected will be considered as an organization response sources.

3.4 POPULATION AND SAMPLING

The population in this study was the construction companies which are Grade 7 and registered under Construction Industry Development Board (CIDB) Malaysia. The targeted location that had been chosen for the population was Klang Selangor, Malaysia. Most of the construction industries were assembled Selangor states and not much relevant study was conducted at those areas. The construction companies selected were registered under the CIDB Malaysia since CIDB website always updates with the new track records of construction companies. The latest information about the registered construction companies is available at CIDB website. The total of construction companies located at Selangor state is assumed 172 (sources: CIDB 2015).

According to Salant and Dillman (1994), sample size is a set of respondents that choose from a population to conduct a research. It is important to the researchers to analyze the data and make decision. In this study, the sample size will be determined by a published table, namely Krejcie Morgan table. Krejcie and Morgan (1970) had published a table for determining the sample size from a given population. In this method, calculation is avoided to calculate the sample size as the table of determining sample size has the provisions that need to get the sample size. The sample size can be

determined from the table directly. The population of this study is 172 and hence the sample size is round off to 118. The table 3.1 shows the Krejcie Morgan Table.

After getting the population and sample size, it needs to conduct the simple random sample process. Sampling is the process that selects the suitable respondents to determine the parameters or characteristic among the population. The sampling method used in this study is simple random sample. In simple random sample, each sample has the equal probability of selection. It will minimize the bias and simplify the analysis of result

The process of the simple random sample was, firstly develop a sampling frame. The sampling frame is determined by listing down all the population in a sequence number, from 1 to 172. Then, the targeted respondents will be drawn randomly from the sampling frame with an interval. For example, pick the respondents with every odd number in the sample frame until getting 118 respondents. A total 200 set of questionnaires will be sent to the targeted respondents via email and predicted that 80% of questionnaires will get back from the respondents.

Table 3.1: Krejcie Morgan Table

N	S		N	S		N	S
10	10		220	140		1200	291
15	14		230	144		1300	297
20	19		240	148		1400	302
25	24		250	152		1500	306
30	28		260	155		1600	310
35	32		270	15		1700	313
40	36		280	162		1800	317
45	40		290	165		1900	320
50	44		300	169		2000	322
55	48		320	175		2200	327
60	52		340	181		2400	331
65	56		360	186		2600	335
70	59		380	191		2800	338
75	63		400	196		3000	341
80	66		420	201		3500	346
85	70		440	205		4000	351
90	73		460	210		4500	354
95	76		480	214		5000	357
100	80		500	217		6000	361
110	86		550	226		7000	364
120	92		600	234		8000	367
130	97		650	242		9000	368
140	103		700	248		10000	370
150	108		750	254		15000	375
160	113		800	260		20000	377
170	118		850	265		30000	379
180	123		900	269		40000	380
190	127		950	274		50000	381
200	132		1000	278		75000	382
210	136		1100	285		1000000	384

Source: Krejcie and Morgan (1970)

3.5 QUESTIONNAIRE DESIGN

The questionnaire will be designed based on the research objectives in order to collect the relevant data. The questionnaire was formulated into specific questions by referring to the literature review. Simple English language was used in the questionnaire to avoid any misinterpretation of used of terms. The statements designed were short and simple to ensure the respondents can understand and willing to answer. Thus, it can improve the response rate.

In this study, the survey questionnaire consisted of closed ended questions. The closed ended questions were more efficient in data collection and data analysis although the closed ended questions are hard to create and formulate (Bourque, 2003).Besides that, the closed ended questions were more suitable for the descriptive research and quantitative data. The purpose of the questionnaire survey was intended for a feedback of the people working in construction companies on the opinions and agreement of potentiality and benefits of the integration of risk management and value management in construction project.

The questionnaire consisted of 3 sections. Section 1 was about the general information of the respondents which consists of 5 questions. Section 2 was the factors that may similar between risk management and value management. It included 14 statements and categorized into 5 groups. Section 3 was about the benefits of the integration of risk management and value management in construction project. It had 20 statements and was categorized into 4 groups. The questions at section 2 and section 3 were fully adapted from the SurveyMonkey website, the research from Ranesh, Zillante et al., (2012).

In the questionnaire, likert scale was used to evaluate the statements. Likert scale is the most popular method to evaluate the attitude or behavior of the respondents by using the answer choice from one extreme to another (SurveyMonkey, 2015). The respondents were asked to express their opinions and agreement on each of the element on response scale. Likert scale was used in the questions in the Section 2 and Section 3

to obtain the level of similarity and level of agreement of the respondents respectively. The respondents could rate the each questions on likert scale, which shown in Table3.2.

Table 3.2: Likert Scale Use to Evaluate Statement

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

3.6 DATA COLLECTION METHOD

Data collection is a way to collect the information needed to answer the objective of the study. In this study, survey is used within the structure questionnaire. The method that used to distribute the questionnaire and get back of the response of the respondents is mail questionnaire and phone interview. Mail questionnaire is selected to be used because the there is no limit for any geographical area and quicker to search a wider respondent. Within the development of technology, online questionnaire is more effective than postal questionnaire.

