

The Role of Flexibility in The Construction Risk Management Prescriptiveness

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Abstract. Risk management in the construction industry is regarded as an important issue for the healthy development of society. In terms of the risk management process, over detailed process would be remarkably time consuming which also can be a burden of the project. the balance between the prescriptiveness and the flexibility of risk process can be considered as the vital factor for a effective risk management framework. However, flexibility is not well valued in the risk management process of many construction projects. An ideal risk management process should include both the clear prescriptiveness and the flexibility in order to minimize the negative influence of risks in construction project as well as to shorten period of process planning.

Keywords. Risk management; Risk management process; Construction project

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1. Introduction

Construction industry be considered as a risky industry [1]. The unique characteristics of construction industry such as changeable working environment create a significant number of potential risks [2]. With the development of economic globalization, more and more construction firms need to deal with different clients, suppliers even the governmental departments worldwide, risk is playing an increasingly role in the construction industry in competitive global business environment [3]. Risk management process is the general term for a series of systematic actions in order to mitigate the risk in project, compound measure might appear in the complex construction project. Primary design, bidding, particulars, construction section and financial issue are the five main aspects in risk management [4]. On one hand, the information of risk in project will update frequently. On the other hand, it will derive a new risk management process when there is a failure in existing mechanism [5]. There is no a comprehensive definition of risk management process, whether the risk management process should be carried out by a particular order for controlling has been seen as a problem in construction field. Risk management will not have a satisfactory performance without a well-defined process [3]. In addition, the risk management aims to control the risks in construction project, but only few processes of risk management are involve opportunity management mechanism [6]. Nevertheless, over detailed process would be remarkably time consuming which also can be a burden of the project. The prescriptiveness of risk management process should stay in a flexible condition.

2. Indicator

In order to illustrate the effectiveness of risk management framework in case study, the decision making process, relevance and the performance of risk management system will be mention as three main indicators. The majority of difficulties in risk management process are caused by previous decision making process [7]. Therefore, the inappropriate decision might interfere the effectiveness of risk management process. Relevance aims to distinguish how significant is the impact of risk management process on the effectiveness. For the performance, this factor will mainly focus on schedule aspect rather than budget which can demonstrate the working quality of risk management process to a certain extent.

3. Case study

3.1 *The South-North Water Transfer project*

The South-North Water Transfer (SNWT) contains three sub-projects which are the eastern route, the middle route and the western route, the preparation started in 1999. However, due to various limitations, the construction started in 2002 which has relatively long period between the decision making and the construction planning. The case study will mostly pay attention to the middle route project which actually finished later six years than the schedule [8]. By until the middle of 2014, the middle route of SNWT project cost 29.1 billion USD. The conditions changed with the development of local society and the transition of environment which could bring more uncertainties (e.g. the hydrologic condition) to the risk management process. As well as that the risk management process have to adjust in order to mitigate the influence of decision making process event the project manager applied various models such as water shortage risk model to simulate supply condition as the supplementary measures of risk management process [9]. The middle route project still got a six years delay which nearly spent double time for construction. Moreover, The Incomplete risk assessment bring a greater water supply pressure and more environmental risks to the water head site [10].

3.2 *The Channel Tunnel project*

Similarly, the Channel Tunnel (CT) project also has over 25 years decision making process [11]. The project was once abandoned by the UK government owing to a seriously financial difficulty in 1975 which improving the awareness of risk management in both the UK and French governments in the next stage. In 1979, two governments restarted the CT project and transferred part of the financial risk to other stakeholders by privatizing the CT project in 1985 [11]. Finally, the construction was completed at the of 1994 with a year and a half extension. Although there is a positive effect on the CT project which is two governments transfer the financial risk to other investors, there also has negative effect on both the effectiveness of risk management and the risk management process. Stakeholders need to absorb the depreciation of the existing infrastructures in the previous construction activities. For example, testings and remedies in construction section charge nearly 2.25 billion dollars [12]. Moreover, the technological sublime of engineers and politicians in this project should be mentioned [13]. The risk management process not only unreliable but also unpredictable due to lack of the immature technology experience [14]. In addition, the slow learning process and the limited knowledge transferring will contribute to a more complex risk management process [15]. In such condition, the project manager should pay more attention to the setting of risk management process such as alternative tool preparing or the responsive mechanism for further risks rather than the risk of technological sublime.

