PROJECT RISK IN THE CONSTRUCTION INDUSTRY: AN EMPIRICAL STUDY

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ABSTRACT

Purpose: *The purpose of the paper is to systematically review project risk in the construction industry. The specific objectives include; classification of project risk and the impact of project risk on project success.*

Design/Methodology/Approach: *The paper adopted a systematic literature review that made used of published journals from 2009 to 2019 on the topic under study. The study ensued that the data collection concerning "project risk" was searched using a combination of some databases with specific much emphasis on Science Direct, Google Scholar and Emerald Insight.*

Findings: *The finding highlighted that project risk tend to directly influence project success. However, the realization of the direct impact of project risk on project success is threatened by the inability for project to be able to classify and prioritize their risks which tend to have an impact of the project success.*

Keywords: Risk, Project Risk, Project Success, Risk Classification, Empirical, Construction.

Paper type: Systematic Literature Review.

INTRODUCTION

Today, project risk forms a major concern for most stakeholders that operate within the construction industry around the globe (Roque & Marly, 2013). It is unfortunate that most organizations in this global business environment have disregarded the concept of managing project risk (Hillson, 2014). This signifies that the various organizations focus more attention of their risk exclusively on individual risks rather than proactively identifying the organisation overall risk exposure associated with firms' projects (Hillson, 2014).

Scholars, researchers and industry players would argue that the best way of dealing with the increasing nature of project risk among construction firms involves the need for all stakeholders to fully exploit a comprehensive framework to deal with the adverse effect of the project risk to the construction firms (Tesfaye et al., 2016). In the Ghanaian environment, the importance of the construction industry contribution to the national income is massive. The construction industry considered to contribute 14.34 percent to Ghana GDP between the years of 2009 and 2013 (GSS, 2018). In support of the facts, the Ghanaian construction industry contributed an amount of $3.8bn to GDP in 2014 at current prices (GSS, 2018).

Moreover, the nature such contribution of the construction industry is accompanied with a lot of uncertainty and risk in relation to their line of business (Adedokun, 2013; Zhen-Yu & Lin-Ling, 2008). Project risk is found to be attributed to numerous works associated with the construction works in respective of the size of the project (Carr & Tah, 2001). It is believed that the project risks that are in line with the construction works are different but the major one that occurred frequently is the rising cost associated with the projects (Carr & Tah, 2001). The rising cost associated with the construction industry project is major issue in the country. The cause of the rising project cost is as result of the depreciation of the local currency to the forex currency. Thus, the local Cedi is deprecation is based on the rising

Citation Information: Lamptey, L.L., & Acheampong, A.K. (2022). Project risk in the construction industry: an empirical study. *Academy of Accounting and Financial Studies Journal, 26*(5), 1-11.

prices of steal and oil. The implication is that the construction industry players are spending more than their initial budget (Mousa & Hmaid 2005). Also, the construction industry is facing the risk of skilled labour. The implication is that the construction industry is lacking skilled labour which has made the industry players to seek an alternative expert labour in the form of outsourcing which is cost expensive and hence, affect the project activities of the industry. The said project risks tend to have direct influence on the firm's project success. This forms of direct influence on the project success shows cost overruns and project schedule delays (Mahamid, 2011; Sarkar, 2012). Based on the different number of studies investigated, it is evident that project risks have led to significant cost and time overrun of the projects (Floricel & Miller, 2001).

Consequently, project risk has become an important subject for both academicians and researchers. Hence, due to the importance of the study topic, it is therefore beneficial to studies that have provided a systematic evidence of its effects and essential factors that increase project risk with specific emphasis on developing countries. Consequently, the specific research questions are:

1. RQ1. What is the key classification of project risk among construction firms?
2. RQ2. What is the impact of project risk on project success of construction firms?

