A STUDY OF RISK MANAGEMENT IN CONSTRUCTION PROCUREMENT PROJECT

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SUPERVISOR'S DECLARATION

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

Signature

Name of Supervisor : MISS ZARITH SUFIA BT AZLAN

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Date:

STUDENT'S DECLARATION

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

Signature :

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Date :

DEDICATION

I specially dedicate this research for my beloved parents Muhamad Ridzwan Bin Saad and Sawiah Binti Makhtar, who give me full encouragement and supported me all the way until I made it up to this day. I also dedicate this research to my siblings who also expect a success from me. Last but not least, I also dedicate for my close friends who stood beside me with great commitment and all who know me. I love you all and I hope that I made all of you proud of me.

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ABSTRACT

Construction is well known as a high-risk project as it involves in lot of uncertainty at which it must be carefully managed. In risk management it is contractor's job to take the risk or to avoid the risk in their construction project. Some of them also may take some action in order to reduce the risk in their construction project. In construction project we always heard about the project is over schedule, project over budget, low quality of project, problems with the tender, problem with the client, problem with the sub-contractor and etc. Hence, this research is to study the possible risk in construction project, to determine the level of awareness of the procurement risk among contractor in construction project and lastly to identify the tools and technique used in managing risk of construction procurement process. This method of research is both qualitative and quantitative based. A questionnaire survey and interview was conducted to collect data from contractor Grade 1. Questionnaire surveys were distributed to 118 respondents from construction firms in Pasir Puteh area and three Grade 1 contractors was interviewed. The data collected is calculated using the percentage analysis. The result shown that financial, management, time and technical are the risk that involved in construction and the level of awareness of risk among the contractors are high. The contractors also have their own tools and technique in managing risk in construction procurement. In conclusion, the risk in construction is not a small issues in construction and the contractor must take quick action in managing the risk in construction.

ABSRTAK

Pembinaan adalah sangat dikenali sebagai projek berisiko tinggi memandangkan pembinaan sering terlibat dalam ketidak pastian dimana ia perlu diuruskan dengan berhati-hati. Dalam pengurusan risiko adalah menjadi tanggungjawab kontraktor untuk menerima risiko ataupun untuk mengelak risiko dalam projek pembinaan mereka. Sesetengah daripada mereka juga boleh mengambil beberapa tindakan untuk mengurangkan risiko dalam projek pembinaan. Dalam projek pembinaan kita sering kali terdengar projek berlebihan bajet, projek berkualiti rendah, masalah dengan tender, masalah dengan pelanggan, masalah dengan sub-kontraktor dan lain-lain. Jadi, kajian ini adalah bertujuan untuk menkaji apakah risiko dalam projek pembinaan, untuk menentukan tahap kesedaran risiko perolehan di antara kontraktor dalam projek pembinaan dan yang terakhir untuk mengenal pasti alat dan teknik yang digunakan untuk menguruskan risiko projek pembinaan. Kajian ini mengunaakan kedua-dua kualitatif dan kuantitatif. Boring kaji selidik telah diedarkan kepada kontaktor Gred 1. Sebanyak 118 borang kaji selidik diedarkan kepada responden yang terdiri daripada firma pembinaan di kawasan Pasir Puteh manakala tiga orang kontraktor Gred 1 telah ditemu bual. Data yang dikumpul dikira menggunakan analisis peratusan. Hasil kajian menunjukkan kewangan, pengurusan, masa dan teknikal merupakan risiko yang terlibat dalam pembinaan dan tahap kesedaran tentang risiko di antara kontraktor adalah tinggi. Kontraktor juga mempunyai cara dan teknik tersendiri dalam menguruskan risiko perolehan pembinaan. Kesimpulannya, risiko dalam pembinaan bukanlah satu isu yang kecil dalam pembinaan dan kontraktor hendaklah mengambl tindakan yang segera dalam menguruskan risiko dalam pembinaan.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

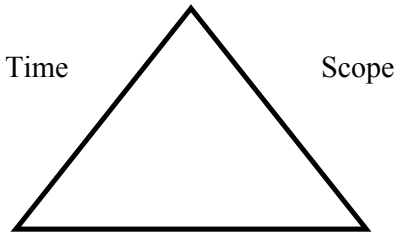
Construction is defined as the process of building and structures something (Dictionaries, 2014) for example building of new office block, houses, or roads and highways. Construction is also actions of something are put together from a separate resource or material to produce something. The installations such as air-conditioning, escalator, elevators, plumbing and electrical work also the activities that been include in construction process. In construction a project there also certain thing that needs to be carrying out before it such as the need of site preparation of clearing the site or facilities such as streets, utility connections, water supply, sewers and others. In order to start a specific project in the construction there are some step such as construing, interpreting or explaining all the work to the team members, fellow workers and also the stakeholder of the project so that all the people who involve in that construction project clearly understand what the project is all about and their roles and responsibilities in that project.

1.2 PROBLEM BACKGROUND

Construction is well known as a high-risk project as it involves in lot of uncertainty at which it must be carefully managed. According to Khumpaisal, S. (2007) performance of workers, delays in materials supply, the quality of material, project budget and cost control, or the complexity of project procurement process are the

examples of sources risks and uncertainty in construction project. In this risk management the contractor also has the choices either to take the risk or to avoid the risk in their construction project. Some of them also may take some action in order to reduce the risk in their construction project. In this construction project there are two things that need to focus on and to deal with. They are understand what type of task that been undertaking and also what are be working on. This is because in construction process it involves many parties such as clients, designer, contractors, project supervisor design process, project supervisor construction stage, as well the employees. Everyone must understand their own roles and appreciate their roles from the other parties. Then, risk especially in procurement starting from early design process until the end of the construction stage.

Risk is defined as known and unknown danger that might cause positively impact or negatively impact for a project (Dictionaries, 2014). Risks will lead to the failure for a project to complete on time and eventually lead to cash flow shortages and the project may be fail. Every project type risk and uncertainty is something that cannot be avoided and something that might occur but risk still can be managed (Khumpaisal, S. 2007). That is why the construction project must not be under estimate. This is because there are three things that are important in construction industry, time, quality and cost. This triple constrains shows that cost also plays an important part in the construction project at which it involves the procurement process. In construction risk is something that must be focus on especially during the starting point of each project as each stage have their own unexpected situation that might occur. This triple constrain are the key project factors that will influence the stakeholder of the best procurement method especially the views and opinions from clients, contractors and consultants (Smith, J. et al., 2004). Figure 1.1 shows the tripe constrain. Time, quality and cost must also be fit the design and construction of buildings that compromise in the circumstances at the time of conception. However, procurement method selection is strongly related with client project characteristics and the individual project requirements.



Cost = f (scope, time)

Figure 1.1: The Classical Triple Constrain

Source: (Baratta, 2006)

Besides, procurement is something that is most comment before the project start and also for the ongoing project in construction. Procurement in construction includes several processes. They are select and determine the project criteria, set the contractual framework, invite and select the tenders and lastly awarding the contract.

In (2007 Khumpaisal) studied the risks in the construction procurement process and the mitigation within the construction industry in which they identify all the risk that involve in construction and after that they construct a Contract Risk profile as a tool to the manager to determine the risk and for each contractor to considering the contract risk. Design and construction is thing that need to be procured separately and the relationship is between them, include the deposition of risk. These things are something that is crucial to be includes in the considerations in procurement. This is because rather than as a stand-alone process, procurement is the part of a broader asset in construction.

Risk in construction procurement is something that usually faced by the contractor in Malaysia. Moreover, there are lots of contractors are born in this construction industry every day. One of the biggest challenges for all contractor in the 21st century is in the managing the risk in their daily work practice. In today global

business environment, contractor of construction industry facing internal risk and also the external risk from community pressures, client pressure and also competitive pressures. But many contractor especially Grade 1 contractor are not using a good interaction with their own targeted suppliers in dealing with the contract and also the procurement process. Other than that, Grade1 contractor also often faced with the risk in procurement during the contracting. In managing the contract they had faced with lack of understanding on what the contact is all about especially the contract requirement; cost uncertainty, technical unknowns as well with the schedule uncertainty.

Besides, numerous problems are detected in the procurement processes that involve the risk for both contractor and also the client, Badarudin (2006). Late of delivery of good from supplier, the exchange of market price for goods and the quality of the product from the supplier as well the outsource will also affect the construction process. Other than that, it also pressure for the contractor if this kind of problem faced by them as it will affected from the beginning until the end of the project that is when the project is finish.

1.3 PROBLEM STATEMENT

There are many risks that being faced by the contractor especially in order to finish a certain project that being carried out by them. But many contractors not realize too much on the risk in especially in procurement. Procurement indeed the most important things that need to be prioritize in the project starting from the early stage of the construction process.

In construction project we always heard about the project is over schedule, project over budget, low quality of project, problems with the tender, problem with the client, problem with the sub-contractor and etc. Generally, there is no construction project without risk and it may affect the project negatively. Besides, the effects of the risk are usually very difficult to predict.

There are many project cannot completed in allocated time. In addition, there also project that been abandoned by the contractor and the complete project but not in the form of exceed the quality needed. This problem is due to the weak in management,

non-systematic risk management, non-systematic organizational management and also not has the right method to handle problem that arise. In order to complete in the right time, quality and cost, it is important to make a proper and good management of risk and cooperate among each other. Besides, analyze of risk is also very important and know a right method to handle the risk is a must. This is because there is no construction project that except from risk.

Increasing the awareness about the risk in procurement construction in Kelantan area and Malaysia is the trend that being said by the Malaysia government in order to protect the contractor right in this industry. Consequently, the contractor must take a quick action to prevent this kind of risk affect their working project. Risk in construction may come in many ways. Minimizing the risk can help the contractor in recovery the value of money and learn on how to fully understand the contract all about.

The above statement leads to the research questions to be figure out in this research project, namely: What is the possible risk in construction industry, awareness of the procurement risk among the contractor and the tools and technique used in managing risk of construction procurement process?

1.4 RESEARCH OBJECTIVES

Below are the research objectives of this study:

1. To study the possible risk in construction project.
2. To determine the level of awareness of the procurement risk among contractor in construction project.
3. To identify the tools and technique used in managing risk of construction procurement process.

1.5 RESEARCH QUESTIONS

The following research objectives were used for this study in order to accomplish all the objectives of this study:

1. What is the possible risk in construction industry?
2. What is the level of awareness of the procurement risk among contractor in construction project?
3. What is the tools and technique used in managing risk of construction procurement process?

1.6 RESEARCH HYPOTHESES

According to the objectives, there were a few hypotheses that can be found. Below are the lists of the research hypothesis of this study:

1. **Risk in construction**

   H_0: The contractor in construction industry in Kelantan knows the possible risk in construction procurement process.

   H_1: The contractor in construction industry in Kelantan does not know the possible risk in construction procurement process.

2. **Awareness**

   H_0: The contractor in construction industry in Kelantan aware about risk in construction procurement.

   H_1: The contractor in construction industry in Kelantan not aware about risk in construction procurement.

3. **Tools and technique**

   H_0: The contractor in Kelantan area is known the tools and technique used in managing risk of construction procurement process.

   H_1: The contractors in Kelantan area do not know the tools and technique used in managing risk of construction procurement process.