Besides the mail questionnaire, the telephone survey is also chosen as an alternative method to collect the data. Since there is a probability that not all the respondents will answer for mail questionnaire, telephone survey will be used to collect data from respondents. The data collected from the telephone survey is more accurate and precise. It will also increase the response rate of respondents.

3.7 DATA ANALYSIS METHOD

In this study, the data collected was analyzed by using the Statistical Package for the Social Science (SPSS).The tests that selected to test the data in this research were reliability test, normality test, Pearson Correlation test and descriptive analysis.

3.7.1 Reliability Test

In order to measure the reliability of the collected data, Cronbach's alpha was used to measure the internal consistency. Cronbach's Alpha can provide an accurate estimate of internal consistency and illustrates how the elements correlated to each other (Brown, 2001). The internal consistency is ranged between 0-1. If the alpha value was 0.70 or above, it considered as acceptable and consistent. The closer the alpha value is to 1.0, the greater the internal consistency of the variable reliability (Source: Indiana University 2014).

3.7.2 Normality Test

Normality test was to analyze whether the data collected was normally distributed or not. Several ways can be used to analyze the normality of the data. The approaches are like monitor the distribution graph through histograms, QQ plots and box plots, analyze the skewness and kurtosis and the test with Shapiro-wilk and Kolmogorov-Smirnow. The test was selected based on the sample size and the type of research.

3.7.3 Pearson Correlated Test

Pearson Correlation Test was selected to test the potentiality of the integration of risk management and value management in section 2. It used to analyze the relationship between two variables, the dependent variable and the independent variable. According to the Lund Research Ltd (2013), when the value r =1, it means there is a strongly positive correlated between two variables; when the value r = -1, it means there is a strongly negative correlated between two variables.

3.7.4 Descriptive Analysis

SPSS helps to define the variables from the questionnaire and generate descriptive statistic. Descriptive analysis summarized the data into central tendency like the frequency, mean, mode, median, variation, and correlation between variables.

Frequency shows the count and proportion of the cases in each category of variable. Mean is the average of all sum up numbers and divide by the number of numbers, median is the middle value of a list of number and mode is the value that most often to occur. The mean, mode and median are the central tendency that answers the question with what is the average response.

Descriptive analysis was used to gather the respondents' general information in Section 1 in the questionnaire and the level of agreement of respondents in Section 3. The mean was used to analyze the data collected in this study. Based on the Lund Research Ltd, (2013), mean is the most familiar measurement for tendency as the value is the most common and can minimize the error in the prediction of value in the data. Thus, mean was selected to analyze the data collected in section 3.

3.8 SUMMARY

In short, the research design for this study was descriptive research. A survey with the structure questionnaire will be used to conduct in this study. It will come out with quantitative result. The population of this study is 172 and the sample size is assumed to be 118. The targeted respondents were the people working in construction industries which located at Klang, Selangor state. Simple random sampling method was used in this study. The data will be collected with the mail questionnaire and phone interview. The questionnaire consisted of ended questions and divided into 3 sections. The data collected will be analyzed with SPSS software. The tests that carried out to analyze the data were reliability test, normality test, Pearson Correlated test and Descriptive Analysis.

CHAPTER 4

DATA ANALYSIS

4.1 INTRODUCTION

This chapter will concentrate on the findings and result of the data collected. The methods that used to analyze the data are Microsoft Excel and SPSS version 2.0 software. The elements that included in this chapter are response rate, respondents' profile, the reliability test, normality test, Pearson Correlation test and descriptive test.

4.2 RESPONSE RATE

The response rate is to measure the number of respondents who had participated in and completed the survey. As explained in chapter 3, a total of 200 questionnaires were distributed to selected companies via email. 120 respondents were agreed to participate and answer the questionnaire; 80 respondents refused to answer due to the time constraints. Hence 120 of questionnaires were received via email and follow up by phone calling. However, only 100 questionnaires are usable as the other 20 questionnaires were incomplete. The response rate for this study was 50% and summarized in Table 4.1.

Table 4.1: Response Rate

Response	Number	Percentage (%)
Total distributed	200	100
No respond/refusal	80	40
Total received	120	60
Incomplete	20	10
Total usable	100	50

4.3 RESPONDENTS' PROFILE

Descriptive analysis was conducted to analyze the questions in Section 1, which was the respondents' profile. The respondents'demographic included the gender, age, education level, job position and the experience in construction project. All the frequency and percentage of each variable was summarized in the Table 4.2 and showed in the pie charts below.