3.3 *The Beneluxlijn project*

The Beneluxlijn project is one of the three metros (3M) project in Netherlands. The budget of the whole project is 760 million Euros and the actual construction cost is 670 million Euros approximately [16]. Although the project got a few months delay as well as that there are various reviews of the project, it still can be considered as a successful project due to the favourable performance in both budget and schedule aspects. Comparing with the SNWT project and the CT project which have a massive and complicated risk management process, the Beneluxlijn project seems to select a entirely

different method which aims to simplified the project in order to control risk. For example, one of the core guiding ideas for construction section is keeping the building work above ground if conditions permits to avoid the risk in underground construction. Moreover, in order to avoid technological sublime, the project team tend to apply the mature technology rather than the new technology. In terms of decision making process, although there was a objection at the planning stage, the management team still provided a generally acceptable solution for the majority of stakeholders. Therefore, the decision making process has a lower complexity than the SNWT project and the CT project.

4. Analysis

Although the prescriptive risk management process is opposite to the flexible risk management process, project manager should pay attention to keep the balance between the prescriptiveness and flexibility of risk management process. According to the case study, a massive risk management process dose not necessarily means a effective risk management framework such as the SNWT project. As well as that a effective risk management framework might not necessarily include a 'formal' risk management process such as the Beneluxlijn project. Although the further influence of the management method of the Beneluxlijn project still is uncertain due to the weakness of overall planning [17], the flexibility has played an important role in project.

In addition, the setting of risk management process need to consider for the result of decision making process, the connection between the main risks and risk management process, the performance of risk management. For example, the SNWT project might need the extra method to deal with both the time consuming and environmental problems when the management team planning their risk management process. Similarly, the CT project also need to add the alternative solution in their risk management process. Therefore, all of these case studies seems still demand a clear guidance of risk management process to improve the effectiveness of their risk management system. Despite the particular problems for each project are different, as well as that there are various solution for one specific problem, the prescriptiveness need to provide the professional advice for the risk management process planning rather than a rigid control of the order of the process. Prescriptiveness should more focus on the common shortage vectoring in a wide view.

The long period of setting risk management process likely would not be allowed owing to the time limitation of project which also is a burden of this project. Once a risk in project out of control, a flexible risk management process will be able to respond this change rapidly and mitigate the negative influence consequently. In addition, the different particular issues of various projects seems will not be the same, such as the SNWT project and the CT project are tend to consider more hydrology condition than other factors for construction which might not a noticeable issue for the Beneluxlijn project. Thus, the prescriptive risk management process is difficult to adapt for various types of situation.

The balance between the prescriptiveness and the flexibility of risk process can be considered as the vital factor for a effective risk management framework. On one hand, prescriptiveness will provide the clear guidelines systematically in early stage of risk management process planning as the outstanding prevention section of the whole risk management framework. On the other hand, flexibility tend to handle the impact from the unknown risks and to select the alternative process once the risk out of control as the protection section.

5. Conclusion

In conclusion, an ideal risk management process should include both the clear prescriptiveness and the flexibility to minimize the negative influence of risks in construction project and reduce the period of process planning. The prescriptive risk management process not only could provide the scientific guideline for project manager in the early stage of the project, but also contribute to avoid the long period of risk management process planning. Relatively, the flexibility in risk management process could offer the rapid responsive ability to the whole risk management framework and keep the alternative plans for the harmful impact of risk occurring. The later stage of the construction project not suitable for being restricted which should be able to acquire flexibility to handle the changeable construction situation and contingencies. In addition, flexibility also can be regarded as the necessary

factor in the risk management process to ensure the management team still has sufficient ability to mitigate other influences which not included in the original risk management process. Nevertheless, there is no an unambiguous position for the balance between the flexibility and the prescriptiveness of risk management process which still require a large number of analyses based on various case studies. Even so, it is not deny the necessity of the prescriptiveness and the flexibility for risk management process. The clear balance not only for various kinds of construction project but also for different scales of project between the prescriptiveness and the flexibility in risk management process might be required in the future with the development of risk management awareness.