1.7 RESEARCH SCOPE

In Malaysia the construction industry can be divided into class A, B, C, D, E and Grade 1 contractor. To facilitate this research, the scope of this study is narrowed down of focusing only for Grade 1 contractor. Grade 1 contactor is a bumiputera contractor which is register with Malaysia Construction Industrial Development Board (CIDB). The targeted area of this research is concentrated only to the contractor Grade 1 of construction in Kelantan area. However, the risk in construction may involve in many kind of risk and sources of risk. So to narrow down the dispersed, this research is only specific focus on the risk in the construction procurement in project. In order to get more accurate data, this research make an action to choose the study developing area which has a lot of distribution of Grade 1 contractor in Kelantan construction area in district of Pasir Puteh. This research also will only touch the level of awareness of the Grade 1 contractor on the procurement risk in construction perspective. From this research it also will lead to the technique used by Grade 1 contractor in managing the possible risk of construction project.

1.8 SIGNIFICANCE OF STUDY

This kind of research will be conducted at construction Industry Company. This is because it is common for every project in construction especially the contractor and the suppliers involved or used in the purchasing in order for them to finish op their project whether it is a small or big project. Therefore, this research will provide a positive feedback for the contractor that involve in this research. Besides, the procurement process or the outsourcing process will be improved after conduct this research.

Based on this research, the contractor will know what is the exactly risk is all about especially risk in procurement construction process. The contractor also will know or faced this kind of risk or have the experience before about this risk especially for the Grade 1 contractor. It can also expose the contractor about the procurement and the way to choose the outsourcer and the supplier that can work together with them

during the project. This procurement also involves of contract that the contractor will be understand of or perhaps be the guideline for contractor in contract and procurement.

This study can be very useful to both contractor and their outsource in the way of awareness and the implementation of risk in procurement construction. This is due the fact that when contractors know and aware of risk of procurement in construction industry as well as implement it in their organizations they actually will avoid the possible risk and thus can earn more profit in their project. This thing will get a high profit margin as the contractor will not waste their money to re-correct what they have done especially when they get a reasonable outsource with a better quality and thus will also increase the customer satisfaction.

Besides, this research also can bring benefit not only for the Grade 1 contractor but also to the other class of contractor such as class A, B, C, D, and also E contractor as all class of contractor is possible to face the risk in procurement construction. It also can act as future reference for the contractor on the risk in procurement in their construction project.

1.9 OPERATIONAL DEFINITION

Construction.

Construction can be defined as a complex in industry, volatile one and responsive, for the temporary relationship it is so essence according to one-off projects (Smith, J. et al., 2004). According to Dickinson, O. (2009), constructions are complex contractual relationships which involve many stakeholders and can be tangible that are of finite-duration.

Project.

Project is defined unique that become evident when a discrete event is combined with several element such as environmental, temporal, and managerial variations (Puddicombe, 2012). A project has starting and also ending point that require resources.

Procurement.

Procurement is the purchasing of product which involve the value of money and is supported by the transparency, ethics, effectiveness and accountability in core principle governing public procurement (Raymond, 2008).

Risk.

Risk is the uncertainty that might face by certain project and can be controlled to some certain extent at which risk can be transferred or share with other project entities (Tsung, C.S and Min, L.Y. 2010).

1.10 EXPECTED RESULTS

There are several expected results that may come out after this chapter one is accomplish. After accomplishing this chapter the predicted result include reaching the objectives that been stated in the study. Besides, it also can give full and clear information about The Risk Management in Construction Procurement Process to both researchers and also to the organizations in construction project itself. Last but not least, this research also expected to be one of the reference to the other researcher that interested in the risk in construction procurement topic thus provide them a guideline for a better research in the future.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter it reviews the related article and research literature about risk in construction procurement in order to support this study. This chapter consists of two parts. First, it starts with the review of the risk in general that faced by Grade 1 contractor. Then, it followed by the risk in construction.

2.2 RISKS IN GENERAL

2.2.1 Risk Definition

Risk is defined as a condition involving exposure to danger for example the financial loss (oxforddictionaries, 2014). According to this definition, the risk will occur if there is the possible exposure inside the project including in the financial. As we all knows that in any project especially in the construction the financial is very important. Besides, the main use of the financial is to procure something as well as to outsource something

According to (Show, Q.W, Dulaimi, M.F and Aguria, M.Y. 2004) risk can be anything at which it multi-facet. Risk could be the likelihood of occurrence of an event or the combination of events at which it happened during the overall process in the context of construction project. Risk also may occur if in the decision making or planning situation, there are the lack of predictability about the structure outcome or the possible consequences that might happen. In that case, risk is actually needed to be managed. However, this management of risk is not only to secure the work but also in the context of making the profit in construction.

Most of the project will involve risk and any project which did not have risk is actually not worth pursuing (Chapman, C. and Ward, S. 2003). This is because for him any project at which involve risk will eventually give the good benefit in return. Risk also may become both treat and also opportunity in a project. Risk also can be easily managed more effectively if the organization has a better understanding of the concept of nature of risk. For some organization they believe that risk cannot escape from unforeseen disasters. However it can work with higher margins and less contingency.

According to Adnan (2008), risks have on the finance with the lowest cost. That is why risk management will involves in the appropriate handling process after evaluation and analysis in order to minimize the negative outcome of risk. The real risk in the construction project is from a lack of consideration. In other hand the risk come from the conflict by various numbers of situations. The contractor also not supposed to only focus on the success of the design and build project but also in the context of identify and analyze the risk that occur during the design and build the project. The difficulty in allocating the resources properly also always been faces in the risk management.

Risk in project is complex just like the project itself. It also having broad scope of possible effect on the project as it arise from a wide range of sources (Hilson, D. Grilmaldi, S. and Ffele, C. 2006). Risk also act as key factor for project success for every project. Work Breakdowm Structure (WBS) and Risk Breakdown Structure are methods used for understanding and managing risk in a project.

Now from my point of view the definition of risk is very broad. It involve not only with lot of people as well with the finance but also the profitability, the scope and also the wilinggness to accept the risk or not. Risk also may be faced by everyone in that construction project not only by the contractor but also the stakeholder itself and something that cannot be easily avoided. In that case all the ontractors as well the stakeholder must predict the possible risk in that project so that an action can be done to reduce the risk and if possible try something that can avoid the risk.

2.2.2 Risk Management

Since 17th century organizations have been practicing risk assessment and risk management. However in the risk management plan, most of the companies did not validate the risk (Kurniawan, D. 2007). In real world, project risk actually need to be managed according to the process of identify, analyze, treat and also monitor all the possible risk. These processes are the fundamental steps but there are so many different descriptions of this systematic process. By continuously go through the process throughout the life cycle of the project is actually is the key factor to a successful risk management plan.

According to Adnan, (2008), appropriate handling of risks after evaluation and analysis to minimize the negative impacts is also involved in risk management. Risk management is applied to obtain key indices for successful design and also to establish the necessary strategies. To ensure that risk not impede the success of the project, it is important for contractor to identify and analyze the risks that occur. In other word, we need to prioritize the risk process then the risks with greatest loss are handled first whereby the lower probability of occurrence loss is handled later. The risk management process can be very difficult as we need to balance both high and low risk in one time. Besides, it also very hard to allocate the risk properly.

Risk management gives a clear framework for identify, analyze, evaluate, treat, monitor and lastly communicate the risk (CIDB, 2004). It is also essential to understand the risk that to be managed. Risk management contributes a big insight of impact

especially in the process of defining the steps, the sequence and in decision making process. It thus a good management practice as it recognizes the most integral part. Risk management also must be part of the organizational family as it always comes without being asked for. However, it contributes more as it enables continual improvement in decision making for an organization.

According to Mills, (2001), risk management is not a new theory. At first risk is managed traditionally by judgment that been informed by someone experience. The new concept of systematic approach changes the risk to become clearer and make it easy to manage. This risk management is practically required experience and training in order to use the techniques. Godfey (1996) said that, systematic risk management help in identify, and rank risk in creation the risk obvious. We also need to focus at the major risks of the project in order to minimise the potential damage in that project. When the risk is well managed we also can control the uncertainty aspect of risk. Risk management also known as tools that be created to reduce the uncertainty occuring when conducting the risk (Skorupka, 2008).

2.2.3 Risk Management Process

Jaafari and Anderson, (1995) said that there are three stage in risk management. They are risk identifcation, risk anlysis and lastly risk response. The first step in risk management process is the risk identification and it is also very essential step. Risk identification is also the most difficult step in risk management (Willians, 1995). In risk identification the project is analysed from an overall point of view that is using top-down approach technique.

In risk identification they also some technique that can be used. They are brainstorming, expert judgement, and analyse from previous case study as a reference. In this step they also need to select which risk that is very important and need to be proritize first. In the brainstorming process all the contractor, project team and also the stakeholder need to identify what is the possible risk that might happened when handling that project. When having this process all the ideas are accepted and all the

project team must contributed an idea in order to make the identification process work smoothly. Then, for the expert judgement the contractor must refer the project to someone who has lot of experience especially in construuction. This is because we can get more valuable knowledge once we refer to someone who is expert in this area. An expert also well known for project risk because they have lot of experience in handling various of risk in construction. They also can give a good suggession if the contractor need some help in that project. The contractor also can make prevoius case study as a reference. This is because most of them also provided a lot of information about project risk in construction.

Other technique that can be used in risk identification is by using cause and effect diagram (Russell and Taylor, 2000). It is very easy to use as it only give the importance of causes of a problem. Thus, it show the problems in a very specific domain in risk identification.

Second step in risk management process is analyse the risk. In risk analysis there are that can be use. They are brainstrorming, probability impact matrix, Work Breakdown Structure (WBS), morte carlo analysis, Delphi Technique, and also decision tree method. These technique are very useful as we can mesure the likelyhood or the probability of occurance in that project (Mills, 2001). Sometimesit is express in monetary terms or damage. In real life the risk may come indirect and uninsured. Figure 1.2 shows the process associated with establishing and implementing a risk management plan. That is why the risk need to be analyze first. Therefore, the first sight of the risk is actually more complex and more complicated.

The next step is evaluate the risk. The risk need to be evaluated either it is worth to accept it or not. Some risk are worth to accept because although it give a risk at the biggining but it outcome is very good. Besides, the risk also need to be evaluate because the risk is just like an iceberg. It seams small in front but it is actually is very harmful to the project that being handle by the contractor.

Then there is the risk response. The more deliberate the response must be when the greater uncertainty with the project is faced by the contractor especially in response for risk in construction procurement. There are three ways in response to the risk. They

are avoid, reduce, transfer or to absorb the risk. However, the best position in hadling the risk is by allocate to accept it (Mills, 2001).