Table 4.2: Respondents' Profile

Variables	Description	Frequency	Percentage (%)
1. Gender	Female	34	34
	Male	66	66
2. Age	<25	4	4
	25-30	37	37
	31-35	22	22
	36-40	11	11
	41-45	12	12
	46-50	10	10
	>50	4	4
3. Education Level	SPM	1	1
	STPM	0	0
	Diploma	23	23
	Degree	70	70
	Master	6	6
	PhD	0	0

4. Job Position	Top Management	5	5
	Project Manager	35	35
	Project Engineer	28	28
	Project Team	18	18
	Member	14	14
	Other		
5. Experience in Construction Project	<5 yrs	39	39
	5-10 yrs	41	41
	11-15 yrs	15	15
	>15 yrs	5	5

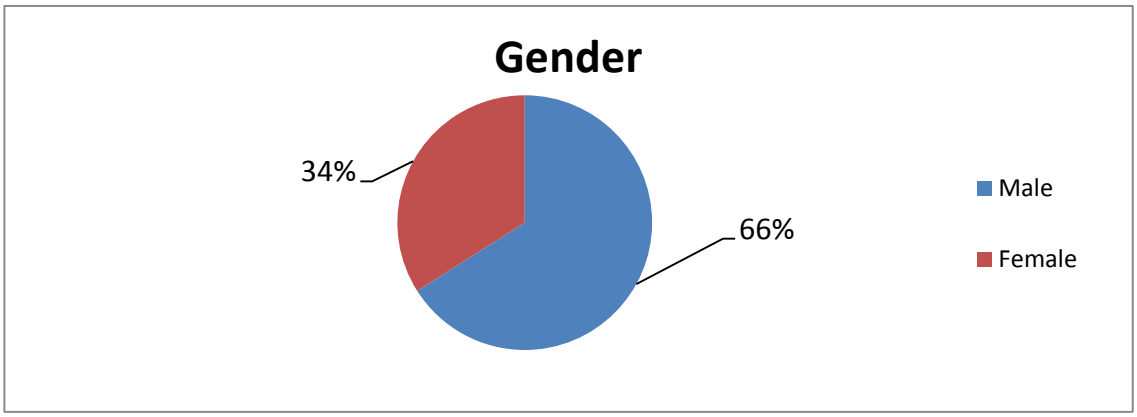


Figure 4.1: Respondents' Gender

Figure 4.1 shows the percentage of respondents' gender. 66% of the respondents are male and 34% of the respondents are female. Therefore, majority of the respondents that participated in the research are male.

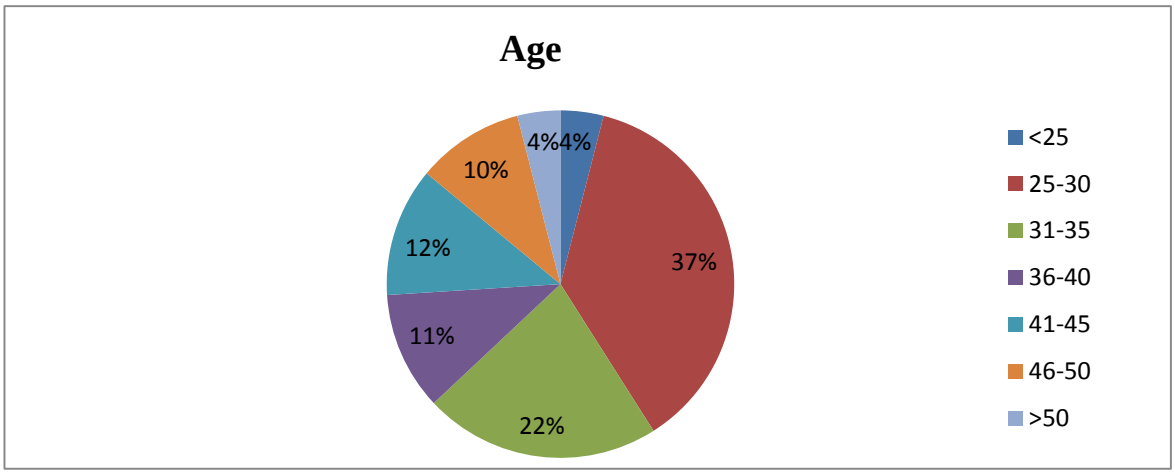


Figure 4.2: Respondents' Age

Figure 4.2 shows that the percentage of respondents' age. The age range from 25-30 is the highest which is 37% out of 100%. The second highest is the age range from 31-35, which is 22%. The third highest is the age range from 41-45, which is 12%. 11% of the respondents are in the 36-40 age range and 10% of the respondents are in the 46-50 age range. Lastly, only 4% of the respondents are below 25 years old and above 50 years old. In short, most of the respondents are between 25 to 30 years old.