The study ensured its contribution by way of systematic review which focus on key issues such as understanding of project risk, classification of project risk, project risk methods, risk ranking in empirical project risk research. The study gap identification proved to show that the reviewed of the project risk was conducted with little or no much attention being paid in area of Africa. Specifically, researchers such as Tesfaye et al., (2016) reviewed comprehensive literature on project risk analysis. Also, Baccarini & Archer, (2001) reviews risk ranking of projects with Hofman & Grela, (2017) empirically reviewing classification of project risk. However, the study identified that none of the reviews concentrated on project risk in relation to drivers of project risk with much emphasis in Africa. In view of this, project risk is of importance to developing economies such as Africa since most Africa countries are now in new ere of developmental stages which involves numerous project activities to help improve their economy. Meanwhile the management of the projects is associated with different forms of risk in this part of the region as result of difference in our cultural factors, business environment and institutional factors. The study tends to contribute to the literature in the context of project risk through adequate reviewing, proper identification of the key project risk in the area of Africa as well as improve the area in line with future research.

Also, the study identified a gap with the prior research concentrating and focusing on the theories and conceptual approaches with little or no attention focusing on the empirical project risk research which includes researchers such as (Baccarini & Archer, 2001; Nieto-Morote & Ruz-Vila, 2011; Tesfaye et al., 2016). Nevertheless, it is equally important for researchers to conduct a more empirical driven studies in relation to the topic under study to help give more proper insights into the understanding of project risk as it was equally important in providing research on theories and conceptualization of project risk issues. In addition, the study identified that some of the prior researchers such has (Hussein & Klakegg, 2014; Papadaki, et al., 2014; Roque et al., 2013) had divergent views and mixed conclusions on the impact of project risk on project success. Therefore, this has allowed the study to conduct research on the effect of project risk on firm project success that takes care of the second research question of the study. The rest of the paper discussed was divided into sections with literature review, methodology, results and findings, gaps and future research agenda and conclusion.

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LITERATURE REVIEW

Concept of Project Risk

"*Project risk*" is defined as the exposure of stakeholders to the consequences of variations in outcome (Zou et al., 2017). The concept of risk is considered important in project success. The concept of project risk can be subdivided into risks in the project and the risk of the project (Zou et al., 2017). Project risk can be direct or indirect depending the opportunity its presents or danger to the project as a whole (Zou et al., 2017). However, unlike individual risks, the consequence of project risk is not on the objectives of the project, but on the project itself (Zou et al., 2017).

The study review of the literature captures that the factors that expose project to various risk within the construction industry. Dey, (2011) argues that the risks that are associated with project arises from different areas as result of the complex issues relating to planning and design, environmental changes, resource availability, economic issues, political issues, climate change, regulatory demands as well as the interest from third-party groups. In succession, Zou et al., (2017) made reference to long, complex environment, complicated process, and the need for investment-intensive, dynamic organizational structures, technological and organizational complexity and the diverse interests of stakeholders. Ghani, (2009) points out as factors and essential features high life cycle design, size, complexity, location, the different parties implicated and familiarity with the performer's work to be done. Zou et al., (2017) found a frequent environmental changes, the high demand in compliance to regulatory requirement and compliance cost, complex nature associated with construction industry project risk and danger of exposure to hazards.

Previous Reviews

Prior research has gained enough grounds and attention for most academicians and researchers with a lot of them conducting reviews in different dimensions relating project risk. Most of the researchers conducted research focusing on the theoretical and conceptual context in relation to project work such as Tesfaye et al., (2016), A project risk analysis: systematic approach to literature review Baccarini & Archer, (2001), the risk ranking of projects Nieto-Morote & Ruz-Vila, (2011), An uncertain approach to construction project risk assessment. However, these form of reviews on project risk are largely theoretical and conceptually in nature. In this regard, the study fails to take a critical look the empirical context of the topic which allowed the researchers and academicians focusing on the theoretical and conceptual issues lack insufficient research for proper understanding of the concept of project risk as well as lack empirical conclusion to enhance different perspective to enrich the concept of project risk. This created a gap for further research to be conducted in more empirical driven nature.

