

CHAPTER II

LITERATURE REVIEW

2.1 Construction Industry

Flanagan and Norman (2006) noted that the construction industry is subject to more risk and uncertainty than many other industries. The process of taking a project from initial investment appraisal to completion and into use is very complex, generally bespoke, and entails time-consuming design and production processes. It requires a multitude of people with different skills and interests and the co-ordination of a wide range of disparate, yet interrelated, activities. The construction industry is affected not only by internal factors, but also by external factors that is uncontrollable.

In the construction industry, some people work together to achieve the goal of some projects. Those people assigned by specific duty and responsibility to finish the project. Owner, designing consultant, supervising consultant, and contractor are people who work together in the construction field. Each person has to work in team and finish their work on time. Successful project management in the construction industry can be achieved if that different parties work together effectively.

2.2 Risk Definition

Risk is usually defined as a positive or negative deviation of a variable from its expected value (Schieg, 2006). Other professionals mentioned that risk is the probability of occurrence of some uncertain, unpredictable, and even undesirable events that would change the prospects for the profitability on a given investment (Kartam & Kartam, 2001). Mazouni (2008) says that the risk is an intrinsic property of any decision, it is measured by a combination of several factors like severity, occurrence, exposure to, etc. Although it is generally limited to two factors: severity and frequency of occurrence of a potentially damaging accidents that incorporate some exposure factors.

The risk of failure in construction industry is various. To explain, the risk in construction industry is full of uncertainty. Risk and uncertainty can potentially have damaging consequences for the construction projects (R. Flanagan, 2006). Specifically said, the risk in construction industry can cause damages that can affect the cost, time, and also quality of the projects. Malek, Pathan, and Mal (2013) argued that the risk can be described as a systematic methodology and continuous process in which events that may significantly affect the final product can identify, quantify, model, manage and monitor (p.377).

The risks in construction industry related to many aspects. It can be related to the management system, technical system, and also the natural

disasters. Risk definition can be different from one person to another. It is depend on their own point of view.

2.3 Risk Management Definition

Junior and Carvalho (2013) stated that risk management has been one of the major concerns of executives and professionals involved with projects today. Risk management in the construction project management context is a comprehensive and systematic way of identifying, analyzing and responding to risks to achieve the project objectives (Thomas Telford Ltd, 2005). The risk management in the construction project can improve the construction process and also improve the affectivity of the resources that used in the project.

The ultimate purpose of developing these risk management techniques is to add value to project delivery and improve efficiency of the construction industry during practice. Thus there has been an increase in research aimed at investigating risk management practice in the construction industry (Wood and Ellis, 2003). The concept of risk management is different from one to another. Simply said, the concept of risk management is multi-dimensional. This is caused by the different definition of risks. With the different definitions, risks can be categorized into different purposes.

Risk management comprises the integration of basic principles of risk policy, the establishment of a risk consciousness as well as the organizational integration. It is an impetus for the risk management process and is responsible for the control of risks in full knowledge of the current risk situation (Diederichs, 2004).

According to Ehsan, Mirza, Alam, and Ishaque (2010), risk management in a project encompasses the identification of influencing factors which could negatively impact the cost schedule or quality objectives of the project, quantification of the associated impact of the potential risk and implementation of measures to mitigate the potential impact of the risk. The riskier the activity is, the costlier will be the consequences in case a wrong decision is made. Proper evaluation and analysis of risks will help decide justification of costly measures to reduce the level of risk.