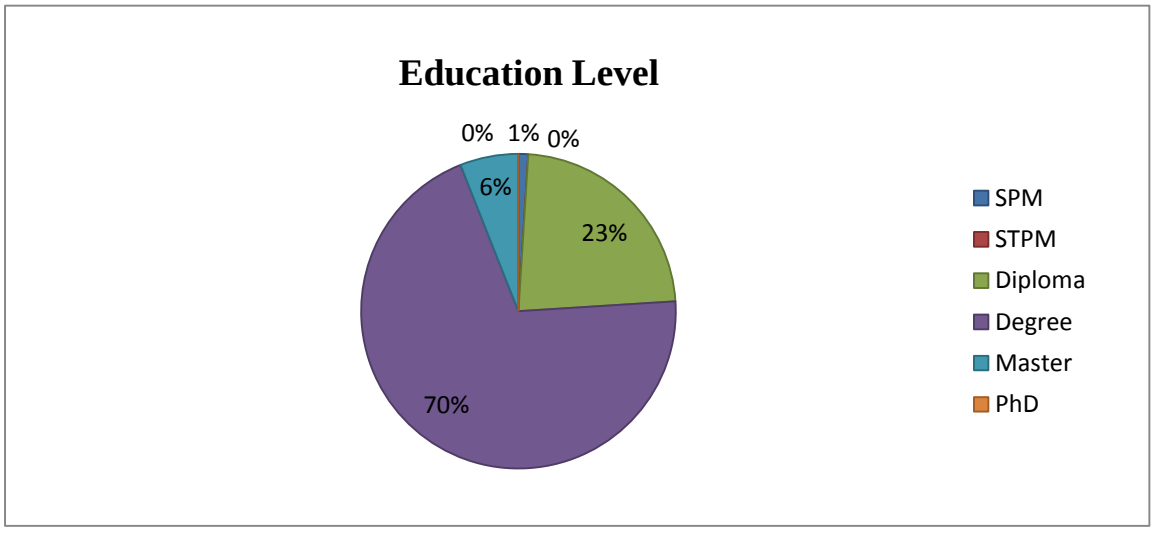


Figure 4.3: Respondents' Education Level

Figure 4.3 shows that the percentage of respondents' education level. 70% of the respondents are in the Degree level; 23% of the respondents are in Diploma level and 6% of the respondents are in Master level. Lastly, only 1% of the respondents are in SPM level. It can be concluded that most of the respondents are Degree level holders.

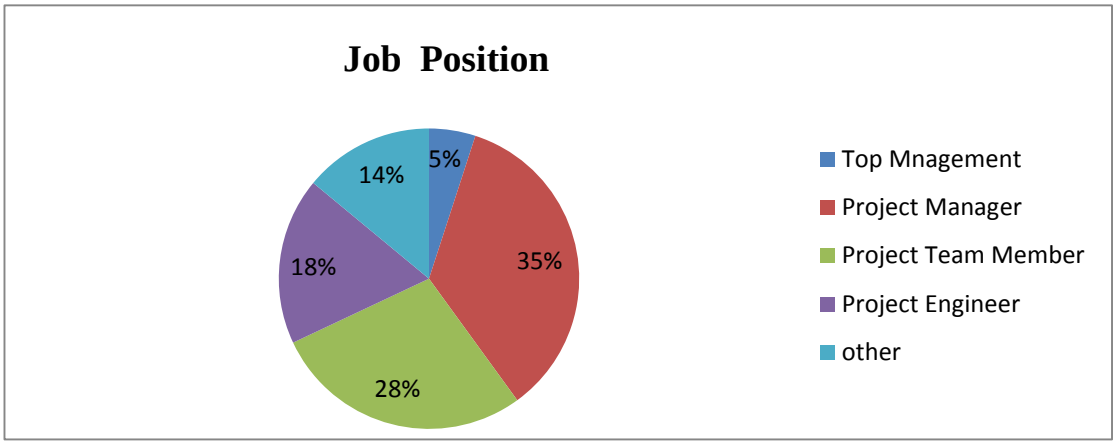


Figure 4.4: Respondents' Job Position

Figure 4.4 shows that the percentage of the respondents' job position. 35% of the respondents are project manager; 28 respondents (28%) are working as project team member; 18 respondents (18%) respondents are working as project engineer; 5 respondents (5%) are holding top management position and 14 respondents are holding other position. Majority of the project manager is agreed to answer the questionnaire.

