



## APPLIED RISK MANAGEMENT IN CONSTRUCTION INDUSTRY: A REVIEW

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### Abstract:

*Risk management was applied to many organizations. There was a risk of multiple and complex manner in the construction industry, because it has a variety of elements. The application of risk management was therefore used in solving problems that suffer from the past to create an alternative to proper functioning under conditions. This article studied the main application to risk management in the construction industry by the sample texts document. The applying of risk management in the construction industry was 3 stages of risk management which were the risk analysis, risk assessment, risk control and follow-up, which was used to store information in the past and brainstorm by virtue of experience, expert tips and techniques to determine the risk analysis and risk evaluation of a mathematical methodology combined with the master planning of construction work to analyze, evaluate the risk under different condition and situations. Control, risk monitoring and risk assessment were a small amount so it should be a topic of research in future rely on notes and update the plan. The three important things for the applying of risk management in the construction industry were personnel, information and continuous learning.*

**Keywords:** Applied; Risk Management; Construction Industry.

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### 1. Introduction

Risk management was one of the tools for management. There was operating to effectiveness by analyzing the events that have the potential to occur and affect the operation of both positive and negative. Many organizations implement risk management to achieve objectives goals [1] provided for risk management was "the assignment of the policy, structure, and process for the Board of Directors. The management and operational personnel in determining the strategy and practical work throughout the Organization of the risk management process to achievement. Organization might be able to indicate the event that may occur, impact assessment and organization determine how appropriate management of risk at an acceptable level. This was to ensure confidence in the level of performance-based missions will be able to achieve the objectives set forth" risk management approach was used in the development and control of the organization by The Committee of Sponsoring Organizations of the Treadway Commission (COSO) who had led competing conceptual guidelines with integrated risk management of the

Organization to respond to the rapid economic development which integration between strategic planned to operational risk based on the difference. Under the framework, [2] by the 8 elements included the environment in determining the purpose of identifying risk assessment, incident response, risk control. News, information and communications, evaluation, risk management process by which all 8 relied on data elements and experiences in order to improve continuously.

The approaches of risk management were used in construction projects or the construction industry. In Chile [3] Risk management in the construction project did not succeed due to a lack of knowledge in risk management from both the owner and the contractor which did not use information on their past projects to improve preparation for risk which would occur. The applying of risk management level enterprise level applied to construction projects. the application of risk management of the construction company was drove by the clarity of senior management policy to create the term of measures with the purpose to provide support to employees of both the personnel and information technology to provide the greater financial for company with performance unable to allocate resources efficiently. There was information that helped in better decisions, reduced the risk of loss with efficiency while obstacles of applying of the risk management was executives who was the lack of specialist knowledge and could no longer providing support priorities which were to manage and hesitated about the information because of the difficulty in assessing risk. The lack of quality information, access to limited information resource shortage and the lack of appropriate personnel actions [4] Risk management process depended on the complexity and the duration of the project, including the techniques and practices, depending on the size of the project complexity, the experience of the team and the influence of contributors. [5] To bring a form of applied risk management in project construction concept was both an information management to create an alternative decision. The distribution of risk between those collaboration in action. [6] Had studied the importance of the causes of risk in construction projects, Saudi Arabia. Resulting from the decision of the owner of the project and proposed risk management patterns developed from Information Measurement Theory and Performance Information Procurement System to study, test and application of construction project in Saudi Arabia. [7] The study of risk management in large projects, from literature to determine which risk as the first step of the risk management process which affected the risk management process was the next step, including the risk to the project's partnership to improve risk management in large scale projects.

## **2. Objective and Methodology Research**

The research aims to study the risk management model in the construction industry. This research is systematic literature review of risk management model in construction industry. This research has been qualitative research, applying the documentary research method and collecting relevant documents, articles, and researcher studies in order to analyze and synthesize risk management model in construction industry and according to the conclusion by descriptive research method.

## **3. Risk Management and Construction Stage**

The risks in the construction industry were caused by multiple factors. From all the stakeholders and work processes. During the planning necessary to define risk and analyze the impact of risks

that may occur both positive and negative. Risk analysis to create alternatives for the decision or to prevent fixed a problem in operations by the general pattern in risk management based on fig. 1.

