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IDENTIFYING A BETTER MANAGEMENT METHOD IN PROJECT MANAGEMENT PRACTICE UNDER UNCERTAINTY CIRCUMSTANCES: A SYSTEMATIC LITERATURE REVIEW

Abstract:

The aim of this paper is to propose a better management method of the practice under different circumstances for formulating strategy in project management of construction industry. The empirical data were absorbed from 40 studies related to project management between 1997 to 2017 by using Systematic Literature Review (SLR) approach. Based on these data, the researcher analysed and identified the better management methods: the uncertainty management, and also found some opportunities and gaps of further research. In conclusion, a better management method for project management under uncertainty circumstance may be able to enhance the strategy formulation of project management.

Keywords:

Project management, Management Method, Uncertainty, Strategy Formulation, Information

JEL Classification: D80, D81, D89

1 Introduction

1.1 The development of project management

In construction industry, managing project has to face more difficulties and challenges than other industries for industrial characteristics. As core leaders in the projects, project managers experience these in their daily operation, and face with becoming more and more flexible and complex of projects under the constantly changing environment of business. Project management and relevant researches, therefore, emerged at the beginning of 1950s, and is quickly adopted by the construction industry (Paul, 2005; Nokes, 2007; Cattani, et al., 2011). With the rapid development of the construction industry in the recent years, the research of project management also begins the evolution, and have roughly undergone three main phrases, such as the technological management as the first phrase (Malcolm et. al., 1959; David & Roland, 2006), the management discipline as the second phrase (Young-Hoon Kwak, 2005) and the standardized and systematic management as the third phrase (Harrison & Dennis, 2004; PMBOK Guide, 2013). Clearly, the evolution of the scope of research has presented a trend from the monotonous technological management to the complex standardized and systematic management, which is adapting the development of construction industry, especially the third stage that enjoys a full gallop at present.

Most of the contemporary project management knowledge are concentrated on the discussion of the standardized and systematic management. It is extensively applied in advanced construction technology and large-scale complex project (Egan, 2002; Bruce, 2011). In this phrase, construction industry experiences the transformation from managing environmental factors to project control process. One of the main reasons for such transformation is that managing project control process enables projects to become more flexibility and complexity (Ward, 2001; John Wiley & Sons, 2003; Bruce, 2011; Perminova, 2011).

The project control process is defined as a system used by the product manager to control an entire project from the project plan, and could control deviations from uncertainty factors via the project plan and emphasize the collection and analysis of information that will facilitate decision making (Bruce, 2011, PMBOK Guide 5th-ed, 2013; Kerzner, 2017). According to the research results of Kerzner (2017) and Daniel (2017), the practices principle of project management could play a key role at the special system of project control process, which involves two aspects, for instant, the management method and the used tools of management, especially guiding the strategy formulation under uncertainty circumstances.

Many past scholars (Agyakwa, Chileshe & Stephenson, 2010; Perminova, 2011; David, 2017) examined only the used tools (i.e. training, people management, communication and so on) of the practices in the strategy formulation of project management, but not the effect of management method, especially under uncertainty circumstances (i.e. risk, opportunity, crisis

and uncertainty management). Without studying a complete list of the selection of management method, the project control process would be impossible to offer useful or practical insight on project planning which may lead to the failure of strategic formulation. This issue hinders the efficiency of project management at the initial phrase of strategic formulation (Harold, 2012; Kerzner, 2017; Daniel, 2017; Pierre & Carole, 2017). This research area has also been lacking as evidenced in past studies (Kerzner, 2017; Daniel, 2017).

Therefore, the aim of this paper is to propose a better management method of the practice under different circumstances for formulating strategy in project management of construction industry by examining past empirical evidence using Systematic Literature Review (SLR) approach.

1.2 Research question

The research question attempts to propose the better management method of the practice under uncertainty circumstance in order to improve the strategy formulation of project management in construction industry. Significant past studies (Cervone, 2006; Sidney, 2006; Perminova, 2011; Zhi, 2016; Pierre & Carole, 2017) are selected to prove that project managers starve for the better management method to formulate a strategy or draw a plan in order to enhance the efficiency and effectiveness of companies' performance in the project management, especially when facing complex environment. Hence, the research question in the study is stated as below:

RQ: What is the better management method of the practice under uncertainty circumstances that could improve the strategy formulation of project management in construction industry?

