

Risk in The Construction Industry¹

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1. Abstract

Risk is inherent in each project within the construction industry in different forms. It can be a threat, which has a negative impact on the project objectives. On the other hand, it can also be an opportunity, which has a positive impact, or a business risk that has either a negative or positive impact. This paper provides a brief about risk in the construction industry, risk definition and types of risks. Moreover, it provides an overall view of risk management processes.

Keywords: Risk, Management, Threat, construction, project objective, impact, Uncertainty.

2. Introduction

All over the world today, the construction industry is the main driver of development, social welfare, and national economy. It contributes greatly to the jobs market by providing many jobs and in different specialization such as Engineers, Accountants, different labors, and many other titles. Additionally, with regard to the urban and industrial development, it supports both by providing the feasibility studies, conceptual design, cost estimate, construction and maintenance services. Therefore, we agree that construction deserves more attention and researches in order to decrease the uncertainty as much as possible, which will maximize the likelihood of achieving the objectives of the different projects within the construction industry.

Uncertainty range differs from project to another based on the project`s circumstances. There are many sources of uncertainty and on the other, hand, we can manage this uncertainty by using some tools and processes. Uncertainty may come from the undefined scope, undefined project objectives, project constraints, improper design, ambiguous contract, and other unknowns. This uncertainty is always translated into risks because both are causing events with a probability of less than 100%, which is defined as a risk.

The above discussion indicates that there are some tools and processes to manage risk either proactively or reactively. By the way, the difference between proactive and reactive can be summarized at the time of managing the risk. If we manage the risk before occurring, definitely it`s a proactive approach, while the reactive approach is managing the risk after occurring.

Risk management is a collaborative effort to drive the project forward the targeted success through some processes. It`s not mean or aims to avoid all project risks. Certainly, it aims to determine the

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probable events and maximize the probability or the impact of opportunities and minimize the probabilities or the impact of the threats.

Every day, the construction parties are requested to make decisions, which always have great impacts on their project. Risk management is very important to make an informed decision which means basing the decision on clear information although it includes an amount of uncertainty.

3. Risk Definition

A risk is a probable event that has a probability, a cause or more and an impact or more. Usually, the probability is not a fixed number and it's changed along the project period. It may be very high at a time and becomes very low at another time based on the project circumstances. The cause of risk is something that converts the probability of occurring into a hundred percent. It may be one cause and may be a group of causes. Furthermore, the occurred risk may represent a cause for another risk. Also, the response of the risk may represent a cause for a new risk which called a secondary risk. The impact of the risk can be positive or negative or a mix between both.

The highest number of risks are mostly existed on the initiation phase because of the big uncertainty, after that the uncertainty begins to be decreased along the project period because of the information received noted through the execution phase.

4. Risk names according to the time of risk identification

Each project passes through some phases until reach the closure phase. The project phases are initiation, planning, execution, monitor and control, and closure. Risks are may be discovered at any phase and it can be identified either before taking placing or after that. Accordingly, one of the risk classifications is mainly based on the identification times as follows:

A. Known risk

A known risk is a risk identified during planning processes, and it can be identified during the execution phase but before occurring. Therefore, the identified contractual risk is considered as known risks. It can be assessed and planned proactively. Normally, we can't predict all probable risks for many reasons such as lack of experience – uncertainty – lack of information – unexpected changes – enterprise environmental factors.

B. Unknown risk

Unknown risk is an undiscovered risk until during the planning phase or execution phase. It cannot be managed pro-actively unless identifying it before occurring. In addition, it can be discovered and planned it discovered before the occurrence.

C. The new risk or discovered risk

Risk has been discovered during the control risk process which is under the execution phase, and before it's occurring.

D. Secondary risk

A risk, which results from a response plan of another risk, and identified during the planning of risk response.

E. Residual risk

A risk which is identified during the planning process and accepted. In most cases, these risks have a low impact on the project.

5. Risk sources

The risk sources are various and are changed over the project duration. In other words, it can be categorized into internal sources and external sources. For more clarification, internal source means those which under the project manager control, while the external source is outside the project manager control. External sources such as economic conditions, political conditions, legal, natural hazards, social conditions, and natural environments. On the other hand, internal sources such as the construction technology, and human factors risk.

6. Risk breakdown structure

Identified risk must be categorized in order to manage it effectively and also facilitate discovering more probable risks. It's very helpful to determine the root causes of risk, effective response, the interaction between risks and well understand the project's risks. It also considered as a powerful tool to identify risk so it commonly used in the risk identification process. The most important use of categories is that it allows risk to be organized well and also can help to tailor responses to deal with a category in a more effective way rather than dealing with individual risk.