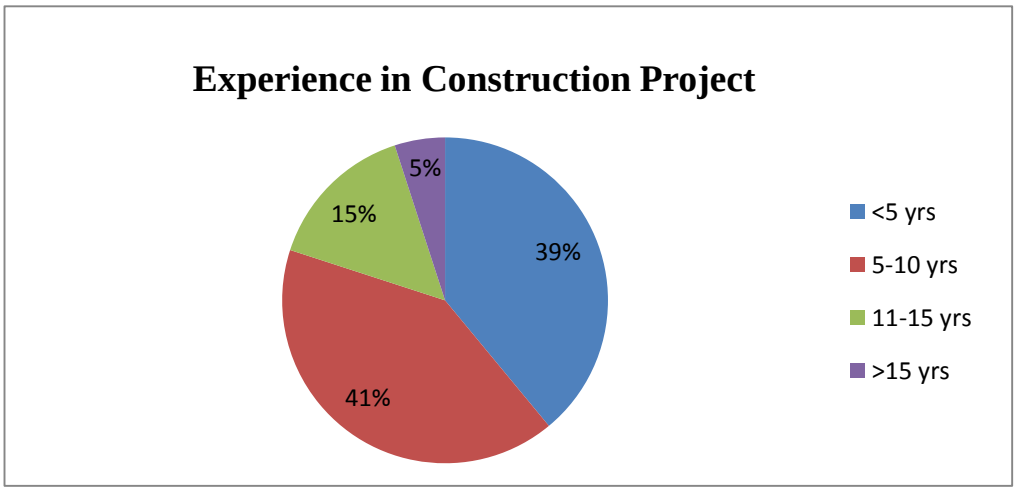


Figure 4.5: Respondents' Experience in Construction Project

Based on the Figure 4.5, it shows that 41 of the respondents (41%) have 5-10 years experience in construction project; 39 of the respondents (39%) have less than 5 years of experience in construction project; 15 of the respondents (15%) have 11-15 years of experience in construction project and only 5 respondents (5%) have more than 15 years of experience in construction project.

4.4 RELIABILITY TEST

The reliability test is very important in this study. Within the types of Likert scale questions, the Cronbach's Alpha is important to interpret the internal consistency reliability of the variables, determining whether the scale was reliable or not reliable. According to the George and Mallery (2003), the rules of thumb for the Cronbach's Alpha Value are shown in Table 4.3. When the Cronbach's Alpha value is closer to 1, the internal consistency of the items in the variable is greater.

Table 4.3: Rules of Thumb for Cronbach's Alpha Value

Cronbach's Alpha Value (α)	Description
>0.90	Excellent
>0.80	Good
>0.70	Acceptable
>0.60	Questionable
>0.50	Poor
<0.50	Unacceptable

Table 4.4: Cronbach's Alpha Value

Variables	No. of Item	Cronbach's Alpha Value
Management Structure	3	0.850
Workshop Format	3	0.764
Cost and Value	2	0.752
Management Style	4	0.785
Tools and Techniques	2	0.777
Benefits for the Project	20	0.763

Table 4.4 shows that the Cronbach's Alpha Value of the variables of questions in Section 2 and Section 3. The highest alpha value is the management structure variable which is 0.850 with 3 items. It shows that the 3 items have high relatively internal consistent. The lowest alpha value is the cost and value variable, 0.752with 2 items. All the alpha value for variables are more than 0.70 and above. So, it can be concluded that all the variables are good and accepted.

4.5 NORMALITY TEST

Table 4.5: Normality Test

Variables	**Mean**	**Standard Deviation**	**Skewness**	**Kurtosis**
Management Structure	3.8446	0.69562	-0.528	0.109
Workshop Format	4.1628	0.74960	-0.434	0.386
Cost and Value	4.0421	0.67009	-0.452	0.520
Management Style	4.3061	0.58964	-0.912	1.145
Tools and Techniques	4.0450	0.77793	-0.560	-0.102
Benefits for the Project	4.0359	0.53767	-0.051	0.087

The purpose of the normality test is to determine whether the data follow a normal distribution or not follow. In this study, skewness and kurtosis are used to assess with normality test. The skewness measures the degree of the symmetry distribution while the kurtosis measures the "peakedness" of the probability of distributed variables. In the normal distribution, the values should be somewhere in the range of -1.96 to +1.96.

Based on the Table 4.5, the value of skewness for all variables of was negative, which were management structure (-0.528), workshop format (-0.434), cost and value (-0.452), management style (-0.912), tools and technique (-0.560) and benefits for the project (-0.051). It meant that the tail of the distribution skewed to the left. The tail was long relative to right tail.

The value of the kurtosis for variables of management structure, workshop format, cost and value, management style and benefits for the project was positive, which are 0.109, 0.386, 0.520, 1.145 and 0.087 respectively. The positive value means that the variables were relatively high peak. Meanwhile, the variable of tools and techniques shows the negative value (-0.102) which mean that the variable was relatively flatter distribution.

It can be concluded that the variables are normal distributed. All the values of Skewness and Kurtosis are in the range between -1.96 and +1.96.

4.6 PEARSON CORRELATION TEST

The first objective of this study is to identify the potentiality of the integration between risk management and value management in construction project. In order to identify the potentiality between the two processes, Pearson Correlation test is assessed to test the strength of the relationship of two variables. One tailed test is selected to test the specific relationship between variables.

The similarity factors between the risk management and value management had been found with the references of journals and previous researches. There are 14 similarity factors and was categorized into 4 groups, which are management structure, workshop format, management style, cost and value, and tools and techniques.

The independent variables are the similarity factors between risk management and value management, the dependent variable is the potentiality of the integration. It will analyze the similarity factors and the potentiality of integration between risk management and value management. The result of the Pearson correlation was summarized in the Table 4.6.