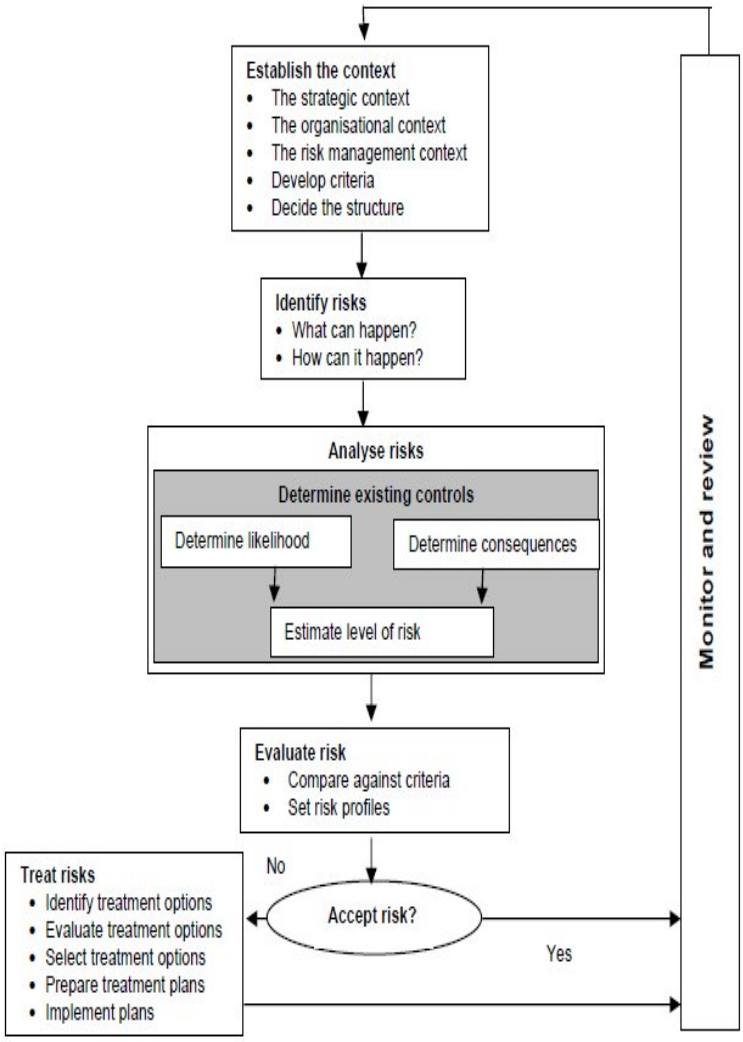


Figure 2.1: The process associated with establishing and implementing a risk management plan

Source: CIDB, 2004

After risk response is done we need to either treat the risks or monitor the risk. The risk will be treat first if the risk is not accepted in the risk response process. However, if the risk is accepted in risk response process it still need to be monitor and review. This monitor and review need to be done because most of the risky project is very dangerous especially to the contarctor. This is because the contractor is usually will faced this kind of risk from the beginning till the end of the construction project process. Some of them also may be faced during the construction project or some of them may faced after the project complition.

2.3 CONSTRUCTION

2.3.1 Construction Definition

The construction industry is a feature as an international industry not only for major national importance (Burtonshaw). Construction is also a process of building something that requires specific steps at which must be managed starting from procurement, design process and follow by end of the construction at which at is high-risk activity. Everyone involve in a building project must appreciate their role from project supervisor design process, project supervisor construction stage, client, designer, employees and also the contractor itself.

According to Merriam, Merriam-Webster, (2014) construction is a building of something for example building a house or road. Construction is a business of creating things and it also includes the way of something is made. The way that thing is made by construing, explaining and also interpreting. Each stage in construction needs a full explanation to the fellow workers and the stakeholder who involves in that project. This explanation is matters because when the explanation is confusing it might cause a lot of risk and uncertainty for that project.

According to Burtonshaw, Risk and Financial Management in Construction, construction is an activity of assembling components and material that been produced

by a multitude of suppliers, working in a diversity of disciplines and technologies to get what a client want to build. In order to build construction project activities such as planning, regulation, design, manufacture, construct maintenance and lastly decommissioning of building of structure.

2.3.2 Risk in Construction

Figure 2.2 shows the project risk. There are lot of risk that being faced by the contractor in construction project. According to (Skorupka, 2008), there are political risk in some publications which it also known as operational risk. In this case the poor service is the main point and one of the weaknesses in risk management.

Next is the corruption risk. As there is political change there is also some change in law and social condemnation. Before the establishment of the law, there are lot of corruption occur and thus make the project stop during the construction process. After lot of law regarding the contract in the construction this kind of problem can be managed very well. That is the reason the client and the contractor need to know and understand the contract that being sigh before the project is started.

Then, there is also risk in changes of the raw material and product price. The changes of material and product price are usually occurring in any project that also leads to cost overrun (Joshua O. D and Jagboro, G.O 2007).

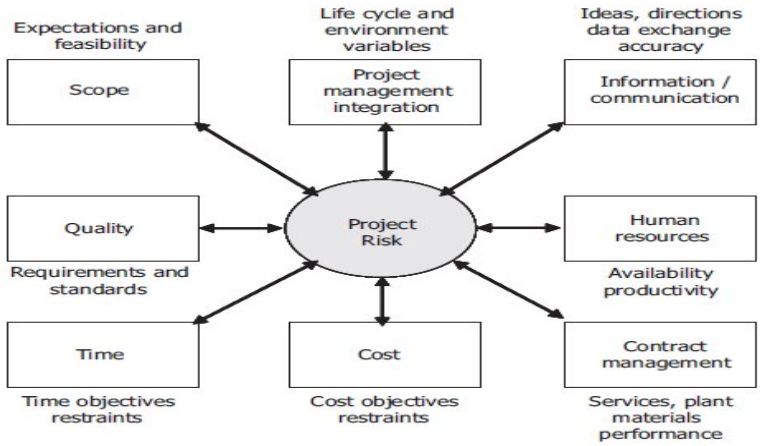


Figure 2.2: Integrating risk management with other project management functions

Source: Project Management Institute, 1992.

In constructing a project there are several risk that need to be highlight by the contractor and project manager to all project team. Risk in construction may come in many ways and it is proven that risk is any event or series of events. Risk also may come both internally or externally at which will cause negative consequences on the on-going project in terms of functionality, time of delivery, cost, performance, and also acceptance. The risk involve in construction include the scope of project. Once the project is suddenly out of scope it will lead to project risk. In construction they also take prioritize on the project quality. If the project is low quality project there will be high risk of collapse.

It is require for realistic estimate of the final cost and duration of the project (Hlaing, N.N. et. al, 2008). This is because a project will faced a risk especially when project over cost and also project over budget. There are three type of estimate for a project that also known as three times estimate in the Program Estimation and Review Technique (PERT). They are optimistic, pessimistic and most likely.

2.3.3 Risk in Construction Procurement

According to CIDB, (2004), the important tool for managing risks is by using the procurement documents. In this document, the contract must be clearly defines and should be flexible enough for both buyer and also seller. It is very importance because the change cannot be look down and there is the need the third party management support is involve. There are three systems that being applied by procurement system in Malaysia. They are direct purchase, tender (open and close tender) and direct negotiation (Wee, S.H. et. al 2011).

The contractor also faced the risk especially during the bidding process. In bidding process they need to fully understand what the project is all about. This type of activity is usually done to get the tendering of certain project. When putting the price for bidding it needs to be done with detail. If this thing is not being prioritized the contractor will not win for the tendering of the project.

In risk of construction procurement time and money is very important (Khumpaisal, 2007). The procurement process is a major concern for the vitality of a project in existing construction project. This is because the construction procurement involves lot of things. They are contractor performance, material lead-time and many more. That is why in the major project procurement process, project manager should clarify all these.

In construction procurement they also face the risk of the material late of delivery. This problem is actually will lead to lot of problems. The late of delivery is usually happened because of there is no solid agreement during dealing the material and product. The contractor is actually needed to sign a concrete contract with the seller. This is because, when the product is delivering late from the supposed date, the process of construct of building will also be late and thus make the project late to finish.

Besides, in signing the contact in procurement process they also must know the of content of the contract. Once the one party did not fully understand the content of the contract will lead to misunderstand. However, they can be suing according to the law as it is a contract base procurement. In procurement also they face lot issue like either to

buy the material or to lease it. So they need to make a bright decision to get a better profit especially for the outcome of the decision. In both developing and in developing worlds are facing cost overrun, late delivery, overstaffed organisation, and low efficiency in procuring construction projects (Lu, W. et.al 2013).

2.4 CONCLUSION

In conclusion, the risk in construction procurement may come in many ways. The contractors especially for the Grade 1 contractor must be very proactive in identify, analyse, evaluate and give the good response for that project. This is because a smart choice will give a good outcome to the project and thus will give the good profit to the contractor.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

This chapter explain the research methodology in order to achieve the goals and objectives of the research. Then, this part in this chapter will describe the research methods that will be used in this research. The methods that will be used include the research design, data collection methods, instrumentation and data analysis. The aspect of this study is based on a literature review of risk management in the construction procurement. A face to face interview is used for the data collection method in order to study the risk and the awareness of risk in construction among the Grade 1 contractor of Construction Company in Kelantan. Survey questionnaire was structure and designed to be distributed to the targeted Grade 1 contractor. These kind of methods is used are explained in detail by researchers because the right methodology will ensure the study carried out with validity and reliability.

3.2 THE RESARCH DESIGN

In order to collect data and some important information for the research, a research design is used as a guide for the researchers. A research design also is created to help researchers conducting this research regularly. In the beginning, the researchers

need to collect the related data to do the research. The method used to collect the data include by using the written materials for example previous studies, journals, magazines and related books.

To identify the variables associated with the research topic a research literature review is made. Then, after the variables are known, several hypotheses have been developed. The expected result from the research hypothesis will be useful as it help researchers to gain the data and information to meet research needs.

There are two type of approach that being used in this research that is quantitative and qualitative research. According to (Moslim, N.H. et al., (2013) qualitative approach refer to the classification that can be placed in the same categories based on the some characteristic or attribute. Qualitative data are classified as ordinal data and nominal data. Ordinal data can be a feeling of agree and disagree while the nominal data is the data that cannot be ranked such as the gender of the respondent. Quantitative approach then is the data that can be counts, ordered, ranked or measure. It is then classified into two they are discrete variable and continuous variables. The discrete variable is the value that can be ranked such as the ranked from zero to five in the questionnaire. Then the continuous variable refers to all value between specific values. Example is the age of the respondent. To describe in terms of finding the fact the quantitative method is used and it may provide a clear measurement. For the descriptions and opinion the qualitative methods is used.

3.3 DATA COLLECTION METHODOLOGY

The data are collected through the theoretical research or preliminary studies in order to obtain the data all necessary information about the research to facilitate the analysis. The methods such as distribution of questionnaire and interviews with the related contractor are involves. There are two sources of data are being collected for this study they are from primary data and also from the secondary data. The primary data is usually are collect from the questionnaires. On the other hand, the secondary data are from the books, journal and also from related books.

3.3.1 Interview

Having an interview session is actually a most important source to get information in the research. It is also an advantage of having an interview as it is expected to get a high feedback and response for the questions. Besides, the interview technique also helps the research analysis in order to get a good sample. This is because during the interview is being done directly from face to face with the person in charge who is directly involved with the topic. All the information is communicate in a clear way by the targeted respondent and they are surely can give a further explanation regarding the topic that being ask.

For this research, the interview part will cover the objective number three of this research. The objective is to identify the tools and technique that the contractor used in managing the risk in the construction procurement. In this session we can ask directly to the contractor their experience on managing the risk and what tools and technique that they used based on their experience in this construction project.