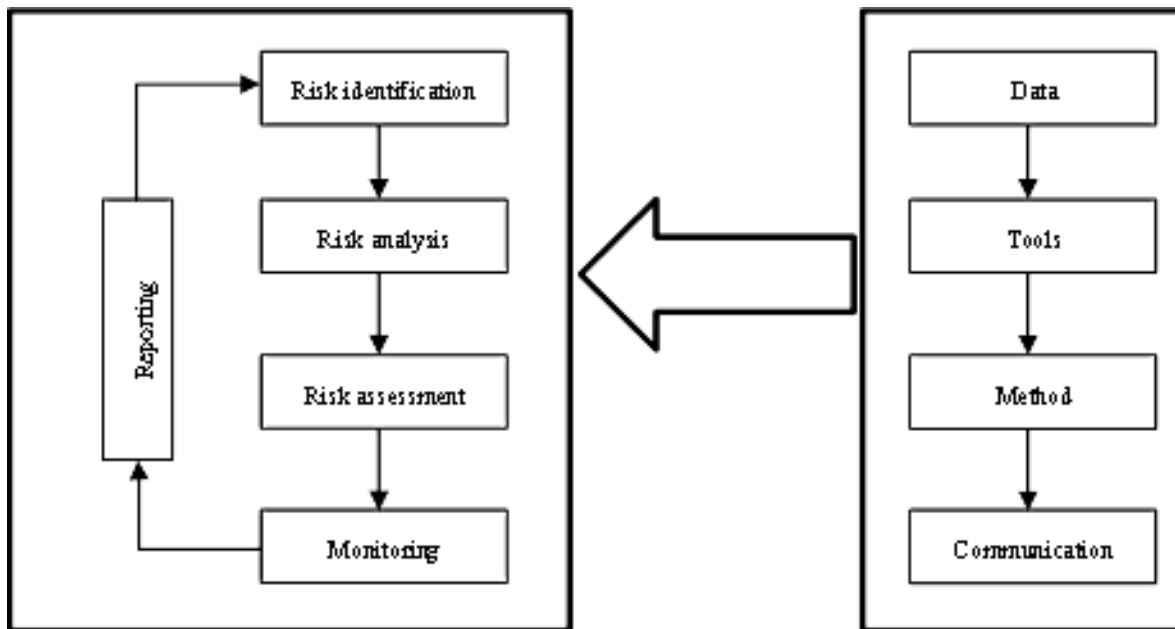


Figure 1: Risk management model

The steps in the risk management required information, tools, and methods of communication, including expert personnel in action. The application of risk management was used in the construction industry could be adapted to all segments of construction projects.

The application of risk management in the stage I of education plan for investment construction projects [8] provided a risk assessment, in the amount of capital from abroad to invest in the domestic construction industry, Russia. Risk assessment under the terms of economic and political conditions under which income to determine the investment plan relied on mathematical methods. Create the most suitable alternative. During the feasibility study of the project, from the analysis of variable cost, the time factor to the uncertainty of the risk assessments of both the positive and negative. In order to create the best investment [9] surveyed of risk factors during the procurement procedure (stage II) that resulted in the construction of projects in the countries of Saudi Arabia and delayed in construction costs higher by using the query data stakeholders from both Government and the private sector. The analysis results showed that risk occurred in a procurement procedure that focused on those tender offers the lowest price. Making the under-performing contractors affected in a negative way, and construction projects are required to have a procurement process optimization and efficiency increases. Risk management is used in the selection of contractors for the construction of infrastructure projects in Nigeria. To store data with survey and data analysis by mathematical methods (Fuzzy theory), was a construction company, the assessment in the company's risk management issues which form the assessment helped customers decided on the appropriate contractor and also helped the construction company decided to join the contest price in construction with. [10]