Moreover, Roque & Marly, (2013) conducted a study concerning the linkage between project risk and project performance: An Empirical Study. The study made sued of quantitative research method with a survey method as data collection. Questionnaire was used as study instrument. The study finding reveled that project risk critical success factors were agreed include:

proper analyses and understanding of the business environment, ensures that there is adequate attention been given to the risks associated with projects as well as making appropriate usage of the risk management techniques. Other researchers (Hofman & Grela, 2017; Hussein & Klakegg, 2014) observed a similar finding that showed that lack of knowledge on the project risk was considered as detrimental to the any given project. Therefore, there is need for project to have a project manager that have adequate knowledge

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that certain risks are likely to materialize which can be prevented or minimize to ensure project success. Papadaki et al., (2014) also conducted an empirical study in relation to important factors that attract management of project risk. The study made used of mixed method approach with usage of both questionnaire and interview as study instrument. The study showed that appropriate training and education in line with project risk will tend to directly contribute in developing more robust risk culture. In response to the above-mentioned issues, the study critically reviewed an empirical study on project risk research with the purpose of providing empirical insights to facilitate the development of theories on the topic.

METHODOLOGY

Research Approach

The study ensured the adoption and usage of systematic review of literature as the study method. Dewey & Drahota, (2016) defined systematic literature review as process that leads to identifying, selecting and critically appraises the research with the aim of answering a clearly formulated question or topic area. Systematic literature review was adopted with the purpose of addressing the problems of the study through critical identification, evaluating as well as integrating all the relevant results with the objective of addressing one or more research questions (Cooper, 2003). The justification for the study adoption of systematic literature review method allowed the researcher to select studies that helped reduce bias as well as produced a reliable and accurate conclusion. Also, it was adopted based on its ability to be more rigorous and includes other under-research areas (Kitchenham, 2004; Yatu et al., 2018).

Data Collection Procedure

The study ensued that the data collection concerning "project risk" was searched using a combination of some databases with specific much emphasis on Science Direct, Google Scholar and Emerald Insight. The study made used of a limitation time frame for the journals and articles ranging from 2009 to 2019/2020. Therefore, the study made used of potential key works as search engine that were based on the title, abstract as well as some keywords on the papers.

Validity and Reliability

The validity of the study was performed using similar studies in relation to the subject matter. The study ensured the usage of the similar works in which the questionnaires were adopted and piloted. Based on this, the adopted questionnaires were sampled form the studies of Papadaki et al., (2014) in their work of critical factors that leads to the management of project risk Tesfaye et al., (2016), in their work of analyses of project risk in the construction industry: literature review. The purpose of conducting the pilot study was to determined the good-fit of the questionnaire for the conduct of the study.

Inclusion and Exclusion Criteria

The study made used of criteria that involves the inclusion and exclusion were specifically defined. The study adopted papers that were translated only English writing as well published papers in international journals. Also, the study set the records straight that the exclusion involves theses, interviews, books chapters, summary communication and

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commentaries, presentation slides and documentations were purely excluded from the study. In support of the statement of exclusion, the study in addition indicated that theses that have not been published, reports on conferences and working papers were not included for reason being that most of them are being developed into articles and this tend to prevent double counting. However, the study ensured that journals need to have developing country context which might include a specific organization or institutions. Therefore, the study made used of about twenty (20) journals but the study made used of nine (9) upon which the study relied on for further analysis.

RESULTS AND FINDINGS

Publication Trends

The study revealed that the total of nine (9) research articles were published between the period of 2009 and 2010. This signified about 11 years in terms of the total number of articles that were systematic reviewed. The study revealed figure 2 below concerning the general trend of the total number of reviewed articles published in the context of project risk. The trend of the number of published articles were considered to be low since there were inconsistent in terms of the period of published. The study trend indicated that between the period of 2012 and 2015 that experienced an increasing rate of published articles in relation to project risk with the rest of the period having inconsistent in terms of published article.

Publication Outlets

The study revealed in terms of the journal outlets for the study which showed nine (9) articles being systematically reviewed. In Table 1, the study journal outlet showcased eight (8) different journals published the nine articles that were used for the reviewed study. The study indicated that only one journal did record two publications. The study identified a gap within the published articles that not at least one article among the reviews was published in the Africa most popular journals. The study showed that the most leading journal for the publication of the topic project risk was indicated as Procedia Social and Behavioural Sciences showing articles such as (Papadaki et al., 2014; Hussein & Klakegg, 2014). This shows that the Procedia Social and Behavioural Sciences established itself as the leading journal publication in terms of project risk as a topic.