Many authorities and authors exposed to this point and developed various categories of risks. All categories aimed to classify the identified risks in an organized way based on different considerations. For instance, risks may be categorized based on the root causes of risks, project phase, impact, rank, responsibility, and other methods.

(Seung H. Han and James E. Diekmann, 2001) Classified construction risks into five categories, namely: political, economic, cultural/legal, technical/ construction and other risks.

(JG PERRY, RW HAYES, 1985) pointed the sources of the various risks and then classified the risks in terms of risks retainable by client, contractor, consultant.

(Dale Cooper, Chris Chapman , 1987) classified risks as per their nature and magnitude and grouped risks into two major types are primary risks and secondary risks.

(Tah, J.H.M., Thorpe, A., and McCaffer, R., 1996) classified risks based on their origin and the location of the impact of the project site.

Risk breakdown structure is a hierarchical way to organize the identified risk through a number of levels starts from a high-level title and go to a more detailed level which presents the project risks. It is developed during the planning phase and updates as needed during the control phase.

In this essay, risks will be classified based on the party who shall bear the risk according to the contract. So the main categorizes of risks are contractor risks and client risks. The classification is more helpful the address the problem of this research and supports the main objective which is to highlight the risk in each contract and how shall bear it.

7. Risk management process

Risk management can be achieved in two ways which are formal and informal. The informal management of risk is to manage risk without following a specific process. Usually, in this case, the contractor allows contingency either a fixed amount or a percentage to absorb any arise risks during construction. It's apparent that this way does not need significant effort but it's very risky and doesn't support the decision making, moreover, it does not alert the project manager toward the probable risks.

The formal way to manage risk is comprised of some processes that will control the project's risk. These processes are varying from company to another and also from the author to another.

According to (PMI, 2017), there are six processes to manage risk are:

- A. Planning risk management
- B. Risk identification
- C. Qualitative risk assessment
- D. Quantitative risk assessment
- E. Plan risk response
- F. Monitor risk

These processes are iterative which means it will be done several times along the project.

8. Conclusion

Risk is existing in each project especially the construction industry due to the big amount of complexity and uncertainty. Theses risk has several and various impacts on the project objectives ranging from high impact and low impact, therefore it shall be managed closely and deeply.

Risk management can be managed in two ways are formal and informal. The informal management of risk is to manage risk not following a specific process. Usually, in this case, the contractor allows contingency either a fixed amount or a percentage to absorb any arise risks during construction. It's clearly seen that this way does not need effort but it's very risky and doesn't support the decision making. Moreover, it does not alert the project manager toward the probable risks.

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Conflict of Interest

No conflict of interest

References

AACE International. (2018). *AACE® International Recommended Practice No. 10S-90, COST ENGINEERING TERMINOLOGY*. AACE International.

Billows, D. (2011). *Project Qualitative Risk Analysis*. The Hampton Group, Inc.

Dale Cooper, Chris Chapman. (1987). *Risk Analysis for Large Projects: Models, Methods, and Cases*. Wiley; 1 edition (April 1987).

JG PERRY, RW HAYES. (1985). *RISK AND ITS MANAGEMENT IN CONSTRUCTION PROJECTS* (Vol. Volum 78 Issue 3). Retrieved from <https://doi.org/10.1680/iicep.1985.859>
Leroy Doris, Neil Opfer, CCP CEP PSP, Sean T. Regan, CCP CEP MRICS, Ted Turner. (2013). *Decision and Risk Management Professional™ (DRMP)™* (First Edition ed.). (C. C. Sean T. Regan, Ed.) AACE® International.

Martin Loosemore, John Raftery, Charles Reilly, David Higgon. (2006). *Risk Management in Projects* (Second Edition ed.). Taylor & Francis.

PMI. (2009). *Practice Standard for Project Risk Management*. Project Management Institute.

PMI. (2017). *PMBOK® Guide – Sixth Edition*. PMI.

Seung H. Han and James E. Diekmann. (2001). *Approaches for Making Risk-Based Go/No-Go Decision for International Projects* (Vols. Vol. 127, Issue 4 (August 2001)). *Journal of Construction Engineering and Management*.

Tah, J.H.M., Thorpe, A., and McCaffer, R. (1996). *Risk interdependencies and natural language computations, Journal of Engineering, Construction and Architectural Management*.

U.S. Office of the Secretary of Defense. (2006). *Risk Management Guide for DOD Acquisition* (Sixth Edition ed., Vol. Version 1.0). U.S. Department of Defense.

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