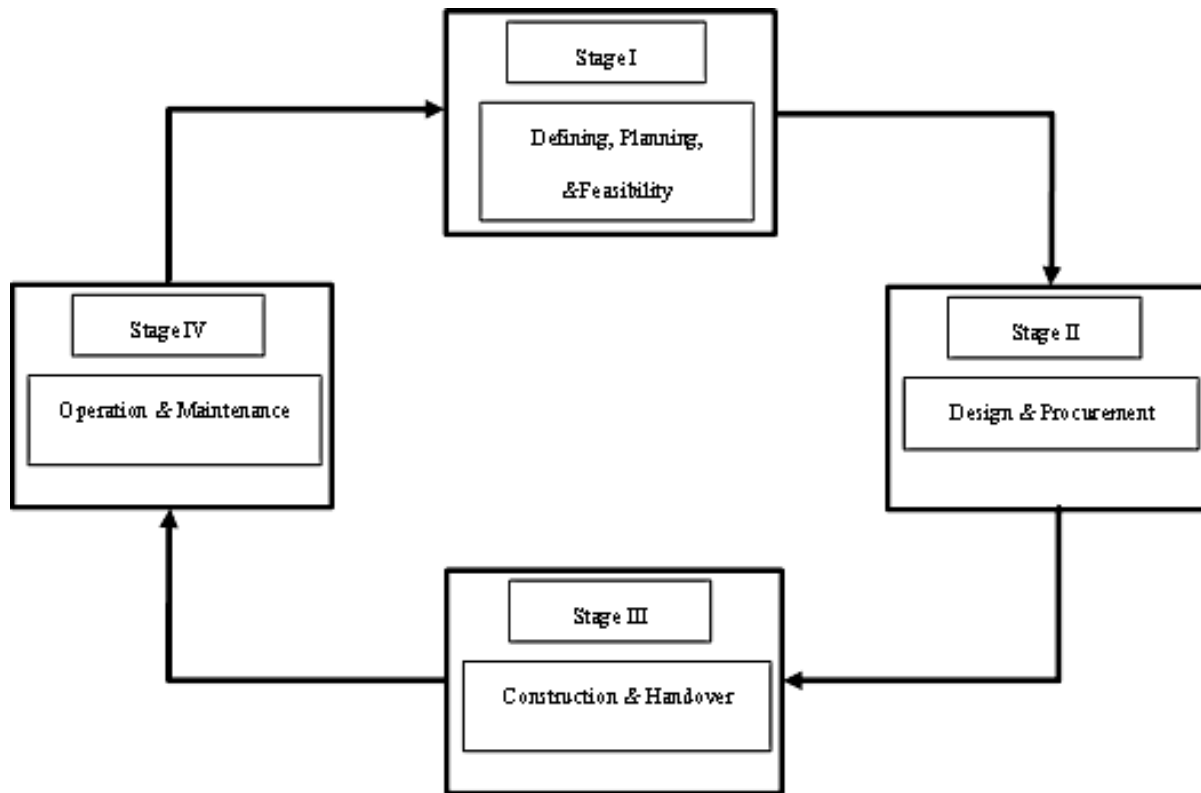


Figure 2: Construction stages

In stage 3, interval during the construction, there were a whole lot of risk factor control and uncontrolled. [11] The assessment of the risk of delays in the project's construction in the country, Malaysia. Project time management was stored with query and analyzed data with statistical methods. Research had shown the importance of planned construction work, determined how the construction from the project manager's experience, including allocated of resources might take into consideration the limitations on the work. The notes that cause delayed could be updated monthly work plans to compensate for the delays that had occurred in the relevant construction project, each party had different risks according to the characteristic obligation to engage both the owner of the project, the contractor of construction materials, commercial Designer, but the most vulnerable party in projects was the owner of the project and a contractor which were bound together with a construction contract. The contract provided power to the project owner being the main. To claim the employment contract often shall cause legal disputed of either party. [12] Guide Game theory applied for the allocation of risk between the parties in contract construction. The risks that occurred in construction projects affecting those involved in construction projects, all parties depended on tougher tannins that occur for different duties. [13] The impact on those involved in the construction project between Government and the private sector. There was a risk of personnel documentation and contextual environment. Development of a tool for risk management in the construction industry had been applied with all relevant organizations, including the data from past projects to improve necessary performance of planning and risk assessment solutions to the project in the future.

#### **4. Applied Risk Management Model in Construction Industry**

The study developed a risk management application of the construction industry was a form of risk management by generic. Defining the risks in the construction industry was complex because of the behavior and engagement of the people involved. Most of the collection of information from the past, experienced professionals to analyze and assess risk, the application of the mathematical statistics method [14] Multi criteria application of risk management principles Hillson model on risk assessment for construction company. It was found that lack of knowledge about risk management as key obstacles that made the company unable to deal with the risks that occurred. Risk factors affecting construction projects were related to the type of project. Project value, which caused a different risk. [15] To analysis risk of financial evaluation of construction projects to identify risks in contracts for investment information. Using data from past projects analyzed risk by statistical way which had significant risks that were the risk assessment, cost, time and financial risk.