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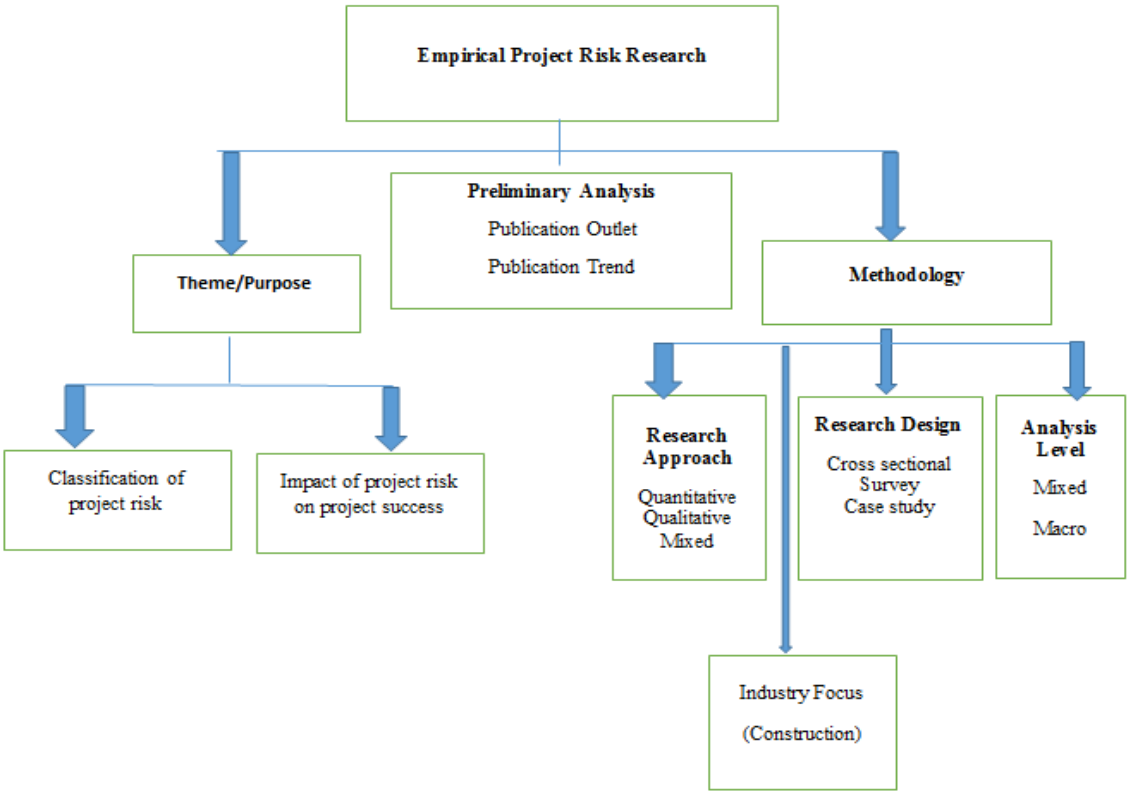