1.3 The tool of pursuing evidence: Systematic literature review

According to Kitchenham et al (2004) and Zheng (2016), it is obvious that the research in project management, especially referring to scopes of strategic formulation, risk and uncertainty management, should depend on the evidence-based research (or empirical study) to summarize current researches, which focuses on the application of evidence-based approach to project managing research because of often deriving from previous experiences and studies.

Combined with this context, the evidence of evidence-based research is defined as a synthesis that "is the best quality scientific studies to explore a specific topic or answer a specific research question" (Barbara etc al., 2008, p.8). The synthesis includes various types of the method, such as systematic literature review (SLR), meta-analyses and expert review (Arindam, 2017). Considering expert review "using ad hoc literature selection" (Barbara etc al., 2008, p.8) and meta-analyses based on a statistical method (Arindam, 2017), the SLR not only aggregates all the existing evidence to the analysis on research questions, but "it is also intended to support the development of evidence-based guidelines for practitioners" (Barbara etc al., 2008, p.8). By

developing the evidence-based guideline, the key point of empirical research is to use the guideline to provide a new field of vision and solutions for practitioners, which be integrated with relevant practical experience (Andy, 2013).

1.4 Delimitation

In order to grip the core of the research and narrow the scope of project management, the section will list topics excluded in the paper as follows:

● Agile project management

● Project integration, scope, time, cost, quality and procurement management

● Communication and human resource aspects exploring

● Monte Carlo simulation

Based on the exclusion above, the scope of this study focuses on reviewing past studies relating to the process of strategic formulation in project management, which involves selecting the better management methods of the practices, analysing the relationship between environmental factors and the management methods, and drawing related information in order to formulate strategy of the project management under uncertainty circumstances.

1.5 Research structure

The remainder of the paper is organised as follows. Section 2.0 describes the methodology of the research involving research questions, research process, data collection and analysis, etc. Moreover, section 3.0 presents research results linking the interpretation of search results, quality evaluation and so on. At last, section 4.0 outlines the discussion of results and limitations, and the promising research directions identified and discussed.

2 Methods

This study is performed on the systematic literature review based on the context of project management from 1997 to 2017, because the third phrase of research in the project management enjoyed a booming development during those two decades (Perminova, 2011; Harold, 2012; PMBOK Guide 5th-ed, 2013).

2.1 Search steps

Based on the research question and the recommendation of Sliva and France (2010), the search study, involving the following steps, such as specifying search terms, defining resources search, and stating inclusion and exclusion criteria, was conducted before the search process of the study.

2.1.1 Specifying search terms

The search terms, as a key point to systematic literature review, are confirmed in the three steps:

● *Based on the principle of PICOC (Population, Intervention, Comparison, Outcome, Context), the key words in the research questions were specified.*

For example:

What is the better management method of the practice under uncertainty circumstances that could improve the strategy formulation of project management in construction industry?

Population: construction industry

Intervention: the better management method

Outcome: the strategy formulation of project management

Context: uncertainty circumstances

Comparison did not appear in the research.

● *Relevant synonyms about key words should be used widely in the search process.*

For example:

Population: “The development of construction industry”, “Global construction engineering” , “Construction project team”, etc.

Intervention: “The better management method”, “Program”, “Method”, “Framework”, “Management model” etc.

Outcome: “Project management”, “Managing project”, “Operation project”, “Strategy formulation”, “Planning strategy” etc.

Context: “Uncertainty circumstance”, “Uncertainty environment”, “Environmental factor” etc.

● *“Wildcards”, “AND” and “OR” should be used flexibly.*

For example, “Global construction development” OR “Global construction managing” OR “Global construction engineering”; “Program* OR Method* OR Framework*” AND “Project management”; “Uncertainty environment* OR environmental factor”.

2.1.2 Defining resources search

In the research, the researcher used the following the databases of the Internet:

● ScienceDirect

● IEEEXplore Digital Library

● ACM Digital Library

● EI Compendex

● Emeraldinsight Digital Library

2.1.3 Stating inclusion and exclusion criteria

In addition to search term and resource search, the inclusion and exclusion criteria were followed in order to select better primary studies.