The interview technique also act as advantageous to the researchers as it give an additional information about the topic that being question. Then, that is the reason why the interview technique is being chosen as a data collection technique in this research. In the interviewing the respondent the semi-structures interview method is used. This is because this technique usually gives more information that can be used for this study. When conduction the interview, the checklist of topic to be studied is being refers to. This thing act as a guide to student to conduct the research. Researcher also must make sure that all topic of question that wants to be asked are presented before the discussion session is ended.

3.3.2 Questionnaire

Questionnaire is a set of questions is developed. The questions are then distributed to the respondents to response. Questionnaire also acts as a tool for the data

collection. Researcher also used questionnaire to know what they want and to get the information from the respondent. For this research, a questionnaire will be distributed to all the Grade 1 contractor in Kelantan area that being register with CIDB. This technique is designed to get data that will be analysed to achieve the objectives of this study. This questionnaire is design by adopt and adapt from previous research by (Osipova, E. 2008, Federal Highwat Administration, 2014 and Napis, N.A. 2013.)

This method needs respondents to answer and point out their own views in a given scale. This analysis is based on the number by which each respondent will be aggregated to get a large amount. Besides, these questions need the consent of the targeted respondent, views and satisfaction on things.

Table 3.1 show the summary of questionnaire. Section A comprise of the gender, level of the education, age, working experience and the monthly salary of the contractor. Section B then covers the risk in construction while in Section 3 cover in risk in procurement. This section is based on rating. In rating based format the respondent need to choose their rate using from zero to five points. The scale is range from 1=strongly disagree, 2=disagree, 3=moderate, 4=agree and 5=strongly agree (Vogt, W. and Paul. 1999). The respondents only need to tick a suitable answer for these questions.

In this study, evaluation was made to find understanding and views of respondent o the risk and procurement in construction. Once all the question is answer by the respondent it then will be calculate for the total score of risk analysis. The score might different depending on their perspective views. Further, the analysis of comparison of each score is calculated to get the answer to the objective.

Table 3.1: Summary of questionnaires

Section	Explanation
A	Gender Level of education Age Working experience Monthly salary
Section B	Risk in construction
Section C	Awareness of risk in procurement

3.4 SAMPLING

3.4.1 Population

According to the scope of this research, the population of this research is referring to Grade 1 contractor in district of Pasir Puteh in Kelantan area. This research will have a direct respondent from the chosen Construction Company. The choosing criteria for the distribution of questionnaire are must with construction project and registered with Construction Industry Development of Board (CIDB). This research only focuses on the Grade 1 contractor in construction category in district of Pasir Puteh in Kelantan area. Based on the recorded from CIDB, the total population of contractors Grade 1 construction category in Pasir Puteh who had register with CIDB is 172 in total. The total of this population is enough to achieve the objective in this study.

3.4.2 Sample

A sample of the population is the portion of the population that being study. In order to get the desirable level of precision the sample must be large enough. Table 2

present the number of respondent which is based on Krejcie & Morgan (1970). According to the table when the population increase the number of sample size also increase at a diminishing rate and remains relatively constants at slightly more than 380 cases. Then, in this study the sample size that being chosen is only 118 of Grade 1 contractor from a total of 172 that had been register with CIDB. The size is suitable enough to conduct appropriate statistical procedures. It will be conduct among Top manager, supervisor, middle manager and also the ordinary worker. They are the targeted list to answer the questionnaire for this research.

Table 3.2: Table for Determining Sample Size from a Given Population

Table for Determining Sample Size for a Given Population

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Note: "N" is population size
"S" is sample size.

Source: Krejcie & Morgan, 1970

Source: Krejcie & Morgan, 1970

3.4.3 Sampling Technique

A sampling is the probability or non-probability of distribution from a large number of samples that is drawn from specific population Moslim, N.H. et al., 2013. For this research, the sampling method is based on non-probability sampling. This is because the respondent is choosing by using stratified sampling technique and not by random. This technique is a probability sampling technique at which the researcher groups the target population into different subgroup and then randomly chose the final subjects from those different strata. When the researcher wants to highlight specific subgroups within the population this type of sampling is being used.

By using this method it also always show a greater precision. The members of the same stratum are same as possible in terms of the characteristic of interest. The bigger the differences between the strata the bigger the gain in precision. For this study, the Grade 1 contractors which register with CIDB from Kelantan territory are chosen. Besides, Kelantan area is located at the researcher's hometown. Thus, it makes it easy to the researcher to conduct the interview with the targeted respondents.

Other than that, the good thing of using stratified random sampling is because it gives guarantees of better coverage of the population. The researcher has already control the targeted group in the sample, where simple random sampling does not guarantee any one of person will be include in the last sample. This study is also very flexible.

3.5 AVERAGE INDEX METHOD

Average index method is used to analyse data in the ranking scale or ordinal. In the average index method, each of the data from data analysis is calculated according to scale range of respondent in the likert scale. The number of index is then divided with total response times to one hundred percent. The average index was calculated to determine the ranking of each factor based on the frequency analysis. The average index is calculated as fellow (Al-Hammad et al., 1997)

$$\text{Average Index} = \frac{\sum aixi}{\sum xi}$$

Where:

a_i = constant expressing the weight given to i

x_i = variable expressing the frequency of the response for

i= 1,2,3,4,5,

x_1 = frequency of the strongly disagree response and corresponding to a_1 = 1;

x_2 = frequency of the disagree response and corresponding to a_2 = 2;

x_3 = frequency of neutral response and corresponding to a_3 = 3;

x_4 = frequency of agree response and corresponding to a_4 = 4;

x_5 = frequency of strongly agree and corresponding to a_5 = 5.

In order to determine the degree of importance of the constructability principes considered in this case study the classification of the rating scales proposed by Abd. Majid (1997) have been used. The classifications of the rating scales are as follows:

Table 3.3 : Average Index

Average Index	**Level of Importance or Evaluation**
0.00 ≤ Average Index < 1.50	Not Important/Strongly Disagree
1.50 ≤ Average Index < 2.50	Less Important/Disagree
2.50 ≤ Average Index < 3.50	Neutral
3.50 ≤ Average Index < 4.50	Important/ Agree
4.50 ≤ Average Index ≤ 5.0	Very Important/Strongly Agree

Source: Abd. Majid (1997)

Next, the number from scale range is calculated with weighted scale before it is classified as agree or disagree of each of the statement. Weighted scale formula also used to calculate the scale value of a particular set of numbers in the data with different levels of relevance. The weight is representing the relevance of each number and shown in percentage of total relevancy. That is the reason all weight should be equal to 100%.

3.6 CONCLUSION

This research method help in answer all questions accurately. The data collection is done through questionnaire and interview. The questionnaire is done based on the previous study that already tests for other research before.

Secondary data collection was done through the use of documentation resources, seminar papers, previous theses and also journals. The quantitative data analysis is done by using descriptive analysis of mean and standard deviation.

CHAPTER 4

DATA COLLECTION & ANALYSIS

4.1 INTRODUCTION

This chapter shows the data collection of the research. This chapter also consists of two sections at which Section A is the interpretation of the results from the conducted survey using descriptive statistic as an instrument while Section B is the result from the interview questions with the selected contractors.

4.2 SECTION A; Questionnaire

Descriptive statistics shows and describe the patterns in a data analysis. Generally, descriptive statistics is applied to examine one variable at a time. Disruptive statistics here include graphs, charts, tables and numbers to explain, summarize, organize and present raw data. Descriptive statistics are most often applied to examine location of data which is measured by mean, median and mode.

4.2.1 Demographic Profiles

This research of A Study of Risk in Construction Procurement is specifically targeted to the contractor who works under construction scope in Kelantan, district of Pasir Puteh. These contractors are focusing only the contractor Grade 1 at which register with Construction Industry Development Board (CIDB). The information about the targeted respondents such as address, person charge and telephone number of the company is obtained from CIDB directory and also from the internet. The survey questionnaire is distributed by hand. Before the researcher meets the respondents, an appointment has been made to ask the permission from the respondents to participate in the questionnaire survey. After appointment and arrangement has been made, the researcher distributes the questionnaire. The distribution of questionnaire took about five day at which from August 31 2014 until September 4 2014.

The total respondent population which is contractor Grade 1 which registers with CIDB is 172 in total and the sample for this research is 118 contractors. This questionnaire is not limit to only the contractor to answer as it open to top management, middle management, engineers and also the general worker at which the persons who has experience in managing construction projects. However, when distributed this questionnaire only 84 respondents who give feedback and willing to cooperate in participating the survey. For this research the total response rate is 71.19.

$$\text{Total response rate} = \frac{\text{Total received}}{Total\ sent\ out} \times 100\%$$

Table 4.1: Number of research list

	Number of respondent	**Percentage (%)**
Target list	118	100
Research list	84	71.19

4.2.2 Section A: General Information

In the Section A of general information it consists of the background of the respondents in general. It consists of the gender of the respondent which is male and female, the level of education, age, and the working experience in the construction industry.

1. Gender

As shows in Table 4.2, out of 84 respondents who participated in the questionnaires, 62 numbers of the respondents are males and only 22 numbers of respondents are females. These numbers contributes 73.81% of males and only 26.19% of females who participate in this survey questionnaire. Therefore, it is showed that the males are the majority who working in this construction industry.

Table 4.2: Gender

Gender	Number of respondent	Percentage (%)
Male	62	73.81
Female	22	26.19
TOTAL	84	100

2. Level of education

As shown in Table 4.3, the level of education of the respondents is mostly from secondary which contribute 51.19%. This result followed by level of education of primary school which equal to 19.05%, diploma which equal to 17.86% and lastly is degree which equal to 11.9%. The results also show that there is no respondent who is

from master for their education background. Therefore, it can be said that majority of the respondents are from secondary school for their level of education.

Table 4.3: Level of education

Level of education	Number of respondent	Percentage (%)
Primary	16	19.05
Secondary	43	51.19
Diploma	15	17.86
Degree	10	11.9
Master	0	0
Others	0	0
TOTAL	84	100

3. Age

As shown in Table 4.4, result showed the highest respondents are age between 41-50 years old which consist of 39.29%. The second highest which is 26.19% is age between 31-40 years old, follow by 17 person age between 21-30 years old which contribute 20.24%, 9 person between age 51-60 years old which contribute 10.71%, 2 person below 20 years old which contribute 2.38% and lastly 1 person who age 61 years old and above which equal to 1.19%.

Table 4.4: Age

Age	Number of respondent	Percentage (%)
Below 20 years old	2	2.38
21-30 years old	17	20.24
31-40 years old	22	26.19
41-50 years old	33	39.29
51-60 years old	9	10.71
61 years old and above	1	1.19
TOTAL	84	100

4. Work experience in the construction industry

As shown in Table 4.5, majority of the respondents has experience in the construction industry from 10 years and above which comprise 38.10% (32) out of all. The second highest is respondents with experience 2-5 years which comprise 30.95% (26). Next, respondents with experience from 6-9 years comprise of 23.81% (20) and the rest 7.14% (6) are the respondents with experience less than one year in construction industry.