[16] Whose was recommended to define risk with Matrix of Risk, it was easier way to analyze and interpret the results. Analysis could be used an alternative method for creating a Multi criteria method or statistical methods to evaluation of manage risk. The important process was to determining the risk might be able to specify frequency and the severe of the risk occurring in the correct order to analysis and assessment of the information of risk. [17] Relying on the default risk level assignment expert application using Risk mapping tool and the assessment of the risks by a finished program (Structural Equation Modeling) to eliminate the personal attitude to risk assessment, risk assessment, and to provide more reliable. The goal of risk management in the construction industry had several goals, such as the financial investment of the project, time management, cost management, construction and etc. [18] the proposed mathematical method to help manage risk. Creating alternatives to perform with the target duration subject to construction in minimal cost applied of PERT method to analyze the risk to create an alternative decision depended on the conditions of construction finance situation, various events including historical data that had the power to decide. To apply of Utility theory analyzed risk and showed the results in the form of benefits was worth the money to create an alternative [19] format to create an alternative to risk assessment was used to analyze the possibility for selected projects. [20] Presenting TOPSIS-F method prioritized the risks of construction projects to be criteria for decision to execute the project.

The study of risk management in the construction industry was mainly focused on the risks and risk analysis and assessment for decision options to create a master. While [21] format tracking control risks was presenting with the mathematical methods for finance as a tool in risk control, which was important in the process of continuous risk management.

#### **5. Conclusions and Recommendations**

The study of risk management in the construction industry had the number of lots tried to applying the methods the tools in each phase of a risk management, stored data in a systematic way, used both tools, the interview questionnaire based on information from the past, had brainstorming technique, Delphic technique, Matrix of risk and experts also defined risk from weather problems in construction. The defined risk process was important; the risk might be

defined in accordance with the type of construction as a continuation to the stages of risk analysis and assessment. This procedure relied on the mathematical methods as a primary example, Statistical model, Probabilistic method, and Multi-criteria Optimization. To create alternatives for the decision to carry out risk assessment. The difficult risk management in the construction industry was to determine the risk due to construction, there were a lot of complex risk factors couldn't be controlled but the applying of risk management in the control, checking the risk assessment process was still little so it should be a topic of research in the future. This section may also include also include discussion on theoretical and methodological implications of findings.

## References

- [1] Energy conservation fund. (2014). [www.enconfund.go.th/pdf/km-1.pdf](http://www.enconfund.go.th/pdf/km-1.pdf).
- [2] Committee of Sponsoring Organizations of the Treadway Commission. (2017). Enterprise Risk Management Integrating with Strategy and Performance. Retrieved December 15, 2017 from <https://www.coso.org/Documents/2017-COSO-ERM-Integrating-with-Strategy-and-Performance-Executive-Summary.pdf>.
- [3] Alfredo Federico Serpella., Ximena Ferrada., Rodolfo Howard., & Larissa Rubio. (2014). Risk management in construction projects: a knowledge-based approach. 27th IPMA World Congress. Social and Behavioral Sciences 119 (2014) 653-662.
- [4] Berenger Y Renault., Justus N. Agumba., & Balogun, O.A. (2016). Drivers for and obstacles to enterprise risk management in construction firms: a literature review. Creative Construction Conference 2016 Budapest, Hungary. Engineering 164 ( 2016 ) 402 – 408
- [5] Luiz Henrique Rodrigues-da-Silva. and Jose Antonio Crispim. (2014). The project risk management process, a preliminary stud. CENTERIS 2014/ ProjMan2014/ HCIST 2014. Technology 16(2014) 943-949.
- [6] Mohammed Algahtany., Yasir Alhammadi, & Dean Kashiwagi. (2016). Introducing a New Risk Management Model to the Saudi Arabian Construction Industry. International Conference on Sustainable Design, Engineering and Construction. Engineering 145(2016) 940-947.
- [7] Ana I. Irimia-Dieguez., Alvaro Sanchez-Cazorla, & Rafaela Alfalla-Luque. (2014). Risk Management in Megaprojects. 27 th IPMA world Cogress. Social and Behavioral Sciences 119(2014) 407-416.
- [8] P.G. Grabovy. and A.K. Orlov. (2016). The Overall Risk Assessment and Management: Implementation of Foreign Investment Construction Megaprojects by Russian Development Companies. XXV Polish-Russian-Slovak Seminar “Theoretical Foundation of Civil Engineering”. Engineering 153(2016) 195-202.
- [9] Ahmed Alofi., Jacob Kashiwagi., & Dean Kashiwagi. (2016). The perception of the government and private sectors on the procurement system delivery method in Saudi Arabia. International Conference on Sustainable Design, Engineering and Construction. Engineering 145(2016) 1394-1401.
- [10] Rasheed A Salawu. and Fadhlin Abdullah. (2015). Assessing Risk Management Maturity of Construction Organisations on Infrastructural Project Delivery in Nigeria. Global Conference on Business & Social Science-2014, GCBSS-2014, 15th & 16th December, Kuala Lumpur. Social and Behavioral Sciences 172(2015) 643-650.
- [11] Lok Siew Chin. and Abdul Rahim Abdul Hamid. (2015). The practice of time management on construction project. The 5th International Conference of Euro Asia Civil Engineering Forum (EACEF-5). Engineering 125(2015) 32-39.
- [12] Aurelija Peckiene., Andzelika Komarovska, & Leonas Ustinovicus. (2013). Overview of Risk Allocation between Construction Parties. 11th International Conference on Modern Building Materials, Structures and Techniques, MBMST 2013. Engineering 57(2013) 889-894.