Inclusion criteria

● The studies directly answering relevant research questions

● The studies indirectly answering or hinting relevant research questions

● The studies involving one of research questions, or explaining key words in the research questions

● The studies are available through the online library service of SEGi university.

Exclusion criteria

● The studies hardly answering relevant research questions

● Repeat studies

● Incomplete results of studies

2.2 Search process

The search process is considered as a manual search of mix literature in the study, involving original research, results in journals, review articles, systematic reviews, conference proceedings, practice guidelines, handbook and textbook. The following **Table 2.2** will present the Internet sources which could help the researcher to select books, conference and journal, and also list a statistic of search results. These books (such as conferences or journals) knew in the research filed were selected for including two aspects, such as empirical studies and literature surveys (Beelmann, 2006), and, as credible sources, they have been used for other

systematic literature reviews concerned in project management and relevant aspects involving several types of management methods.

Table 2.2 Sources Review and Validated

Source	Search results	Potential relevant studies	Not relevant	Repeated	Incomplete & Opinion pieces	Relevant studies
ScienceDirect	440	27	6	1	6	14
IEEEXplore	329	51	26	10	6	9
ACM	714	39	28	5	1	5
EI Compendex	84	17	10	6	0	1
Emeraldinsight	819	42	17	9	5	11
Total	2386	176	77	22	18	40

The search process, hence, is presented by the following four steps:

Firstly, in order to lock onto potentially related researches, the researcher sought relevant resources search of the Internet at the beginning, especially related search terms. After that, based on the relevant titles or key words, the selection excluded irrelevant articles directly.

Secondly, following the first step, the researcher evaluated the primal articles through reading abstract and seeking key words because of avoiding repeated articles or similar studies.

Thirdly, based on the inclusion and exclusion criteria, the researcher removed some special articles, such as incomplete studies, articles missing theories or lacking demonstrations, from the list of search results.

Finally, the researcher created a special form including a list of relevant studies to deepen the forward research. The form also documented reasons why some articles were excluded.

2.3 Search quality assessment

Based on the criteria stated in the Section 2.1.3, relevant articles were evaluated for subdivided analysis of systematic literature review. Combined with five key words and using a Likert-5 scale, these articles were divided into five categories, such as poor, fair, good, very good and excellent (Silva & France, 2010). If satisfied with 4 or 5 key words, a article will be ranked in the excellent

group. On the contrary, the article hardly meeting one key word will be place in the poor group. By the parity of reasoning, relevant studies were classified as the following Table 2.3.

Table 2.3 The 5-point Likert Scale of Selected Studies

	Poor (<20%)	Fair (21%~40%)	Good (41%~60%)	Very good (61%~80%)	Excellent (81%>)	Total
Relevant studies	0	0	5	22	13	40
%	0	0	12.5%	55%	32.5%	100%

2.4 Data extraction and analysis

By the search quality assessment, information from 40 studies were proved to fit for data extraction and analysis. The citations for 40 studies, therefore, will be numbered in the Table 2.4a in order for the interpretation of relevant sub-problems in the Table 2.4b that could explore the research question in the paper.

Table 2.4a Citations numbered

No.	Citations
[01]	Shen, L. Y. (1997)
[02]	De Meyer, A. C. L., Loch, C. H., & Pich, M. T. (2002)
[03]	Pich, M. T., Loch, C. H., & Meyer, A. D. (2002)
[04]	Ward, S., & Chapman, C. (2003)
[05]	Nummelin, J. (2005)
[06]	Simu, K. (2006)
[07]	Van Thuyet, N., Ogunlana, S. O., & Dey, P. K. (2007)
[08]	Zwikael, O., & Sadeh, A. (2007)
[09]	Manelele, I., & Muya, M. (2008)
[10]	Sun, Y., Fang, D., Wang, S., Dai, M., & Lv, X. (2008)