Table 4.5: Work experience in the construction industry

Duration	Number of respondent	Percentage (%)
Less than one year	6	7.14
2-5 year	26	30.95
6-9 year	20	23.81
10 years and above	32	38.10
TOTAL	84	100

4.2.3 Section B: Risk in Construction

In this Section B it consists of the data analysis risk in construction. This section is divided into four parts. They are financial risk, risk management, risk in time management and lastly are the technical risk in construction. This section showed the frequency of the risk in construction. It shows the percentages of the preferences answer based on five scales which are 1=strongly disagree, 2=disagree, 3= neutral, 4=agree and 5=strongly agree of the respondents for each question involve in the instruments. The purpose of this analysis is to identify the response of each question from respondents.

1. Financial Risk

As shows in table 4.6, there are five questions being stated under the financial risk. Firstly, there is loss during the fluctuation in material risk. Out of 84 respondents who participated in the questionnaires, 75 numbers of them agreed that there is loss during fluctuation in material price. This contributes to 89.29% of total respondents. Besides, 9 respondents ranged this statement as neutral or satisfactory, which is 10.71% of total respondents. Therefore, it can be said that majority of the respondents agreed that the fluctuation of material price can lead to loss and thus risk the financial of the project.

Secondly, fluctuation in material price can lead to shortage of construction material. 41 respondents disagree that the fluctuation in material price can lead to shortage of construction material which equal to 48.81% of total respondents. 25 respondents agree with this statement which equal to 29.76% of total respondents. Then, 18 respondents who state this statement as neutral which is equal to 21.43%. Therefore, it can be said that majority of the respondents disagree that fluctuation in material price can lead to shortage of construction material as the construction material is always enough in the market.

Thirdly, under the statement of there is loss due to rise in fuel price 61 respondents agree which equal to 72.62%. 22 respondents out of total respondents stated that it is neutral which equal to 26.19% and lastly only one respondent disagree with is statement

which equal to 1.19%. Therefore, it shows that most of respondents agree that there is loss due to rise in fuel price.

Next, is the result of the statement that there is loss during the fluctuation of material price. 60 respondents out of total agree with this statement which compromise of 71.43% follow by 21 respondents who ranged this statement as neutral which equal to 25%. Lastly, 3 respondents disagree with this statement which equal to 3.57%. Therefore, mostly agree that there is loss during the fluctuation of material price.

Last statement under financial risk is there is loss due to increase in labour cost. Out of total respondent, 39 respondents agree with this statement which equal to 46.43%. 21.43% respondents range it neutral and 26 respondents disagree with this statement which equal to 30.95%.

Table 4.6: Financial Risk

Financial Risk	**Weighting Scale**						**Classification**
	Strongly disagree/disagree (1+2)		**Neutral (3)**		**Strongly agree/agree (4+5)**		
	Frequency	**%**	**Frequency**	**%**	**Frequency**	**%**	
There is loss during the fluctuation in material price	0	0	9	10.71	75	89.29	Agree
Fluctuation in material price can lead to shortage of construction material	41	48.81	18	21.43	25	29.76	Disagree
There is loss due to rise in fuel price	1	1.19	22	26.19	61	72.62	Agree
There is loss during the fluctuation of material price	3	3.57	21	25	60	71.43	Agree
There is loss due to increase in labour cost.	26	30.95	18	21.43	39	46.43	Agree

2. Risk Management

As shows in table 4.7, there are five questions being stated under risk management. Firstly, the contractor experience is important to reduce risk. Out of 84 respondents who participated in the questionnaires, 71 numbers of them agree that the contractor experience is important to reduce risk. This contributes to 84.52% of total respondents. Besides, 12 respondents range it as neutral which equal to 14.29% and one respondents disagree which equal to 1.19% of total respondents. Therefore, it can be said that majority of the respondents agreed that contractor experience is important to reduce risk.

Second statement is unfairness in tendering. 39 of total respondents agree with this statement which contributes 46.43% and 26 respondents range it as neutral which equal to 30.95%. The rest 16.67% disagree with this statement. Therefore, majority of the respondents agree that there is unfairness in tendering process.

Third statement is improper planning and budgeting lead to change on design in project. 59 of respondents agree with this statement which contributes 70.24% and the highest. 11 of them range it as neutral which is equal to 13.10 and lastly, 14 respondents disagree with this statement which equal to 16.67%. Therefore, majority of respondents agree with the statement of improper planning and budgeting lead to change on design in project.

Next is the statement of lack of management of risk can lead to corruption and bribery. 69.05% of the respondents agree with this statement while 4.76% of respondent disagree with this statement. The other 26.19% of respondent range this statement as neutral. Therefore, the majority also agree with this statement of the lack of management of risk can lead to corruption and bribery.

Lastly, the statement of sub-contractor related problem in risk management. Out of 84 respondents who participated in this survey 61 respondent agree the risk because of sub-contractor related problem which contribute 72.62%. Then, 17 of them choose range neutral which equal to 20.24% and lastly 6 respondent disagree with this statement which equal to 7.14%. Therefore, majority choose to agree with the statement of sub-contractor related problem can lead to risk in project.

Table 4.7: Risk Management

Risk management	Weighting Scale						Classification
	Strongly disagree/disagree (1+2)		Neutral (3)		Strongly agree/agree (4+5)		
	Frequency	%	Frequency	%	Frequency	%	
Contractor experience is important to reduce risk	1	1.19	12	14.29	71	84.52	Agree
Unfairness in Tendering	19	22.62	26	30.95	39	46.43	Agree
Improper planning and budgeting lead to change on design in project	14	16.67	11	13.10	59	70.24	Agree
Lack of management of risk can lead to corruption and bribery	4	4.76	22	26.19	58	69.05	Agree
Sub-contractor related problems	6	7.14	17	20.24	61	72.62	Agree

3. Risk in Time Management

Table 4.8 shows, the risk in time management which consists of five related statement. Firstly, 76 respondents agree that planning is most important stage in any construction project which equal to 90.48%. 6 out of 84 respondent range it as neutral and rest of it range it as disagree which equal to 2.38%. Therefore, majority agree with the statement of planning is the most important stage in any construction project.

Secondly, for every project has tendency to change in schedule, 80.95% agree with this statement and 14 respondents ranges it as neutral. The other rest of 2 respondents disagree with this statement which equal to 2.38%. Therefore, majority of respondent agree with the statement of every project has tendency to change it schedule.

Thirdly, for the statement of lack of management of risk lead to project delay, 62 respondents agree with this statement which equal to 73.81%. 6 respondents disagree with this statement and while 16 respondents range it as neutral which equal to 7.14%. Therefore, majority of respondent agree with the statement of risk lead to project delay.

Besides, for the fourth statement of there is time constrain in a project, 61 respondent agree with this statement which equal to 72.62%, follow by 19 respondent range as neutral which equal to 22.67% and lastly 4 out of 84 respondent disagree with this statement which equal to 4.76%. Therefore, majority also agree with the statement of there is time constrain in a project.

Lastly, 65 respondents agree with this statement which compromise of 77.38%. 12 out of 84 people range as neutral which equal to20.19 and there is 7 respondents disagree with this statement. Therefore, majority of this respondent agree with this statement.

Table 4.8: Risk in Time Management

Risk in Time Management	**Weighting Scale**						**Classification**
	Strongly disagree/disagree (1+2)		**Neutral (3)**		**Strongly agree/agree (4+5)**		
	Frequency	**%**	**Frequency**	**%**	**Frequency**	**%**	
Planning is the most important stage in any construction project	2	2.38	6	7.14	76	90.48	Agree
Every project has tendency to change in schedule	2	2.38	14	16.67	68	80.95	Agree
Lack of management of risk lead to project delay	6	7.14	16	19.05	62	73.81	Agree
There is time constrain in a project	4	4.76	19	22.62	61	72.62	Agree
Improper of planning can lead to late in material delivery	7	8.33	12	12.29	65	77.38	Agree

4. Technical Risk

Table 4.9 shows the result of the technical risk. It consists of firstly the design changes will involve more additional cost in construction project. 52 out of 84 respondents agree with this statement which equal to 61.90%. 17 respondents choose range neutral which equal to 20.24% and the rest of 15 respondents disagree with this statement. Therefore, majority of respondent agree with this statement.

Secondly is the statement of improper planning can lead to change on design in project. 44 respondents which is 52.38% agree with this statement and 20 respondent which is equal to 23.81 disagree with this statement. The rest of 20 respondents which equal to 23.81 also range this statement at neutral. Therefore, majority of respondent also agree with the statement of improper planning can lead to change on design in project.

Next, is the statement of accidents on sites. 40 respondents agree with this statement which equal to 47.62%. 32 respondents range it as neutral which equal to 38.10% and 12 respondents disagree with this statement which equal to 14.29%. Therefore majority agree with the technical risk lead to accidents on sites.

Then, for the statement poor quality procured material 48 out of total respondent agree with this statement which equal to 48.81%. 29 respondents range it as neutral which equal to 34.52% and 14 respondents disagree with this statement which equal to 16.67%. Therefore, majority agree with this statement.

Lastly is the statement of short tendering time. 41 out of 84 respondents agree with this statement which equal to 57.14%. 26 of the respondents range this statement as neutral and the rest of 10 respondents disagree with this statement. Therefore, mostly lots of respondents agree with this statement.

Table 4.9: Technical Risk

Technical Risk	**Weighting Scale**						**Classification**
	Strongly disagree/disagree (1+2)		**Neutral (3)**		**Strongly agree/agree (4+5)**		
	Frequency	**%**	**Frequency**	**%**	**Frequency**	**%**	
Design changes will involve more additional cost in construction project	15	17.86	17	20.24	52	61.90	Agree
Improper planning can lead to change on design in project	20	23.81	20	23.81	44	52.38	Agree
Accidents on sites	12	14.29	32	38.10	40	47.62	Agree
Poor quality procured material	14	16.67	29	34.52	41	48.81	Agree
Short tendering time	10	11.90	26	30.95	48	57.14	Agree

4.2.4 Section B Summary

Table 4.10 shows the summary of section B question in questionnaire. From the result it indicate that all the respondent agree with the risk in the risk management of construction among the contractor when managing any project.