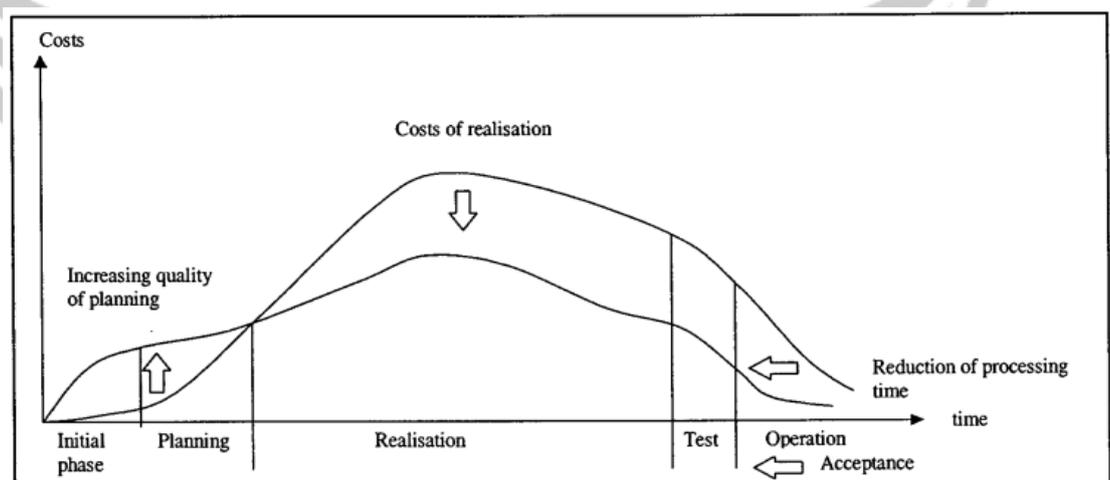


Figure 2.1. Potential through the use of risk management in construction projects (Schieg, 2006)

Good risk management system in the construction industry can avoid many problems through many proactive actions that can make the project under control. Risk management can mitigate the risks that results in project delay, cost overruns, and the change scope of work.

2.4 Concepts of Risk Identification and Risk Analysis

Perera et al. (2009) specified that in the risk management process, especially in the risk identification, the contractual parties should adopt a continuous learning approach because these past projects are real life scenarios from which to gain experience that might place the parties in a good state in the future so that the probable risk that might be encountered in a new project can be identified beforehand.

There are various methods in determining the risks in the construction industry. The method depends on the type of the project. The systems used for project risk management have their focus on quantitative risk analysis, but these techniques do not allow that risks, problems, remedial measures and lessons learned from previous projects be captured and reused when developing new projects (Tah and Carr, 2001).

According to Ehsan, Mirza, Alam, and Ishaque (2010), there are two methods to determine risks in a project, namely the qualitative and quantitative approach. The quantitative analysis relies on statistics to calculate the probability of occurrence of risk and the impact of the risk on

the project. The most common way of employing quantitative analysis is to use decision tree analysis, which involves the application of probabilities to two or more outcomes. Another method is Monte Carlo simulation, which generates value from a probability distribution and other factors.

The famous method of qualitative approach is the precedence diagram method. The precedence diagram usually used to scheduling some activities in the project. It is use ordinal numbers to determine the outcomes and priorities of one activity to another.

According to Baker et al. (1999), the current risk management procedure includes the following main steps: risk identification, analysis, evaluation, and control. Yet these steps can be further divided to include risk response and monitoring which in turns will result in obtaining a controlled risk environment.

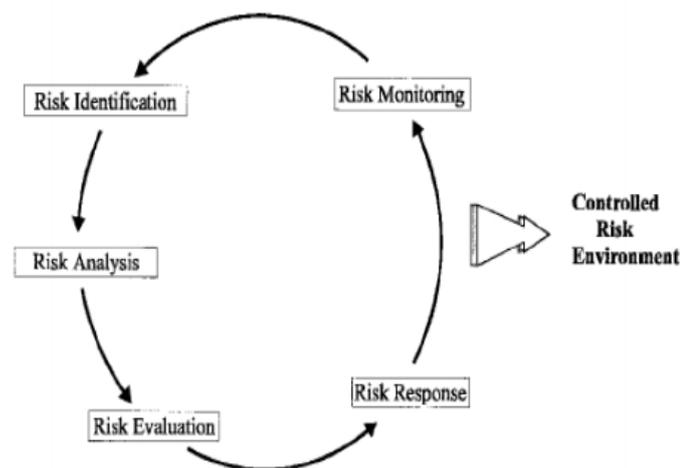


Figure 2.2 Risk Management Cycle (Baker et al., 1999)

2.5 Factors that Affecting Risks in Construction Project

Rezakhani (2012) classified the risk factors under three heads: External, Legal and internal. External risk was sub divided into two subsets: unpredictable/ uncontrollable, predictable/ uncontrollable and Internal risk was sub divided into two subsets: non-technical/ controllable, technical/ controllable. Various factors disclose the project from normal to the higher risk.