[11]	Zwikael, O. (2009)
[12]	Portny, S. E. (2010)
[13]	Adamantidou, E., Xenidis, Y., & Papaioannou, P. (2010)
[14]	Agyakwa-Baah, A., Chileshe, N., & Stephenson, P. (2010)
[15]	Antoniadis, D. N., Edum-Fotwe, F. T., & Thorpe, A. (2010)
[16]	Carter, A., & Chinyio, E. (2012)
[17]	Chan, D. W., Chan, A. P., Lam, P. T., Yeung, J. F., & Chan, J. H. (2010)
[18]	Fragkakis, N., Lambropoulos, S., & Pantouvakis, J. P. (2014)
[19]	Georgiou, L., & Pantouvakis, J. P. (2010)
[20]	Pantouvakis, J. P., & Lambropoulos, S. (2010)
[21]	Papari, E., Pantouvaki, J., & Panas, A. (2010)
[22]	Polat, G., & Duzcan, M. (2010)
[23]	Ekambaram, A., Johansen, A., Jermstad, O., & Økland, A. (2010)
[24]	Geraldi, J. G., Lee-Kelley, L., & Kutsch, E. (2010)
[25]	Perminova, O. (2011)
[26]	Ahola, T., & Davies, A. (2012)
[27]	Rose, K. H. (2013)
[28]	Johansen, A., Eik-Andresen, P., & Ekambaram, A. (2014)
[29]	Krane, H. P., Johansen, A., & Alstad, R. (2014)
[30]	Johansen, A., Halvorsen, S. B., Haddadic, A., & Langlo, J. A. (2014)
[31]	Serpella, A. F., Ferrada, X., Howard, R., & Rubio, L. (2014)
[32]	Ronald, S. K. (2014)
[33]	Johansen, A. (2015)
[34]	Joslin, R., & Müller, R. (2015)

[35]	Brink, T. (2016)
[36]	Zheng, E. Z. H., & de Carvalho, M. M. (2016)
[37]	Cleden, D. (2017)
[38]	Daniel, P. A., & Daniel, C. (2017)
[39]	Do Vale, J. W. S. P., & De Carvalho, M. M. (2017)
[40]	Kerzner, H., & Kerzner, H. R. (2017)

Table 2.4b Sub-problems for Addressing Research Question

Addressing research question	Sub-problems (SP)
What is the better management method of the practice under uncertainty circumstances that could improve the strategy formulation of project management in construction industry?	What are main types of the management methods that are adopted by past researchers and construction project managers during 1997 to 2007?
	How do these management methods improve the strategy formulation of construction project management?
	What is the better management method to improve the strategy formulation under uncertainty circumstance?

Once data was recorded, the research used constant comparison method as proposed by Silva & France (2010). The report of such analysis is presented in the next section.

3 Results

Empirical findings are presented below.

3.1 Search results

3.1.1 Number of sources

The **Table 2.3** listed relevant studies from seeking the databases in the Internet. By using search engine of the databases, the researcher retrieved profoundly and acquired 2,386 studies

totally. Based on the inclusion and exclusion criteria stated in Section 2.1.3, the researcher extracted 40 relevant or similar studies. The detailed statistics is illustrated in **Table 2.2**.

3.1.2 Temporal view of sources

Due to the rapid development of the third phrase of research in the project management between 1997 to 2017 (Perminova, 2011; Harold, 2012; PMBOK Guide 5th-ed, 2013), the researcher concentrated mainly on special studies published during this time. So, out of the 40 primary studies, 26 studies (65%) were published after 2010 and they were related to the development of new models or tools in project management, especially some important conference proceedings to support this study, such as the 5th European Conference on Innovation and Entrepreneurship in 2010.

3.1.3 Type of sources

After searching the Internet, various types of 40 studies selected by the researcher include qualitative research, quantitative research, mix research and the SLRs so on. Thereinto, 17 studies are empirical qualitative researches, because the finding of them explained that the researches is based on empirical evidences. Moreover, 14 studies belonging respectively to mixed research and the SLRs could provide a support from tools or models as references. At last, as the supplementary information, 9 studies involving conceptual or theoretical qualitative and quantitative research were also considered into the scope of research source.

3.1.4 Data sources

According to the **Table 2.2**, the researcher considered five categories data source in the Internet, such as ScienceDirect, IEEEXplore, ACM, EI Compendex, Emeraldinsight. Out of the five categories, ScienceDirect and Emeraldinsight Digital Library provided 14 studies (35%) and 11 studies (27.5%) respectively. Although IEEEXplore Digital Library provides a conference proceeding of the 5th European Conference on Innovation and Entrepreneurship (2010) merely, the conference proceeding includes 9 studies (22.5%) that contribute to research questions and the theoretical support. The remaining 6 studies are from two types of data sources. 5 (12.5%) studies come from a periodical and International Journal of Project management in ACM Digital Library, and 1 (2.5%) study is from the European Management Journal.