Table 4.10: Summary of section B

Question	Scale Range										Weighting Scale			
	1	%	2	%	3	%	4	%	5	%	(1+2) %	3%	(4+5) %	Classification
The is loss during the fluctuation in material price	0	0	0	0	9	10.71	60	71.43	15	17.86	0	10.71	89.29	Agree
Fluctuation in material price can lead to shortage of construction material	2	2.38	39	46.43	18	21.43	22	26.19	3	3.57	48.81	21.43	29.76	Disagree
There is loss due to rise in fuel price	0	0	1	1.19	22	26.19	42	50	19	22.62	1.19	26.19	72.62	Agree
There is loss during the fluctuation of material price	0	0	3	3.57	21	25	46	54.76	14	16.67	3.57	25	71.43	Agree
There is loss due to increase in labour cost.	11	13.10	15	17.86	18	21.43	33	39.29	6	7.14	30.95	21.43	46.43	Agree
Contractor experience is important to reduce risk	1	1.19	8	9.52	12	14.29	51	60.71	20	23.81	1.19	14.29	84.52	Agree
Unfairness in Tendering	3	3.57	16	19.04	26	30.95	31	36.90	8	9.52	22.62	30.95	46.43	Agree
Improper planning and budgeting lead to change on design in project	2	2.38	12	14.29	11	13.10	41	48.81	18	21.43	16.67	13.10	70.24	Agree

Table 4.10: Continue

Question	Scale range										Weighting Scale			
	1	**%**	**2**	**%**	**3**	**%**	**4**	**%**	**5**	**%**	**(1+2) %**	**3%**	**(4+5) %**	**Classification**
Lack of management of risk can lead to corruption and bribery	1	1.19	3	3.57	22	26.19	44	52.38	14	16.67	4.76	26.19	69.05	Agree
Sub-contractor related problems	0	0	6	7.14	17	20.24	58	69.05	3	3.57	7.14	20.24	72.62	Agree
Planning is the most important stage in any construction project	0	0	2	2.38	6	7.14	55	65.48	21	25.00	2.38	7.14	90.48	Agree
Every project has tendency to change in schedule	0	0	2	2.38	14	16.67	52	61.90	16	19.05	2.38	16.67	80.95	Agree
Lack of management of risk lead to project delay	2	2.38	4	4.76	16	19.05	50	59.52	12	14.29	7.14	19.05	73.81	Agree
There is time constrain in a project	0	0	4	4.76	19	22.62	44	52.38	17	20.24	4.76	22.62	72.62	Agree
Improper of planning can lead to late in material delivery	1	1.19	6	7.14	12	14.29	43	51.19	22	26.19	8.33	14.29	77.38	Agree

Table 4.10: Continue

Question	Scale Range										Weighting Scale			
	1	**%**	**2**	**%**	**3**	**%**	**4**	**%**	**5**	**%**	**(1+2) %**	**3%**	**(4+5) %**	**classification**
Design changes will involve more additional cost in construction project	4	4.76	11	13.10	17	20.24	35	41.67	17	20.24	17.86	20.24	61.90	Agree
Improper planning can lead to change on design in project	4	4.76	16	19.05	20	23.81	29	34.52	15	17.86	23.81	23.81	52.38	Agree
Accidents on sites	4	4.76	8	8.52	32	38.10	29	34.52	11	13.10	14.29	38.10	47.62	Agree
Poor quality procured material	9	10.71	5	5.95	29	34.52	30	35.71	11	13.10	16.67	34.52	48.81	Agree
Short tendering time	0	0	10	11.90	26	30.95	38	45.24	10	11.90	11.90	30.95	57.14	Agree

4.2.5 Section C: Awareness of Risk in Procurement

1. The contractor makes comprehensive background checks to third parties

Table 4.11 shows, 35 numbers of respondents agreed and 16 numbers of respondents strongly agree that contractor makes comprehensive background checks to third parties. The average index for this awareness is 3.58 at which situated at the agree level in the table of average index. It is also indicate that the respondent aware of this risk in procurement.

Table 4.11: The contractor makes comprehensive background checks to third parties

Level of awareness **Risk in procurement**	**1**	**2**	**3**	**4**	**5**	**Average index**
The contractor makes comprehensive background checks to third parties.	2	14	17	35	16	3.58

2. The contractor check for the agreement in the contract

As shows in Table 4.12, 31 numbers of respondents agreed and 16 numbers of respondents strongly agree that contractor makes comprehensive background checks to third parties. The average index for this awareness is 3.61 at which situated at the agree level in the table of average index. It is also indicate that the respondent aware of this risk in procurement.

Table 4.12: The contractor check for the agreement in the contract

Level of awareness **Risk in procurement**	**1**	**2**	**3**	**4**	**5**	**Average index**
The contractor check for the agreement in the contract.	2	11	25	31	16	3.61

3. The contractor understands each of the agreement in the contract

As shows in table 4.13, 30 numbers of respondents agreed and 22 numbers of respondents strongly agree that contractor makes comprehensive background checks to third parties. The average index for this awareness is 3.73 at which situated at the agree level in the table of average index. It is also indicate that the respondent aware of this risk in procurement.

Table 4.13: The contractor understands each of the agreement in the contract

Level of awareness **Risk in procurement**	**1**	**2**	**3**	**4**	**5**	**Average index**
The contractor understands each of the agreement in the contract.	-	13	19	30	22	3.73

4. The contractor follows the agreement in the contract

Table 4.14 shows 32 numbers of respondents agreed and 22 numbers of respondents strongly agree that contractor makes comprehensive background checks to third parties. The average index for this awareness is 3.76 at which situated at the agree level in the table of average index. It is also indicate that the respondent aware of this risk in procurement.

Table 4.14: Contractor follows the agreement in the contract

Level of awareness **Risk in procurement**	**1**	**2**	**3**	**4**	**5**	**Average index**
The contractor follows the agreement in the contract	2	8	20	32	22	3.76

5. The contractor act according to the contract

Table 4.15 shows 36 numbers of respondents agreed and 22 numbers of respondents strongly agree that contractor makes comprehensive background checks to third parties. The average index for this awareness is 3.79 at which situated at the agree level in the table of average index. It is also indicate that the respondent aware of this risk in procurement.

Table 4.15: The contractor act according to the contract

Level of awareness **Risk in procurement**	**1**	**2**	**3**	**4**	**5**	**Average index**
The contractor act according to the contract.	4	6	16	36	22	3.79

6. The contractor makes sure all the fellow worker work based on the project schedule

Table 4.16 shows 35 numbers of respondents agreed and 20 numbers of respondents strongly agree that contractor makes comprehensive background checks to third parties. The average index for this awareness is 3.76 at which situated at the agree level in the table of average index. It is also indicate that the respondent aware of this risk in procurement.

Table 4.16: The contractor makes sure all the fellow worker work based on the project schedule

Level of awareness **Risk in procurement**	**1**	**2**	**3**	**4**	**5**	**Average index**
The contractor follows the agreement in the contract	2	7	20	35	20	3.76

7. The contractor alert for the material delivery

Table 4.17 shows 28 numbers of respondents agreed and 24 numbers of respondents strongly agree that contractor makes comprehensive background checks to third parties. The average index for this awareness is 3.70 at which situated at the agree level in the table of average index. It is also indicate that the respondent aware of this risk in procurement.

Table 4.17: The contractor alert for the material delivery

Level of awareness **Risk in procurement**	**1**	**2**	**3**	**4**	**5**	**Average index**
The contractor alert for the material delivery.	5	7	20	28	24	3.70

8. **The contractor had cooperated with the supplier before**.

As shows in table 4.18, 32 numbers of respondents agreed and 18 numbers of respondents strongly agree that contractor makes comprehensive background checks to third parties. The average index for this awareness is 3.64 at which situated at the agree level in the table of average index. It is also indicate that the respondent aware of this risk in procurement.

Table 4.18: The contractor had cooperate with the supplier before

Level of awareness	**1**	**2**	**3**	**4**	**5**	**Average index**
Risk in procurement						
The contractor had cooperated with the supplier before.	2	10	22	32	18	3.64

4.2.6 Awareness summary

Table 4.19 shows the summary of the awareness of risk in procurement analysis. From this summary the researcher can said that all the respondents agreed that the contractor are aware of the risk in construction procurement. After rank all the awareness in the risk construction procurement, the highest rank is statement that the contractor act according to the contract while the lowest rank is the statement that the contractor check the agreement in the contract. However for the overall result, it shown that all the contractor is aware of risk in construction procurement project.

Table 4.19: Summary of awareness of risk in procurement analysis

Level of awareness	**1**	**2**	**3**	**4**	**5**	**Average index**	**Range**
Procurement							
The contractor makes comprehensive background checks to third parties.	2	14	17	35	16	3.58	8
The contractor check for the agreement in the contract.	2	11	25	31	16	3.61	7
The contractor understands each of the agreement in the contract.	0	13	19	30	22	3.73	4
The contractor follows the agreement based on the contract.	2	8	20	32	22	3.76	2
The contractor act according to the contract.	4	6	16	36	22	3.79	1
The contractor makes sure all the fellow worker work based on the project schedule.	2	7	20	35	20	3.76	3
The contractor alert for the material delivery.	5	7	20	28	24	3.70	5
The contractor had cooperated with the supplier before.	2	10	22	32	18	3.64	6

4.3 SECTION B; INTERVIEW ANALYSIS

Semi-structure interviews are used as the technique for the data collection in this case study. All the targeted respondents are contacted from 16th August2014 to 30th August 2014 and the appointments for the interview sessions are set up and the interview are conducted by the researcher. 3 construction companies are agreed to interview in order to obtain their views in getting and achieving the third objective of this research to identify the tools and technique used in managing risk of construction procurement. All the respondents who participated in this interview are registered under Grade1 of CIDB's registration. Table 4.20 shows the summary of the participation of respondents in this interview.

Table 4.20: Summary of the participation of respondents in interview

Respondents	Quantity	Percentage (%)
Grade 1	3	100
Total	3	100

Results of this research were depending on the respondents' responses and point of views. The data were analyzed by using summarization. List of the interviews question are divided into five questions to achieve the third objective of this research which is to identify the tools and technique used in managing risk in construction procurement.

The analysis of this case study is presented according to the three totals of respondents which come from three different companies who participated in this interview, which are:

1. Puncak Timur Construction
2. Mikedis Trading
3. Selising Vision Enterprise

4.3.1 Puncak Timur Construction

This construction company is register under CIDB as Grade 1 contractor. Puncak Timur Construction is founded by Mr. Zulkifli Azman Bin Mohd Amri as the contractor. Mr. Zulkifli himself has the working experience of over 10 years in construction industry.

1. **Contractor work with risk in a project**

In order to handle the risk in any project in construction the contractor must concern about the risk itself and what type of risk that are encounter. The risk in construction comes in many ways and the contractor need to identify all the related risk and problem and figure out that the risk is supposed to be handling by the contractor or by the client.

Besides, when there is risk among the supplier in procure material the contractor needs to deal with the supplier. A serious discussion and meeting need to immediately be taken to take an action in order to overcome this risk.

2. **What does the term risk meant to the contractor?**

The respondent point of view on the meaning of risk is the danger that might encounter especially during the ongoing project. The danger may come in many ways such as the tendering, financial, client, weather, and also from supplier. However all the risk has their own level of risk such as high, medium and low risk. For the project with the high risk, the contractor needs to monitor the project all the time. For the medium and low risk in construction also need to be figure out from the beginning as the small and medium risk might become bigger if no action is taken by the contractor.

3. **What does the term risk management meant to the contractor?**

According to Mr. Zulkifli the term risk is meant by the problem that he encounter need to be handle by identify the problems itself. Then, the contractor need to know how to solve the risk immediately. He also said that not all the risk is the contractor work in order to solve because some project the risk can be transfer to others such as the third parties which is depends on the situation.

4. **Is there any connection between the procurement option and risk management in the project?**

According to Mr. Zulkifli there is connection between procurement and risk management. This due to fact that under the procurement also need the same management as risk management which are the planning, estimating, find the solution and monitor the problem or Risk. This basic steps is important to make sure all the procurement process is done smoothly from the beginning of getting the tender until the project hand over process.