There are many different classification of factors that affecting the risks in the construction project. Many researchers identified several risk factors and they classified into different types depends on their own understanding. Based on Ehsan et al. (2010), factors that affecting the risks in construction industry are:

a) History

Newer projects pose more risk because the process has not been refined with the passage of time. If a project of similar nature has been done many times before, then the likelihood of success with the current project is also enhanced.

b) Management Stability

Management stability means that the whole management team shares the same vision and direction, thereby leading successful achievement of goals.

c) Staff expertise and experience

In the event that the members of a project team lack the direct working knowledge and experience of the area, there is a likelihood of time delays, estimated cost upsets and poor quality.

d) Team Size

In case of large teams, the probability of problem occurrence increases due to the team size.

e) Resource Availability

If the availability of resources is easy, the probability of responding to problems in real time also increases.

f) Time Compression

In case of highly compressed time schedule, the risks are magnified in the project. When more time is available, more flexibility is present in the project and there is an opportunity to mitigate and reduce the impact of occurring risks.

g) Complexity

In case of a highly complex or sophisticated project, the opportunity of a mistake or a problem is also enhanced.

S. M. Renuka et al. (2014) explained that the predictable factors should be forecasted during the earlier stage of the project whereas the non-predictable factors involve uncertainties; this should also be estimated for the successful completion of the project because these risks will affect the cost, time, quality of the project.