3.2 The evidences from past empirical studies

Combined with the comment of search source, the section will present detailed evidences on how to choose the best management methods to improve the project management. Based on sub-problems for addressing research question, the researcher will demonstrate the related evidences to deal with the research question.

SP1 --- Several main types of the management method during 1997 to 2007.

Relevant management methods in project management (management method) are presented in the Table 3.2a. The left column lists main types of the management method of project management adopted by researchers and construction project managers from 1997 to 2017, and relevant evidences from 40 studies are summarized on the right column. For the further research, the frequency under each management methods is showed, and merely reflects how many times to appear.

Table 3.2a Several main types of the management method

Management Method (MM01~MM04)	Evidence ([01]~[40])
MM01 Risk Management (Frequency:26)	[01],[03],[04],[06],[07],[08],[09],[10],[12],[13], [14],[15],[16],[19],[21],[22],[25],[29],[30],[31], [32],[34],[35],[36],[39],[40].
MM02 Crisis Management (Frequency:11)	[07],[08],[11],[22],[25],[29],[30],[32],[34],[40].
MM03 Opportunity Management (Frequency:14)	[04],[08],[16],[19],[23],[25],[27],[28],[29],[30], [32],[33],[34],[40].
MM04 Uncertainty Management (Frequency:25)	[02],[03],[04],[05],[06],[08],[12],[20],[23],[24], [25],[26],[27],[28],[29],[30],[32],[33],[34],[35], [36],[37],[38],[39],[40].

SP2 --- How to improve the strategy formulation.

How to improve the strategy formulation is presented in the Table 3.2b. The left and intermediate column respectively concludes types of management method and their emphases to improve the strategy formulation under uncertainty environment, and relevant evidences from 40 studies are summarized on the right column. As for the frequency, the Table 3.2b also shows the number of each element.

Table 3.2b Ways to improve the strategy formulation

Management method (MM01~04)	Emphases	Evidence([01]~[40])
MM01 Risk management	Analysis of environmental risk factor (Frequency:21)	[01],[04],[06],[07],[08],[09],[10],[12],[13],[14],[15], [16],[18],[21],[22],[25],[27],[34],[35],[36],[39]
	Handling historical information (Frequency:27)	[01],[02],[04],[06],[07],[08],[09],[10],[12],[13],[14], [15],[16],[17],[18],[21],[25],[27],[29],[30],[31],[32], [34],[35],[36],[39],[40]
	Formulating contingency planning (Frequency:13)	[01],[03],[08],[09],[11],[22],[25],[27],[31],[32],[34], [36],[38]
MM02 Crisis management	Analysis of crisis or risk environmental factors (Frequency:9)	[07],[08],[22],[25],[27],[29],[30],[34],[40].
	Handling unexpected and unpredictable information (Frequency:12)	[02],[07],[08],[11],[17], [25],[27],[29],[30],[32],[34],[40].
	Formulating crisis management planning (Frequency:4)	[11],[25],[27],[32]
MM03 Opportunity management	Handling predictable information (Frequency:15)	[02],[04],[08],[16],[17],[23],[25],[27],[28],[29],[30], [32],[33],[34],[40]
	Formulating opportunity management planning (Frequency:7)	[23],[25],[27],[28],[29],[32],[33]
MM04 Uncertainty management	Analysis of all kinds of factors in a project (Frequency:18)	[02],[04],[05],[06],[08],[12],[18],[20],[24],[25],[26], [27],[29],[33],[34],[35],[36],[39]

	Integrating and handling historical and predictable information (Frequency:25)	[02],[03],[04],[05],[06],[08],[12],[17],[18],[20],[24], [25],[26],[27],[29],[30],[32],[33],[34],[35],[36],[37], [38],[39],[40]
	Integrated contingency and opportunity management planning (Frequency:5)	[03],[25],[32],[33],[37]

SP3 --- The better management method under uncertainty circumstances.