- [13] Pooworakulchai C., Kongsong W., and Kongbenjapuch K. (2017). Affecting on Contract Administration in Government Construction Projects. *International Journal of Applied Engineering Research*. Volume 12(9), pp. 2079-2086.
- [14] Alfredo Serpell., XimenaFerrada., Larissa Rubio., & Sergio Arauzo. (2015). Evaluating risk management practices in construction organizations. 28th IPMA World Congress, IPMA 2014, 29 September – 1 October 2014, Rotterdam, The Netherlands. *Social and Behavioral Sciences* 194(2015) 201-210.
- [15] AgnieszkaDziadosz., AndrzejTomczyk., & Oleg Kapliński. (2015). Financial risk estimation in construction contracts. *Operational Research in Sustainable Development and Civil Engineering - EURO working group meeting and 15th German-Lithuanian-Polish colloquium (ORSDCE 2015)*. *Engineering* 122(2015) 120-128.
- [16] AgnieszkaDziadosz. And MariuszRejment.(2015). Risk analysis in construction project - chosen methods. *Operational Research in Sustainable Development and Civil Engineering - meeting of EURO working group and 15th German-Lithuanian-Polish colloquium (ORSDCE 2015)*. *Engineering* 122(2015) 258-265.
- [17] AcelyaEcemYildiz., IremDikmen., & M. TalatBirgonul. (2014). Using expert opinion for risk assessment: a case study of a construction project utilizing a risk mapping tool. 27th IPMA World Congress. *Social and Behavioral Sciences* 119(2014)519-528.
- [18] Barbara Gładysz., DariuszSkorupka., DorotaKuchta., & ArturDuchaczek.(2015). Project risk time management – a proposed model and a case study in the construction industry. *Conference on ENTERprise Information Systems / International Conference on Project Management / Conference on Health and Social Care Information Systems and Technologies, CENTERIS / ProjMAN / HCist 2015 October 7-9, 2015*. *Computer Science* 64(2015) 24-31.
- [19] Oleg Kaplinski. (2013). Risk Management of Construction Works by Means of the Utility Theory: a Case Study. 11th International Conference on Modern Building Materials, Structures and Techniques, MBMST 2013. *Engineering* 54(2013) 533-539.
- [20] JolantaTamosaitiene., EdmundasKazimierasZavadskas., & ZenonasTurskis. (2013). Multi-criteria risk assessment of a construction project. *Information Technology and Quantitative Management (ITQMn 2013)*. *Computer Science* 17(2013) 129-133.
- [21] TamasToth. andZoltanSebestyen. (2015). Time-varying risks of construction projects. *bCreative Construction Conference 2015 (CCC2015)*. *Engineering* 123(2015) 565-573.

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