Table 4.6: Pearson Correlation Test

		Management structure	Workshop Format	Cost &Value	Management Style	Tools and Technique
Potentiality	Pearson Correlation	0.770**	0.804**	0.810**	0.785**	0.824**
	Sig. (1 tailed)	0.000	0.000	0.000	0.000	0.000
	N	100	100	100	100	100

**. Correlation is significant at the 0.01 level (1-tailed).

H1: There is a positive relationship between the management structure and the potentiality of risk management and value managementto be integrated.

Based on the Table 4.6, the correlation value of the management structure is r =0.770, which is positively correlated with the potentiality of the integration. The relationship for the variables was moderate strong. The hypothesis is accepted.

H2: There is a positive relationship between the workshop format and the potentiality of risk management and value management to be integrated.

Based on the Table 4.6, the correlation value for the workshop format is r =0.804, which positively correlated with the potentiality of the integration. The relationship between these two variables is strongly correlated. The hypothesis is accepted.

H3: There is a positive relationship between the cost and value and the potentiality of risk management and value management to be integrated.

Based on the Table 4.6, the correlation value for the cost and value is r =0.810, which positively correlated with the potentiality of the integration. The relationship between these two variables was highly strong. The hypothesis is accepted.

H4: There is a positive relationship between the management style and the potentiality of risk management and value management to be integrated.

Based on the Table 4.6, the correlation value for the management style was r =0.785, which positively correlated with the potentiality of the integration. This value indicated that the relationship between the two variables was moderate strong. The hypothesis was accepted.

H4: There is positive relationship between the tools and techniques and the potentiality of risk management and value management to be integrated.

Based on the Table 4.6, the correlation value for the tools and techniques was r =0.824, which positively correlated with the potentiality of the integration. The relationship between these two variables was highly strong. The hypothesis was accepted.

In short, all the hypotheses designed are accepted. The positive correlation examined that the similarity factors were strongly correlated to the potentiality of the integration between risk management and value management. The highest correlation value was found in the similarity factor of the tools and techniques (r =0.824). Therefore, the potentiality of the integration is high.

4.7 DESCRIPTIVE ANALYSIS

The second objective of this study is to determine the benefits of the integration of risk management and value management in construction project. Based on the previous researches and literature reviews, the benefits of the integration of risk management and value management had been identified and stated in Chapter 2. It found that there were total 20 of benefits for the construction projects. The 20 of benefits had been categorized into 4 groups, which were benefits in time, benefit in cost, benefit in performance and benefit in communication.

In order to achieve the second objective, descriptive analysis was used to determine the most significant benefit of the integration of risk management and value management in construction project.

Table 4.7: Mean of Benefits

Variables	Mean (M)	Average Mean	Rank
1.0 Benefit in Time			
1.1 Project can be delivered on time or even earlier.	3.63	3.7325	4
1.2 Simplify the project design and method used.	3.75		
1.3 Duplication of effort can be avoided.	3.81		
2.0 Benefit in Cost			
2.1The unnecessary cost can be removed	4.37	4.2163	1
2.2 Projects can achieve the best value for money.	4.14		
2.3 Resources can be assigned effectively	4.01		
2.4 Improvement of Life Cost Cycling	4.04		
2.5 Balancing between the cost and the function.	4.28		
Benefit in Performance and Quality			
3.1 Minimize the probability of risk to happen.	4.33	4.1747	2
3.2 Improvement of decision making and problem solution.	4.06		
3.3 The development of the viable solutions based on the risks and function.	4.25		
3.4 The increase in the optimum performance and quality of project	4.34		
3.5 The development of innovative design for construction project.	4.07		
3.6 Providing a structure route to control risk effectively.	4.18		
3.7 Maintain the records for continues improvement.	4.04		
4.0 Benefit in Communication			
4.1Make the project team aware of their weakness and strength.	4.14	4.0203	3
4.2 Encourage the introduction of RM and VM into an organization	3.85		
4.3 Facilitate for option assessment through creative and innovative ideas.	4.16		
4.4More understand the customers' needs and requirements.	4.13		
4.5The improvement of the team work, communication and understanding among the stakeholders.	3.82		

Scale: 1-Strongly disagree 2-Disagree 3-Neutral 4-Agree 5-Strongly agree

Table 4.7 shows the mean value of the benefits of integration between risk management and value management. The highest average mean value was the benefit in cost (M=4.2163), which meant that the integration of risk management and value management can bring significant benefit in the cost for the construction project. The second highest mean value is the benefit in performance and quality (M=4.1747), followed by the benefit in communication (M=4.0203). The mean value of benefit in time (M=3.7325) shows that the respondents neither agree nor disagree with the benefit. Hence, it can be concluded that majority of the respondents agree that the most significant benefit of integration of risk management and value management was the benefit in cost.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

The objectives of the study are to identify the potentiality and benefits of the integration between risk management and value management in construction projects. This chapter will conclude all the results that discuss at the previous chapter. Further elements like discussion, limitation, recommendations for future research and conclusion will be explained in detail as well.