The better management method selected and considered by different researchers are presented in the Table 3.2c. The left column presents related management methods of project management, and relevant reasons and evidences are summarized respectively on the middle and right column. As for the frequency, the Table 3.2c also shows the number of each element.

Table 3.2c The better management method

Management method (MM01~04)	Reason	Evidence([01]~[40])
MM01 Risk management	The project management is the risk management (Frequency: 7).	[06],[07],[08],[12],[14],[16], [27]
MM02 Crisis management	None	None
MM03 Opportunity management	There is a transformation from risk to opportunity (Frequency: 3).	[23],[29],[33]
MM04 Uncertainty management	The uncertainty management is a part of the Integration Management Knowledge Area, involving risk and opportunity management (Frequency: 8).	[02],[03],[04],[25],[30], [33],[37],[39]

4 Consideration

4.1 Discussion about the results

By showing related evidences in three tables of section 3.2, the researcher discussed empirical results in the areas of main management methods, the improvement of strategy formulation, and the best management method under uncertainty circumstances. The discussion of each finding is further explained as below:

Main management methods

The **Table 3.2a** appeared in 76 evidences from 40 studies to indicate four types of management methods, such as risk, crisis, opportunity and uncertainty management that are regarded as current main project management. Thereinto, the empirical result on risk and uncertainty management demonstrated that most of researchers and project managers payed close attention to these two types of management method.

The improvement of strategy formulation

The analysis of management methods in the **Table 3.2b** listed important functions of each management method, which can support the management method to enhance strategy formulation. It is noticeable that to handle related information and to analyse environmental factor are regarded as the more attention than the planning. Because these frequencies have a high share in the total of management method, for example, the analysis of environmental risk factor and historical information are occupied 78.7% of the total of frequency of risk management; and the value of crisis, opportunity and uncertainty management showed respectively 84%, 68% and 89.6%. In conclusion, it is clear that the uncertainty management may be more suitable for uncertainty circumstances because the high frequency (89.6%) showed that researchers or project managers would like to choose it to manager project if facing the same conditions.

Moreover, the researcher found that the **Table 3.2b** delineated potential relationships between various management methods. Clearly, there is inclusion relation (or called osmosis) among risk, opportunity and uncertainty. As compared to other management methods, the crisis management is considered as relatively independent method.

The better management method under uncertainty circumstances

The **Table 3.2c** described the selection of 40 previous researches to the better management method, and drew main reasons from these articles to explain why they claim that relevant management method is more suitable for uncertainty circumstances than others. Clearly, the uncertainty management is regraded as the better management method. Because the related frequency of eight is more than others (e.i. 0, 3 & 7). It should be noted that, with the

development of project management, uncertainty management has been received more and more attention by researchers and project managers, especially from 2010.

Furthermore, the crisis management is unpopular than others because of the terrible frequency of zero. Researchers hardly situated the crisis management in the better management method or the best choice, for many past scholars (Perminova, 2011; Daniel, 2017; David, 2017; Kerzner, 2017) pointed out that crisis management has a narrow scope of application in project management.

4.2 Limitation

There are some limitations of this study as follows:

Firstly, the researcher solely selected and executed the search and categorization of relevant articles and books. Although the research procedure in the study followed the rules of the SLR strictly, a single researcher can hardly give consideration to both at exact selection and execution at the same time.

Secondly, this paper excluded precised statistics analysis. Instead, it offered research insights relating to summary statistics on the topic of project management. Specifically, the researcher provided a detail explanation on descriptive statistics to explain relevant frequency and percentage of different elements, such as, emphases of management methods.

Finally, the paper excluded a comparative study of related theories for each management method including but not limited to fundamental concept, detail principle planning and so on.

4.3 Conclusion

The results of this study showed that project managers, currently, prefer to focus on uncertainty management to manage a project, instead of risk management. Besides, the topic on opportunity management in the context of uncertainty enhances the importance of being innovative strategically in the formulation of project management. In the same vein, the topic on crisis management deserves the attention of future researchers as it could be handled unexpected and unpredictable information that other methods are unable to process, and will remedy the deficiency of risk and uncertainty management.

Last but not least, the empirical result of this study contributes to the identification of a better management method. Firstly, it provides a better understanding management method of project management. Besides, possible research areas may be of interest of future researchers, such as the opportunity management in the context of uncertainty, the application of crisis management under uncertainty circumstances, integrating project management and others, which may bring firth both new theoretical insights and practical contributions to the study of project management.