Figure 1
ANALYTICAL FRAMEWORK

Source: Authors' own framework

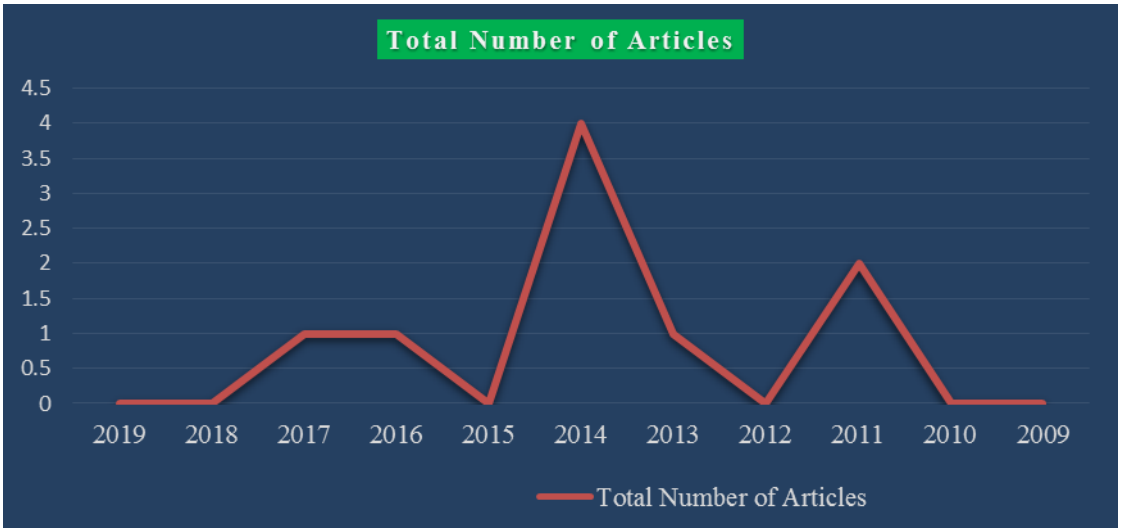

Figure 2
TRENDS IN PROJECT RISK

Source: Empirical Review Study, 2021

Table 1
PUBLICATION OUTLETS

Database	Journal	Total
Science Direct	International Journal of Project Management	1
	Procedia Social and Behavioural Sciences	2

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	Procedia Computer Scienc	1
	Procedia Technology	1
Emerald Insight	International Journal of Managing Project in Business	1
Google Scholar	Journal of Technology, Management & Innovation	1
	International Journal of Project Management	1
	International Journal of Risk and Contingency Management	1
Total		9

Source: Empirical Review Study, 2021

Main Findings

Research themes

The study based its conclusion on the number of reviewed works that were critically conducted. Hence, the study critical reviewed allowed the study to theme its objectives into two main ideas namely; classification of project risk and impact of project risk on project success as showed in Table 2.

The study revealed that the number of reviews concerning the empirical project risk research. Thus, the study indicated that majority of the reviews was conducted on the impact of project risk showing 56%. The explained that majority of authors did focus on this theme in order to ascertained the impact on project success.

Table 2
THEMES OF EMPIRICAL PROJECT RISK RESEARCH COVERED

Project Risk Classification	Nieto-Morote & Ruz-Vila (2011), Hofman & Grela (2017), Baccarini & Archer (2011), Hartono et al. (2014).
Impact of Project Risk	Roque & Marly (2013), Hussein & Klakegg (2014), Peixoto et al. (2014), Tesfaye et al. (2016), Papadaki et al. (2014).

Source: Empirical Review Study, 2021

Project risk classification

Project risk classification has been investigated in four studies (Baccarini & Archer, 2001; Hartono et al., 2014; Hofman & Grela, 2017; Nieto-Morote & Ruz-Vila, 2011). Based on this, the study indicated for a total of nine (9) articles that were reviewed, 4 out of the 9 showing 44% of the reviewed concentrated on the classification of project risk. This signified how important project risk classification was to the various researchers and academicians. The study indicated that studies that focused on the classification of project found it important to be able to classify the various project risk that pertained to the individual industries with much focused on the construction industry. Based on the reviewed, Nieto-Morote & Ruz-Vila, (2011) suggested in their topic "*approach assessment of project risk in the context of construction*" In connection with findings, Nieto-Morote & Ruz-Vila, (2011) proved that project risk was divided into 13 classification upon which it was further into 4 main groups namely project management risk, engineering risk, execution risk and supplier's risk. The implication was that the cost that is involved in reducing the threat of project risk was huge and expensive especially in the line of construction industry because the capital-intensive nature of the industry projects. Therefore, the study indicated that it was important for firms to be able to classify their project risk into groups which tend to become familiar with the risk manager. The study concluded that the moment project risks were classified into themes might allowed the risk managers to be able priorities the risk in order to tackle and take actions to reduce the level of threat to the project.