5.2 DISCUSSION

Based on the findings and results that had discussed in chapter 4, the objectives of this research had been achieved. The collected data was test with reliability test, normality test, Pearson Correlation test and descriptive test.

The reliability test was assessed to analyze the reliability and acceptable of the data collected. The result showed that the alpha value for all the variables was 0.70 and above. The internal consistency of the item with variables was high. Therefore, the data collected in this study was good and acceptable. The result of the normality test had proved that data collected was in normal distribution. The tailed skewed to the left, long relative to the right tailed.

The Pearson Correlation test used to analyze the potentiality of integration between risk management and value management. The correlation value for all the variables was positive. The similarity factors were strongly correlated with the

potentiality of the integration between risk management and value management. The positive results had showed that the risk management and value management has the potentiality to be integrated.

Once the risk management and value management had integrated, it will bring the significant benefits to the construction projects. The benefits that had been identified were benefit in time, benefit in cost, benefit in performance and quality and benefit in communication. Descriptive analysis was conducted to determine the most significant benefit among the 4 benefit. The average mean of each benefits was calculated and found that the benefit in the in cost was the most significant as the average mean was the highest.

5.3 LIMITATION OF STUDY

Limitation of the study was the constraints and barriers faced while conducting the research. There are few limitations in the research. Those limitations had affected the quality of the research. The first constraint was the limitation of time. The time that given to conduct the research was limited. Hence, the result of the research was relatively to be less valid and reliable.

Besides that, the limitation of research strategy made the response rate low. It took longer time for waiting the response from the respondents. Some of the participants refused to answer the questionnaire with the reasons of busy with their work, the questionnaire was quite long and difficult to understand the theory and concept in the questionnaire. It is difficult to know whether the respondents had answered the questions in the

Second, the limited resources of related research papers, journals and books might affect the literature review of the study. The concept of the integration of risk management and value management was not familiar in Malaysia. Therefore, it was hard to get the supporting points from the researches when the relevant research was limited. This will more or less reduce the validity of the points.

The third limitation was the cost. As the questionnaire was distributed via email and following up by phone calling, the cost that spending on the phone bill was high. The sample size of this research was 145 construction companies. A total of 200 respondents need to be followed up. It needs to call the selected companies one by one in order to invite them to participate in answering the questionnaire.

5.4 RECOMMENDATION FOR FUTURE RESEARCH

There are few recommendations for the future research to make some improvements and further study purpose. The recommendations are introduced for the amendment and improvement for future research.

Firstly, this research was carried out on a small population of participants who working in construction companies in Selangor, Malaysia. The future researches may involve a large population in different areas as to collect more opinions and detailed information about the topic. Then, the researcher can make a comparison and improvement. The data would become more reliable and acceptable.

Besides that, there are many types of projects which involve the practice of risk management and value management. It is suggested that the further research could be conducted to identify the effects of the integration between risk management and value management in IT project and event management. Perhaps it was an interesting topic for other researchers and can introduce for the future project manager.

The next recommendation for the future researches was the data collection method. Except from distribute the questionnaire through email, conducting an interview was more efficient while collecting the data. The face to face interview can clarify the concept and objectives of the research to the respondents. The researcher may discover the perception and thinking of the respondent on the topic. This method will more or less increase the response rate and the reliability of the data.

5.5 CONCLUSION

Construction industry is one of the contributors for the growth of economic in Malaysia. It is the important sector for the developing country. However, the process of the construction projects is full of uncertainty and high risk. The practice of risk management and value management can help to increase probability of the success. The misconception with the idea of integration between risk management and value management is wasting the time and resources. So, the analysis and discussion about the potentiality and benefits of the integration of risk management and value management will help the project manager to have better understanding about the concept.

In conclusion, this research has contributed the idea of the integration of risk management and value management in construction project. The results from the data analysis had answering the research questions. Further researcher may refer the findings and results in the research to make comparison and other improvement.

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APPENDIX A1

GANTT CHART FOR FINAL YEAR PROJECT 1 (SEMESTER 02 2015/2016) AND FINAL YEAR PROJECT 2 (SEMESTER 01 2015/2016)

Tasks / Month	FEB 2015	MAR 2015	APR 2015	MAY 2015	JUN 2015	JUL 2015	AUG 2015	SEP 2015	OCT 2015	NOV 2015	DEC 2015	JAN 2016
Meet with supervisor for general briefing about process flow of FYP I												
Consult with supervisor for further clarification / discussion on FYP I proposal development												
Chapter 01: Introduction												
Chapter 02: Literature review												
Chapter 03: Research methodology												
Submit FYP 1 to supervisor												
FYP 1 oral presentation												
Correction on the FYP 1 report and submit to supervisor												

Distribute and collect the date from targeted respondents												
Progress on chapter 04: Research findings and analysis												
Progress on chapter 05: Conclusion and recommendations												
Submit poster design and FYP report to Kalam UMP.												
FYP 2 poster presentation												
Correction on FYP 2 report and submit to supervisor												
Refine and review the FYP proposal												
Submit the FYP proposal to panel												
Discuss with supervisor												

APPENDIX A2

QUESTIONNAIRE

Dear participant,

My name is Lee Swet Jean, ID number PB12075, student from Universiti Malaysia Pahang (UMP). I am in the process of writing a research entitled "A Study of Integration of Risk Management and Value Management in Construction Project" for my final year project. The objectives of my research are to determine the potentiality and the benefits of the integration between risk management and value management in construction project. I am inviting you to participate in this research by completing the attached survey questionnaire.