5 References

Adamantidou, E., Xenidis, Y., & Papaioannou, P. (2010). Critical Review of the Current Public-Private-Partnerships Legal Framework in Greece with Respect to Legal Risks Management. *PM-05-Advancing Project Management for the 21st Century "Concepts, Tools & Techniques for Managing Successful Projects*.

Agyakwa-Baah, A., Chileshe, N., & Stephenson, P. (2010). *A risk assessment and management framework to support project delivery* (Unpublished Doctoral dissertation, National Technical University of Athens).

Ahola, T., & Davies, A. (2012). Insights for the governance of large projects: Analysis of Organization Theory and Project Management: Administering uncertainty in Norwegian offshore oil by Stinchcombe and Heimer. *International Journal of managing projects in business*, 5(4), 661-679.

Antoniadis, D. N., Edum-Fotwe, F. T., & Thorpe, A. (2010). Framework for Managing Complexity of Interconnections in Projects. *Advancing Project Management for the 21st Century "Concepts, Tools & Techniques for Managing Successful Projects" Crete, Greece*.

Brink, T. (2016). Managing uncertainty for sustainability of complex projects. *International Journal of Managing Projects in Business*, 10(2), 315-329.

Carter, A., & Chinyio, E. (2010). Effectiveness of risk management: barriers and solutions. International *Journal of Project Organisation and Management* 5, 4(4), 368-378.

Chan, D. W., Chan, A. P., Lam, P. T., Yeung, J. F., & Chan, J. H. (2010). A research framework for developing a performance evaluation model for target cost contracts in construction. *PM-05-Advancing Project Management for the 21st Century,"Concepts, Tools & Techniques for Managing Successful Projects" 29-31 May 2010, Heraklion, Crete, Greece*.

Cleden, D. (2017). *Managing project uncertainty (eBook Published)*. Routledge. *International Journal of Managing Projects in Business*, Vol. 2 Issue: 4.

Daniel, P. A., & Daniel, C. (2017). Complexity, uncertainty and mental models: From a paradigm of regulation to a paradigm of emergence in project management. *International Journal of Project Management,* 36(1), 184-197.

De Meyer, A., Loch, C. H., & Pich, M. T. (2002). Managing project uncertainty: From variation to chaos; Project managers can't predict the future, but accurately gauging the degree of uncertainty inherent in their projects can help them quickly adapt to it. *MIT Sloan Management Review*, 43(2), 60-68.

Do Vale, J. W. S. P., & De Carvalho, M. M. (2017). Risk and uncertainty in projects management: literature review and conceptual framework. *Revista GEPROS*, 12(2), 93.

Ekambaram, A., Johansen, A., Jermstad, O., & Økland, A. (2010, September). Opportunities in projects and innovative thinking. In *European Conference on Innovation and Entrepreneurship* (p. 173). Academic Conferences International Limited.

Fragkakis, N., Lambropoulos, S., & Pantouvakis, J. P. (2010). A computer-aided conceptual cost estimating system for pre-stressed concrete road bridges. *International Journal of Information Technology Project Management* (IJITPM), 5(1), 1-13.

Georgiou, L., & Pantouvakis, J. P. (2010). A review of spatial considerations in project scheduling (Published in: PM-05, Fifth Scientific Conference on Project Management, *Advancing Project Management for the 21st Century: Concepts, Tools and Techniques for Managing Successful Projects* by (ed.) Pantouvakis, J. P., [2010] p.249-256).

Geraldi, J. G., Lee-Kelley, L., & Kutsch, E. (2010). The Titanic sunk, so what? Project manager response to unexpected events. *International Journal of Project Management*, 28(6), 547-558.

Johansen, A. (2015). Project Uncertainty Management a New Approach—The “Lost Opportunities” (Unpublished Doctoral dissertation, PhD. Thesis, Norwegian University of Science and Technology, Trondheim, Norway).

Johansen, A., Halvorsen, S. B., Haddadic, A., & Langlo, J. A. (2014). Uncertainty management–a methodological framework beyond “the six W's”. *Procedia-Social and Behavioral Sciences*, 119, 566-575.