5. **What tools and technique that you used in managing risk of construction procurement?**

In managing the risk in construction procurement this company also applying a few tools and technique. Firstly, by meeting and further discussion with the customer and also the supplier. This kind of meeting usually is done as soon as the contractor detecting the problem and also before the project is started to avoid serious risk in the future.

Secondly, this company also refers to the expert in order to get the material and resource from the supplier. They tend to ask some expertise who has lots of experience in the construction project. In addition they also make some checklist for some supplier and only choose the best at which can offer the best price with the good quality of material.

Mr. Zulkifli also said that he personally make cost risk analysis and study the project schedule very well in order to avoid the unexpected risk in the future. This risk analysis is done and share with the other co-worker and makes sure all of them understand how to cope with the risk in construction project.

4.3.2 Mikedis Trading

Mikedis trading is one of the company that been register with CIDB Malaysia under Grade 1 contractor in district of Pasir puteh. This company is founded by Mr. Pahami Bin Mat Yusoff who also the contractor of this company. He has the experience in this consruction industry for about 9 years and had finish lot of construction project and have lot of experience in construction area.

1. **Contractor work with risk in a project**

According to Mr. Pahami, he copes with the risk in construction by make an early preparation and standby early for unexpected risk in the project. He personally will find the facilities before enteringthe sites of the project. He also will make an early planning so that he can handle the risk that may face him with a great confidence.

2. **What does the term risk meant to the contractor?**

Mr. Pahami also gives his own opinion that the risk is something what we call as problem that encounter in the project. The risk also something that usually happened in any project no matter the project is big or a small project. If the contractor personally can solve the problem its means that they had success in face the risk in the project.

3. **What does the term risk management meant to the contractor?**

The risk management is meant by if someone can solve the risk successfully. Mr. Pahami personally said that all the contractor need to willing to face the problem in

managing the risk. This is because all the risk actually has their own ways to be solves at which the contractor himself need to find the solution immediately and make an early planning in order to face the risk in risk management.

4. **Is there any connection between the procurement option and risk management in the project?**

For this question Mr. Pahami said there is no connection between the procurement and risk management. This is because these two statements of procurement and risk management is something that different and need to be handling differently.

5. **What tools and technique that you used in managing risk of construction procurement?**

According to Mr. Pahami, he said that he usually used the asking from the expertise in construction procurement especially during the bidding of tendering to get the project tender. He tends to ask the person who has lot of experience in tendering to put the good amount of price for a project.

Besides, he also often makes some meeting with his co-worker in order to cope with the risk in construction so that not a single of his worker did not know the risk that they been facing on. For materials and resource purchasing him also do some material checklist for price and which supplier can supply good with a good price and also with the good quality.

Other than that, he also said the most needed tools and technique in managing risk in construction procurement is the discipline, experience and able to face the problem without afraid to face with the problem.

4.3.3 Selising Vision Enterprise

Selising Vision Enterprise is founded by Mr. Rojuna bin Mamat who also the contractor in this company. Mr. Rojuna also Grade 1 contractor who register with CIDB Malaysia. He also has the great experience in construction project which is over 10 years of experience in construction industry.

1. **Contractor work with risk in a project.**

From the personal point of view from Mr.Rojuna, in order to work with risk in a project the contractor need to call all the co-worker and make a briefing and meeting. This meeting is to figure out and discuss what the cause of the risk is. After that, they will discuss on how to handle the risk and all the opinion will be considered.

2. **What does the term risk meant to the contractor?**

The term risk is equal to the problem that being faced by the contractor especially during ongoing project. This risk may come in various ways and need to solve immediately as it may affect the other project if not handle well.

3. **What does the term risk management meant to the contractor?**

According to Mr. Rojuna, the term risk management is when the risk is encounter there is some ways on how to handle the risk. The risk is actually has its own ways to solve as every problem has their own solution to be handle to solve that risk. Risk management started with the risk identification, execution, solving, and lastly is monitoring the risk and keep it update.

4. **Is there any connection between the procurement option and risk management in the project?**

Mr. Rojuna also has the same opinion like Mr. Zulkifli that there is connection between the procurement option and risk management in the project. However, the connection is not too many as in risk management they go in detail of the specific risk and the risk also come in various ways while in procurement is only about the tendering and the dealing between the contractor and also with the supplier.

5. **What tools and technique that you used in managing risk of construction procurement?**

The tools and technique that this company used in managing risk of construction procurement includes firstly they gather all the worker for a serious meeting in the meeting room and divided the entire task evenly. Each of the workers has their own roles and responsibilities in that project must give full cooperation in that task.

The task include the person in charge to find the supplier at least ten hardware supplier to rates the price in the market and choose the best price with the good quality of the material. Secondly, for the person in charge at the sites, they need to make sure all the work at the site was done smoothly following the schedule.

Lastly, if the contractor has the problem related to money they need to make loan from bank so that they will not encounter big problem in the future.

4.3.4 Summary of interview question

In this interview session with three contractors which come from different background gives a different point of view. Each of them has their own perspective of the meaning of the terms of risk in construction and the risk management in construction. They also share their own tools and technique in managing risk in construction procurement and in summary all of this company choose the meeting as

first preference tool and technique in managing risk in construction procurement is based on table 4.21.

Table 4.21: The summary of the tools and technique used in managing risk n construction procurement.

Company	Tools and technique
Puncak Timur Construction	▪ Meeting ▪ Refer to expertise ▪ Make checklist of cost ▪ Make cost risk analysis
Mikedis Trading	▪ Meeting ▪ Refer to expertise ▪ Study from previous experience ▪ Discipline
Selising Vision Enterprise	▪ Meeting ▪ Distribute the task ▪ Make early loan

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

This chapter 5 is about the finding and highlights back the result in chapter 4 and further discuss about the overall conclusion and the recommendation from the analysis of this research. This chapter is divided into five parts which is 5.1 introductions, 5.2 limitations of study, 5.3 conclusions, 5.4 recommendations and lastly 5.5 future studies. For the limitation part, the difficulties of the researcher in finishing this research and recommendation to overcome it will be further explained. The summary of this overall research will be including in the conclusion part. Then, for the part of recommendation it consist of the suggestion for improvement the managing risks in construction procurement. Last but not least, there some suggestions to improve the future study to make it more useful and interesting.

5.2 LIMITATION OF STUDY

Behind the scene of this study, there are lots of limitations that face by researcher in order to achieve the objective of this research. This limitation may cause by several matters that are outside of researcher's ability and they include firstly is time limitation. The duration of this study is too short that it's make the researcher to make a research with a little time. Besides, the researcher also busy with other commitment with other subjects and activities. In distributing the questionnaire it also time limiting because a few respondents unable to complete the questionnaire within the time. So, the double effort was put to ensure this research complete within the time given.

The number of receive feedback from respondents is also not equal to the exact number of sample for this research. This is because some of the Grade 1 contractor did not put their phone number and also their email address. So the researcher need to send the questionnaire by hand and cannot by email. It also difficult to contact the contractor as they also did not put their phone number when register with CIDB.

In addition to that, during completing the literature review there also some problem faced by researcher. There are lots of reading is need to ensure a good literature review was established. There also some difficulties come out in order to get a valid and good journal and articles.

5.3 CONCLUSION

In conclusion the objective of this research of to study the risk in construction procurement project is achieved. The first objective to study the possible risk in construction project was achieve by the literature review in the chapter 2 and also from the questionnaire in section B. in the literature review all the risk in construction is being highlighted and most of the researcher found there are lot of risk in construction which it comes in many ways. For example according to research by Chris Chapman and Stephen Ward, (2003) said that most of the project will involve risk and any project which did not have risk is actually not worth pursuing. This is because for him any project at which involve risk will eventually give the good benefit in return.

Besides, based on the data analysis of the questionnaire section B majority of the respondent agreed the risk listed in the questionnaire which is include the financial risk, risk in management, risk in time management and also the technical risk.

Other than that, the second objective of this research also was succeeding which is to determine the level of awareness of the procurement risk among the contractor in construction project. From the questionnaire section C the researcher can conclude that majority agreed with the contractor aware with the risk in procurement.

Next, for the third objective to identify the tools and technique used in managing risk of construction procurement are also achieved by the interview session with three related contractor Grade 1 which register with CIDB. Three of them give out their own opinion on tools and technique used in construction procurement.

5.4 RECOMMENDATION

This study is not enough to reveal all the risks that exist in the construction procurement from the beginning until the completion of the project for construction industry in Malaysia. Therefore, it is useful to conduct further study to complete the study on the risk in construction.

Therefore, these show the several recommendations for future study due to continuing this study. Firstly is to larger the scope to conduct the study in the whole Malaysia and involve many respondents. Secondly, study on the factors that cause the risks and also the solutions for every risk that exist. This recommendation can benefit the entire contractor in the future.

5.5 FUTURE STUDY

In the future study there is several suggestions that can be implemented. First and foremost, further study can be done to study the risk management in construction

procurement project by doing research in a different perspective not only in the construction procurement perspective. For example is from the project owner, clients, consultants and others those who related with the construction industry. Secondly, the reading of the journal and articles need to be increase to get a better understanding about the research purpose and also the general knowledge about the construction and also the related risk that can also be the related risk in construction project.

REFERENCES:

Abd. Majid, M. Z. 1997. *Non-excusable Delays in Constructions*, Ph.D. Thesis: Loughbrough University of Technology, UK

Adnan, H. 2008. Risk Management Project in Design and Builds on Construction Projects in Malaysia. *International Conference On Construction And Technology,* pp. 39-50.

Baratta, A. 2006. The Triple Constraint. *A Triple Illusion: PMI Global Congress Proceedings,* pp. 202.

Badarudin, M.F. 2006. *Risk in Construction*. Bachelor's Degree. University Malaysia Pahang, Malaysia.

Burtonshaw, S. A. (undated). Risk and Financial Management in Construction.

Chapman, C. Ward, S. 2003. *Project Risk Management*. England: John Wiley & Sons, Ltd.

CIDB. 2004. Construction Procurement Best Practice Guideline #A5. CIDB Development Trough Partnership, 1-8.

Dickinson, A.S. 2009. Construction Project ProcurementRoutes: an in-depth critique. *International Journal of Managing Project in Business*, 2, pp. 338-354.

Dictionaries, O. 2014. Oxford Dictionaries Language Matters. Retrieved From Oxford University Press:

http://www.oxforddictionaries.com/definition/english/construction?q=construction

Federal Lands Highway Division. 2014. Risk and Opportunity Management Plan, pp. 1-11.

Godfey, P. 1996. A Guide to the Systematic Management of Risk from Construction. *Construction Industry Research and Information Association*. London

Hilson, D. Grilmaldi, S. and Fafele, C. 2006. Managing Project Risk Using a Cross Risk Breakdown Matrix. *Risk Management.* **8**: 61-76.

Hlaing, N.N. Singh, D. Tiong, R.L.K. and Ehrlich, M. 2008. Perception of Singapore Construction Contractors on Construction Risk Identification. *Journal of Financial Management of Property and Construction.* **13**(2): 85-94.

Jaafari, A.C and Anderson, J.J. 1995. Risk assessment on Development Projects. *The Case of Lost Opportunities.* Australian Institute Building Papers.