If you choose to participate in the research study, please answer all the questions as honestly as possible and submit the questionnaire promptly to my email xueqinglee92@gmail.com at your earliest convenience. Your opinions are critical success of the research study.

The data collected will provide useful information for the research study. All the information collected will remain confidential. If you require any additional information or have any questions, please contact me at this number (017-6120678) or email me at xueqinglee92@gmail.com.

Thank you for participating.

Sincerely,

Jean

_____

(Lee Swet Jean)
Faculty of Industrial Management
Universiti Malaysia Pahang

Section 1: Respondents' general information

Instruction: Please read and tick (/) an answer from the options.

1.	Gender :				
	Male		Female		
2.	Age :				
	25-30		41-45		
	31-35		46-50		
	36-40		>50		
3.	Education level:				
	SPM		Degree		
	STPM		Master		
	Diploma		PhD		
4.	Job position :				
	Top management				
	Project Manager				
	Project Engineer				
	Project team member				
	Other:				
5.	Respondents' years of experience in construction project.				
	<5 years		11-15 years		
	5-10 years		>15 years		

Section 2: Similarities between the risk management and value management

The table below shows the factors that may be similar between the Risk Management and Value Management. These questions seek to verify the reasons and potential for integrating the two processes. Please express your opinion on the level of similarity between the Risk Management and Value Management in construction project.

	Level of agreement				
	No Similarity	**Little Similarity**	**Moderate Similarity**	**Much Similarity**	**Identical**
	1	**2**	**3**	**4**	**5**
I. Structure					
1. The preparation stage is to understand and define the objective of the project.					
2. The process is iterative in project life cycle.					
3. It requires consultation.					

II. Management Style	**1**	**2**	**3**	**4**	**5**
1. It provides written records for a clear audit trail.					
2. The need for regular reviews to monitor progress.					
3. Apply team oriented management style.					
4. Alignment of formal reviews with key milestones or gateway.					

III. Facilitation of workshop/ Workshop format	**1**	**2**	**3**	**4**	**5**
1. The involvement of experienced facilitators in the workshop					
2. The involvement of main stakeholders in the workshop.					
3. Involving of multi-disciplinary group in creative workshop.					

IV. Cost and Value	**1**	**2**	**3**	**4**	**5**
1. The development of value and risk profiles in the end of project.					
2. It optimizes the life cycle cost and maximizes value of the project.					

V. Tools and Techniques	**1**	**2**	**3**	**4**	**5**
1. The systematic process undertaken according to a fixed plan.					
2. Using of brainstorming technique to identify solutions.					

(**Adopted from** SurveyMonkey, 2012)

Section 3: The benefits of the integration of risk management and value management in construction projects.

The integration of Risk Management and Value Management has the potential to bring significant benefits. The suggested benefits are listed in the table below. Please express your opinions on the level of agreement to those listed benefits that would be achieved in construction projects.

	Level of agreement				
	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
I. Benefits in Time	**1**	**2**	**3**	**4**	**5**
1. The construction project can be delivered on time or even earlier.					
2. Simplify the construction project design and method used		.			
3. Duplication of effort can be avoided.		.			

II. Benefits in Cost	**1**	**2**	**3**	**4**	**5**
1. The unnecessary cost can be removed					
2. Projects can achieve the best value for money.					
3. Resources can be assigned effectively					
4. The improvement of Life Cost Cycling in construction project.					
5. The balancing between the cost and the function in the project.					

III. Benefits in Performance	**1**	**2**	**3**	**4**	**5**
1. Minimize the probability of risk to happen.					
2. The improvement of decision making and problem solution of construction project.					
3. The development of the viable solutions based on the risks and function.					
4. The increase in the optimum performance and quality of project					
5. The development of innovative design for construction project.					
6. Providing a structure route to control risk effectively.					
7. Maintain the records for continues improvement.					

IV. Benefits in Communication	**1**	**2**	**3**	**4**	**5**
1. Make the project team aware of their weakness and strength.					
2. Encourage the introduction of RM and VM into an organization					
3. Facilitate for option assessment through creative and innovative ideas.					
4. The project manager will more understand the customers' needs and requirements.					
5. The improvement of the team work, communication and understanding among the stakeholders.					

(**Source:** SurveyMonkey, 2012)

*RM = Risk Management
VM= Value Management