Johansen, A., Eik-Andresen, P., & Ekambaram, A. (2014). Stakeholder benefit assessment–Project success through management of stakeholders. *Procedia-Social and Behavioral Sciences*, 119, 581-590.

Joslin, R., & Müller, R. (2015). The impact of project methodologies on project success in different project environments. *International Journal of Managing Projects in Business*, 9(2), 364-388.

Kerzner, H., & Kerzner, H. R. (2017). *Project management: a systems approach to planning, scheduling, and controlling 10th Edition*.

Krane, H. P., Johansen, A., & Alstad, R. (2014). Exploiting opportunities in the uncertainty management. *Procedia-Social and Behavioral Sciences*, 119, 615-624.

Manelele, I., & Muya, M. (2008). Risk identification on community-based construction projects in Zambia. Journal of Engineering, *Design and Technology*, 6(2), 145-161.

Nummelin, J. (2005). Uncertainty Management Concerning Cultural Dynamics in Project Management–Case Study. In *IPMA World Congress*, New Delhi.

Pantouvakis, J. P., & Lambropoulos, S. (2010). Uncertainty in Scheduling Multiple Projects. *PM-05-Advancing Project Management for the 21st Century "Concepts, Tools & Techniques for Managing Successful Projects"* 29-31 May 2010, Heraklion, Crete, Greece. 442-450.

Papari, E., Pantouvaki, J., & Panas, A. (2010). A framework for the implementation of a knowledge management platform in the Greek construction industry. *PM-05-Advancing Project Management for the 21st Century "Concepts, Tools & Techniques for Managing Successful Projects"* 29-31 May 2010, Heraklion, Crete, Greece. 552-559.

Perminova, O. (2011). *Managing uncertainty in projects* (PhD Thesis. Åbo Akademi University Press, Sweden).

Pich, M. T., Loch, C. H., & Meyer, A. D. (2002). On uncertainty, ambiguity, and complexity in project management. *Management science*, 48(8), 1008-1023.

Polat, G., & Duzcan, M. (2010). Factors affecting cost contingency in international projects. Proceedings of Advancing Project Management for the 21th Century. Concepts, *Tools & Techniques for Managing Successful Projects*, 29À31 May, 609À617.

Portny, S. E. (2010). *Project management for dummies 3rd Edition*. John Wiley & Sons, 2010 by Wiley Publishing, Inc., Indianapolis, Indiana, the United States.

Ronald, S. K. (2014). *Project Uncertainty Management* (Unpublished Master Thesis. Atlantic International University, the United Sates).

Rose, K. H. (2013). A Guide to the Project Management Body of Knowledge (PMBOK® Guide)—Fifth Edition. *Project management journal*, 44(3), e1-e1.

Serpella, A. F., Ferrada, X., Howard, R., & Rubio, L. (2014). Risk management in construction projects: a knowledge-based approach. *Procedia-Social and Behavioral Sciences*, 119, 653-662.

Shen, L. Y. (1997). Project risk management in Hong Kong. *International journal of project management*, 15(2), 101-105.

Simu, K. (2006). *Risk management in small construction projects* (Doctoral dissertation, Luleå tekniska universitet).

Sun, Y., Fang, D., Wang, S., Dai, M., & Lv, X. (2008). Closure to "Safety Risk Identification and Assessment for Beijing Olympic Venues Construction" by Yu Sun, Dongping Fang, Shouqing Wang, Mengdong Dai, and Xiaoquan Lv. *Journal of management in engineering*, 25(2), 98-100.

Van Thuyet, N., Ogunlana, S. O., & Dey, P. K. (2007). Risk management in oil and gas construction projects in Vietnam. *International journal of energy sector management*, 1(2), 175-194.

Ward, S., & Chapman, C. (2003). Transforming project risk management into project uncertainty management. *International journal of project management*, 21(2), 97-105.

Zwikael, O., & Sadeh, A. (2007). Planning effort as an effective risk management tool. *Journal of Operations Management*, 25(4), 755-767.

Zwikael, O. (2009). Critical planning processes in construction projects. *Construction Innovation*, 9(4), 372-387.

Zheng, E. Z. H., & de Carvalho, M. M. (2016). Managing uncertainty in projects: a review, trends and gaps. *Gestão e Projetos: GeP*, 7(2), 95-109.