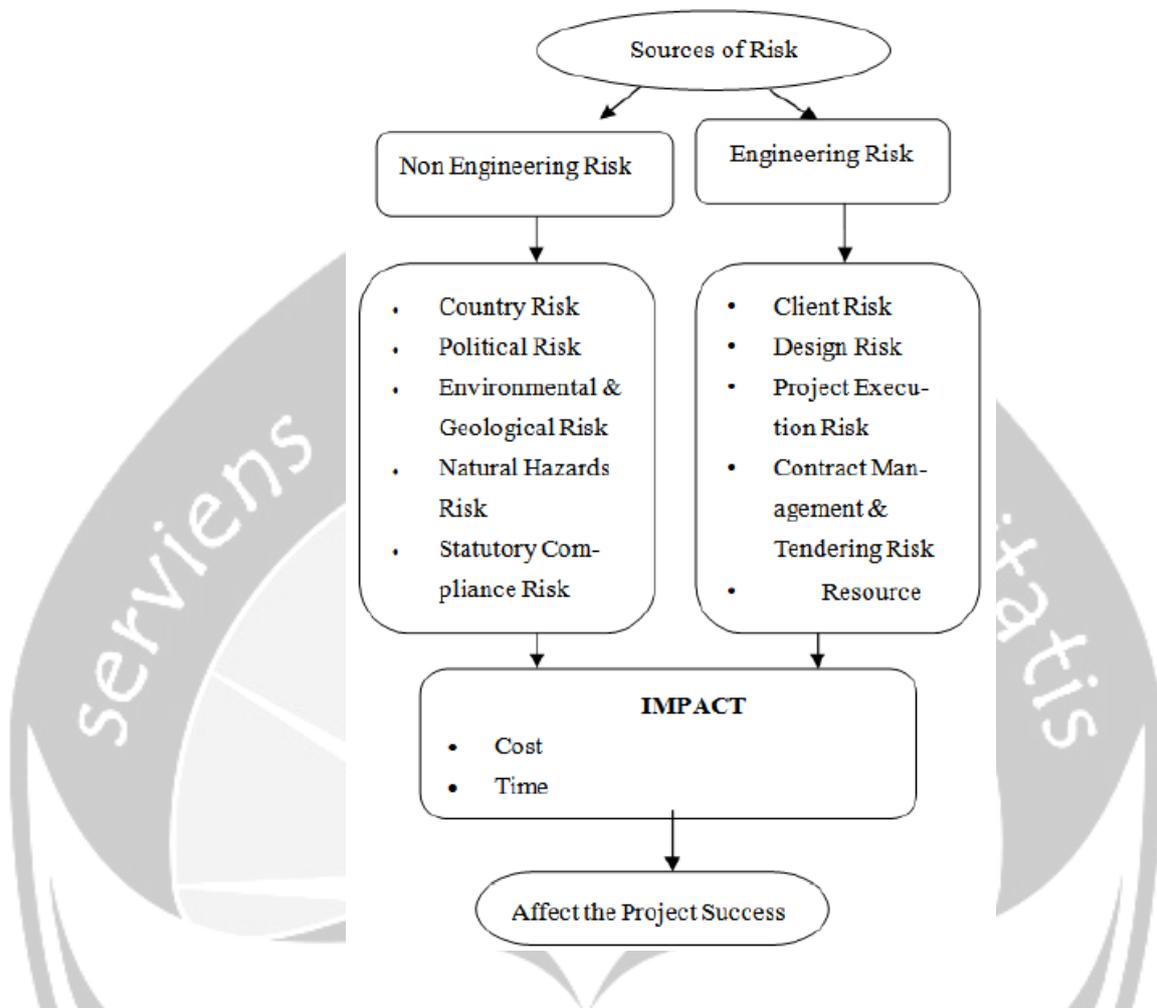


Figure 2.3 Knowledge Map Representing the Risk Sources affecting the Project Success (S. M. Renuka et al., 2014)

2.6 Risks Response

In the risk management, the risk analysis is followed by the risk response. The risk response is used to control the risks that happen in the construction project. Based on Flanagan & Norman (2006), responses is often graded in four levels, namely:

1. Risk retention

Risk retention concerns accepting the presence of risk and still conducting business as usual. The reasons for retaining the risk could be that the estimated probability, consequence or the combination of the two is low and at an acceptable level. A good everyday life example is when it comes to the choice of insurance premium. Either one takes a high premium and then gets reduced excess or chooses a lower premium and gets a higher excess. Still, the risk is there and retained.

2. Risk reduction

Risk reduction is about decreasing the probability, the consequences or a combination thereof for a risk to breakout. This could be done in several ways, of which sharing with other parties or taking some action where the probabilities or consequences become reduced is common. A common way to reduce risks at construction sites is through work planning. The work plans consist of timetables and allocation of resources such as staff and equipment.

3. Risk transfer

Transferring the risk to another party is a fairly common way to deal with risks in the construction sector. It is transferred from the client to the contractor through the agreements in the contract, or from the contractor to the sub-contractor.

4. Risk avoidance

Risk avoidance is about refusing to accept a risk. This is either done by simply refusing a project that is too risky to proceed with or by writing exceptional clauses in the tender.

Another professionals, Ehsan et al. (2010), stated that there are five categories of classic risk response strategies: accepting, avoiding, monitoring, transferring and mitigating the risk.

1. Accepting the risk

This category implies to understand the risk, its consequences and probability of occurrence, and not doing anything about it. The project team will react to the risk in case of occurrence. This strategy is commonly used in cases when the probability of a problem occurrence is minimal.

2. Avoiding the risk

Risk can be avoided by not doing part of the project which contains risk. Scope of the project is changed in this manner, which might change the business case as well, since a scaled down product could lead to lesser revenue or cost saving opportunities.

3. Monitoring the risk

Risk can be monitored by employing a predictive indicator to watch the project as it approaches a risky point. The risk strategy is to monitor the risk by being part of the test team.

4. Transferring the risk

In order to transfer the risk in a project, many large scale projects purchase insurance for risks ranging from theft to fire. Risk can also be transferred by hiring an expert. Transferring risk to another party has advantages, but it also introduces new risks because it involve another party to the project.

5. Mitigating the risk

Mitigation is process of response to the risk after it has affected the project. Mitigation covers all actions the project team can take to overcome risks from the project environment.