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Conflicts of Interest

There is no any financial support for this paper. The research materials are published articles or reports which have been cited by a large number of scholars in different studies, those research materials can be considered as the reliable resources of this paper, and collected by the author.

References

- [1] Shevchenko, G. Ustinovichius, L. and Andruskevicius, A. (2008). Multi-attribute analysis of investments risk alternatives in construction. *Technological and Economic Development of Economy Vol. 14*, 428-443.
- [2] Liberda, M. Ruwanpura, J. Y. and Jergeas, G. (2003). Construction Productivity Improvement: A Study of Human, Management and External Issues.
- [3] Conklin, W. A. Shoemaker, D. and Kohnke, A. (2017). Building Control into the Supply Chain Risk Management Process. *EDPACS 56*, 12 - 16.
- [4] Szymański, P. (2017). Risk management in construction projects. *Procedia Engineering Vol. 208*, 174-182.
- [5] Zhao, X. Hwang, B. G. and Phng, W. (2014). Construction project risk management in Singapore: Resources, effectiveness, impact, and understanding. *KSCE Journal of Civil Engineering Vol. 18*, 27-36.
- [6] Jaafari, A. (2001). Management of risks, uncertainties and opportunities on projects: time for a fundamental shift. *International Journal of Project Management Vol. 19*, 89-101.
- [7] Leijten, M. Koppenjan, J. F. M. Heuvelhof, E. T. Veeneman, W. and Voort, H. V. D. (2010). Dealing with Competing Project Management Values under Uncertainty: The Case of RandstadRail. *European Journal of Transport and Infrastructure Research Vol. 10*, 63-76.
- [8] Pohlner, H. (2016). Institutional change and the political economy of water megaprojects: China's south-north water transfer. *Global Environmental Change-human and Policy Dimensions Vol. 38*, 205-216.
- [9] Gu, W. Shao, D. and Jiang, Y. (2012). Risk Evaluation of Water Shortage in Source Area of Middle Route Project for South-to-North Water Transfer in China. *Water Resources Management Vol. 26*, 3479-3493.
- [10] Zhao, X. Liu, J. Liu, Q. Tillotson, M. R. Guan, D. and Hubacek, K. (2015). Physical and virtual water transfers for regional water stress alleviation in China. *Proceedings of the National Academy of Sciences Vol. 112*, 1031 - 1035.
- [11] Anguera, R. (2005). The Channel Tunnel – An Ex-post Economic Evaluation.
- [12] Anbari, F. T. Giammalvo, P. Jaffe, P. Letavec, C. and Merchant, R. (2009). *Case Studies in Project Management - The Chunnel Project. In Case Studies in Project Management (Anbari, F. T., Ed.)*, USA: The George Washington University.
- [13] Marrewijk, A. v. Clegg, S. R. Pitsis, T. S. and Veenswijk, M. (2007). Title: Managing Public-Private Megaprojects: Paradoxes, Complexity and Project Design.

- [14] Collingridge, D. (1992). David Collingridge: The Management of Scale. Big Organizations, Big Decisions, Big Mistakes, *Organization Studies Vol. 15*, 639 - 639.
- [15] Robbins, R. (1995). Boring under the channel: One perspective on the experience, *Tunnelling and Underground Space Technology Vol. 10*, 23-25.
- [16] Giezen, M. (2012). Keeping it simple? A case study into the advantages and disadvantages of reducing complexity in mega project planning, *International Journal of Project Management Vol. 30*, 781-790.
- [17] Priemus, H. (2007). Development and Design of Large Infrastructure Projects: Disregarded Alternatives and Issues of Spatial Planning, *Environment and Planning B: Planning and Design Vol. 34*, 626 - 644.