Joshua, O. D and Jagboro, G.O. 2007. An Evaluation Of the Impact of Risk on Project Cost Overrun in the Nigerian Construction Industry. *Journal of Financial Management of Property and Construction*. **12**(1): 37-44.

Khumpaisal, S. 2007. Risk in the Construction Project Procurement Process and The Mitigation Methods. *Journal of Architectural/ Planning Research and Studies*. 135-144.

Krejcie, R.V & Morgan, D.W. 1970. Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, **30**: 607-610.

Lu, W. Liu, A.M.M. and Wang, H. 2013. Procurement Innovation for Public Construction Project, A Study of Agent-Construction System and Public-Private Partnership in China. *Public Construction Project*, **20**(6): 543- 562.

Merriam. 2014. Merriam-Webster. Retrived Mei Sunday, 2014, from idp Education Open Your Mind

http://www.meriam-webster.com/dictionary/construction

Mills, A. 2001. A systematic Approach to Risk Management for Construction. *Structural Survey*, 245-252

Moslim, N.H, Misni, F. Muhammad, N. Zakaria, R. Yaziz, S.R. and Satari, S.Z. 2013. *Applied Statistic Module*. Kuantan: Universiti Malaysia Pahang Publisher.

Napis, N.A. 2013. *A Study on Risk Factors That Lead To Cost Overrun in Construction Project in Kuantan Areas*. Bachelor Degree. Universiti Malaysia Pahang. Malaysia.

Osipova, E. *Risk management in construction project: a comparatives study of the different procurement options in Sweden*. Bachelor Degree. Lulia University of Technology.Sweden.

Oxforddictionnaries. 2014. Oxford Dictionaries Language matters. Retrived from

http://www.oxforddictionaries.com/definition/english/risk

Puddicombe, M.S.2012. Novelty and Technical Complexity: Critical Constructs in Capital Project. *Journal of Construction Engineering and Management*, 613-620.

Raymond, J. 2008. Benchmarking in Public Procurement. *Benchmarking: An International Journal*, **15**: 782-793.

Russell and Taylor. 2000. Operation Management. NJ: Prentice-Hall Inc.

Shou, Q.W, Dulaimi, M.F and Aguria, M.Y. 2004. Risk Management Framework for Construction Project in Developing Countries. *Construction Management and Economics*, 237-252.

Skorupka, D. 2008. Identification and Initial Risk Assessment of Construction Project in Poland. *Journal of Management in Engineering*, 120-127.

Tsung, C.S and Min, L.Y. 2010. Risk Assessment of Design-Bid-Build and Design-Build Building Project. *Journal of the Operations Research Society of Japan*. **22**(1/2): 20-30

Vogt, W. and Paul. 1999. *Dictionary of statistics and methodology*. Sage: Thousand Oaks, California.

Wee, S.H. Othman, R. Omar, N. Abdul Rahman, R. and Haron, N.H. 2011. Procurement Issues in Malaysia. *International Journal of Public Sector Management*, **24**(6): 567-593.

William, S. 1995. A Regulation Evolution System: A Decision Support System for the Building Code of Australia. *Construction Management and Economic*, 197-208.

APPENDICES A

QUESTIONNAIRES

Faculty of Industrial Management

University Malaysia Pahang

Dear Sir/Madam/Miss,

First and foremost thank you for participating in this survey. We feel excite to invite you to contribute in this survey and give appreciation for your kind involvement. For your information, this survey is to fulfil the requirement for my undergraduate research project entitled A Study of Risk Management in Construction Procurement Project.

Kindly complete and give an earnest and honest opinion and experiences accordingly. All the questions are based n individual experience and there is no right or wrong answer. Your response to the question will be treated with strict confidential and only will be used for the purpose of the academic research.

Lastly, we would like to thank you for participating in this survey. Your high cooperation and participation is highly appreciated.

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Bachelor of Project Management (Honors.)

University Malaysia Pahang

(Contact Number: 013-9177275)

Supervised by:

Miss Zarith Sufia Bt Azlan

SECTION A: GENERAL INFORMATION

Please complete the question mark (/) in the box provided and provide suitable answers to the questions below.

Sila lengkapkan soalan dengan menandakan (/) pada kotak yang diberikan dan beri jawapan yang sesuai untuk soalan di bawah.

1. Gender / Jantina

☐ Male / Lelaki

☐ Female / Perempuan

2. Level of education / Tahap Pendidikan

☐ Primary / Sekolah Rendah ☐ Secondary / Sekolah Menengah

☐ Diploma ☐ Degree / Ijazah

☐ Master ☐ Other / Lain-lain

Nyatakan :

3. Age / Umur

☐ Below 20 years old / bawah 20 tahun ☐ 41-50 years old / tahun

☐ 21-30 years old / tahun ☐ 51-60 years old / tahun

☐ 31-40 years old / tahun ☐ 61years old and above / 61 tahun dan ke atas

4. Work experience in the construction industry/pengalaman bekerja dalam pembinaan

☐ Less than one year /kurang setahun ☐ 6-9 year / tahun

☐ 2-5 year / tahun ☐ 10 years and above / tahun dan ke atas

SECTION B: RISK IN CONSTRUCTION

Strongly disagree / Sangat tidak bersetuju	Disagree / tidak setuju	Neutral / Biasa	Agree / Setuju	Strongly agree / Sangat Bersetuju
1	2	3	4	5

Please read each statement carefully and using the scale above, indicate the suitable answers for each of statements by tick your response on a scale from 1 (Strongly disagree) to 5 (Strongly agree), that most closely corresponds with your opinion.

Sila baca setiap penyataan dengan teliti dengan menggunakan skala di atas, nyatakan jawapan yang sesuai untuk setiap pernyataan dengan menandakan jawapan anda pada skala bermula dengan 1 (sangat tidak setuju) hingga 5 (Sangat setuju), pilih jawapan yang paling hampir dan sepadan dengan pendapat anda.

No.	Question	Scale				
		1	2	3	4	5
	Financial Risk/ Risiko kewangan					
1	There is loss during the fluctuation in material price. *Kerugian akibat kadar turun naik kadar harga barang.*					
2	Fluctuation in material price can lead to shortage of construction material. *Kadar turun naik harga barang menyebabkan kekurangan barangan binaan.*					
3	There is loss due to rise in fuel price. *Berlaku kerugian semasa kenaikan harga minyak*.					
4	There is loss during the fluctuation of material price. *Kerugian akibat turun naik harga barang*.					
5	There is loss due to increase in labour cost. *Kerugian akibat peningkatan gaji pekerja*.					
	Risk Management/ Risiko Pengurusan					
6	Contractor experience is important to reduce risk. *Pengalaman kontraktor adalah penting untuk mengurangkan risiko.*					
7	Unfairness in tendering. *Ketidakadilan dalam tender.*					
8	Improper planning and budgeting lead to change on design in project.					

	Perancangan yang tidak tepat dan belanjawan membawa kepada perubahan pada reka bentuk dalam projek.					
9	Lack of management of risk can lead to corruption and bribery. *Kekuranagan pengurusan risiko menjurus kepada kerugian akibat rasuah.*					
10	Sub-contractor related problems. *Masalah yang berkaitan dengan sub-kontraktor.*					
	Risk in Time Management/ *Risiko Pengurusan Masa*					
11	Planning is the most important stage in any construction project. *Perancangan adalah peringkat yang paling penting dalam mana-mana projek pembinaan.*					
12	Every project has tendency to change in schedule. *Setiap projek mempunyai kecenderungan untuk berubah dalam jadual.*					
13	Lack of management of risk lead to project delay. *Kekurangan pengurusan risiko menjurus kepada penangguhan projek.*					
14	There is time constrain in a project. *Setiap projek mengalami kekangan masa*.					
15	Improper of planning can lead to late in material delivery. *Perancangan yang tidak betul membawa kepada terlewat penghantaran barang*.					
	Technical Risk/ *Risiko Teknikal*					
16	Design changes will involve more additional cost in construction project. *Perubahan reka bentuk akan menlibatkan banyak penambahan kos dalam pembinaan projek.*					
17	Improper planning can lead to change on design in project. *Perancangan projek yang tidak betul boleh menjurus kepada perubahan reka bentuk sesuatu projek.*					
18	Accidents on sites. *Kemalangan di tempat kerja.*					
19	Poor quality procured material. *Bahan yang rendah kualiti.*					
20	Short tendering time. *Masa tender pendek.*					

SECTION C: AWARENESS OF RISK IN PROCUREMENT

Strongly disagree /sangat tidak setuju	Disagree/ tidak setuju	Neutral/ Biasa	Agree/ setuju	Strongly agree/sangat bersetuju
1	2	3	4	5

Please read each statement carefully and using the scale above, indicate the suitable answers for each of statements by tick your response on a scale from 1 (Strongly disagree) to 5 (Strongly agree), that most closely corresponds with your opinion.

Sila baca setiap kenyataan dengan teliti dan menggunakan skala di atas, menunjukkan jawapan yang sesuai untuk setiap pernyataan semak jawapan anda pada skala dari 1 (sangat tidak setuju) hingga 5 (Sangat setuju), pilih yang paling hampir sepadan dengan pendapat anda.

No.	Question	Scale				
		1	2	3	4	5
1	The contractor makes comprehensive background checks to third parties. *Kontraktor membuat pemeriksaan latar belakang yang komprehensif kepada pihak ketiga*.					
2	The contractor check for the agreement in the contract *Kontraktor memeriksa perjanjian dalam kontrak.*					
3	The contractor understands each of the agreement in the contract. *Kontraktor memahami antara satu sama perjanjian dalam kontrak.*					
4	The contractor follows the agreement based on contract. *Kontraktor mengikut perjanjian itu berdasarkan kontrak.*					
5	The contractor act according to the contract. *Perbuatan kontraktor mengikut kontrak.*					
6	The contractor makes sure all the fellow worker work based on the project schedule. *Kontraktor memastikan semua kerja rakan-rakan sekerja mengikuti jadual projek.*					
7	The contractor alert for the material delivery. *Kontraktor berjaga-jaga untuk penghantaran bahan.*					
8	The contractor had cooperated with the supplier before. *Kontraktor telah bekerjasama dengan pembekal sebelum ini.*					

Interview questions

1. How did you work with the risks in a project?

2. What does the term risk meant to you?

3. What does the term risk management meant to you?

4. Is there any connection between the procurement option and risk management in the project?

5. What tools and technique that you used in managing risk of construction procurement?

APPENDICES B

GANTT CHART PSM 1

Progress/ week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Project briefing		↔												
Title Brainstorming			↔											
Introduction			←	—	—	—	—	—	—	—	—	—	→	
Literature review							←	—	—	—	—	→		
Methodology								←	—	—	—	→		
Final Submission												↔		
Prepare slide for presentation													↔	
Presentation														↔

GANTT CHART PSM 2

Progress/ week	1	2	3	4	5	6	7	8	9	10	11	12	13
Complete questionnaire	↔	↔											
Prepare questionnaire sufficiently			↔	↔	↔								
Conduct data analysis				↔	↔	↔							
Distribute and collect data from respondent							↔						
Meet supervisor: discuss about data collection								↔					
Submit draft of report									↔				
Submitting full report of FYP2										↔	↔		
Preparing slide for oral presentation												↔	
Presenting FTP2													↔