Moreover, Hofman & Grela, (2017) in their work of "*Taxonomy of the project*

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portfolio risks" also based their study on classification of project risks. Therefore, in reviewing of their study, project risk was classified into 36 risk in the risks were further classified and group into 11 factors. Hofman & Grela, (2017) based on their findings showcased that the first of the factors include the risk that is associated with the problems in connection with the project portfolio environment, secondly, the risk is associated with the project structure, the third was associated with the inadequacy of the collection of project components. Also, the fourth factor delt with the risks that were identified as result of the strategic difficulties in managing the project funds, the fifth identified the factors that are associated with the inability of managing collection of assets and funds. In addition, the sixth showcase the factors that involves with the risks link to interpersonal conflicts within the project portfolio, the seventh presents the identification of factors that are associated with issues in relation to portfolio assets and funds, the eighth also presents factor that deals with the risks associated with issues in relation to project consistency in meeting its objectives as well as the risk of project divisions and finally, the risk factor in relation to the shortfalls methods that are associated with project portfolio. Based on Hofman & Grela, (2017) findings, the study implied that there is need to be knowledgeable that certain risks are bound to arise and therefore, there is need for appropriate measure been put in place in order to prevent the risk from occurring or reduce the likelihood form occurring. In support of other researchers in connection with the classification of the project risks, Baccarini & Archer, (2001) and Hartono et al., (2014) had a common view on the theme. Aforementioned findings of the review indicate that the classification of the project risk is very important since its classification proved to be instrumental in helping to minimise or prevent the threat of the risks to project success.

Impact of project risk on project success

The impact of project risk on project success has been revealed by different researchers including the researches that were reviewed under the study. Based on the total number of articles that were reviewed, majority of 56% of the researchers making a total of 5 out of 9 articles investigated the impact of project risk. According to Roque & Marly, (2013) the presence of project risk manager was considered to impact on project success. This implies that the ability for firms to have risk management department with risk manager in place has potential to have significant impact improving project success. This shows that the risk manager has the qualification, knowledge and the experience to help in identification, assessment and classification of the project risks. This tends to give the chance for prioritization of the various projects risks and thus; the risk manager represents significant understanding of the risk which had direct impact on project success. In this regard, the prevention or reduction of project risk were agreed by the study to take in the form of proper analyses and understanding of the business environment, ensures that there is adequate attention been given to the risks associated with projects as well as making appropriate usage of the risk management techniques. This implies that the ability for a risk manager to be able to ensure that the project risks are well classified and analyzed based on the situation on the environment tend to positively impact of project success. In the context of services and manufacturing sector, Hussein & Klakegg, (2014) reviewed in their study concerning the impact of project risk on project success revealed that the risk factors that includes; inability to identify the success criteria as result of limited knowledge about stakeholders, the use of appropriate criteria in the designing of success criteria and also having criteria that is consistent in accommodating the diversity of stakeholders. Based on the findings, the study showed that project risk occurred as result of the firms' top management not willing to provide the needed commitment and support to curtail the risks as well as the inability to

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assess the various risk subjectively proved to give rise to numerous project risks that affect the project success negatively. Similarly, (Peixoto et al., 2014; Tesfaye et al., 2016), revealed that majority of the risk impact on project was considered high and medium. This implies that almost every identified risk may jeopardize the project success (Tesfaye et al., 2016). These forms of project risks have implications on project success. Consequently, the aforementioned studies have showed that the non-reduction or prevention of project risk among firms in terms of their projects tend to have direct impact on project success.

Discussion of Managerial Implications, Future Research Agenda and Conclusions

Managerial implications

Project risk has been considered in this study to have direct impact on project success. Therefore, there have numerous researches conducted on this topic and thus, there is no systematic review in terms of classification of project risk as well as the impact of project risk on project success in an empirical project risk research. Based on this, the study conducted a systematic review of empirical project risk research. The study evidentially revealed that management of firm needs not take project risk lightly. This is because the nature of project risk is very costly to project success and perhaps the mangers of the firm need to provide all the needed support and commitment to curtail all risks that are associated with a given project. Further, the management of a firm needs to have substantive risk manager who is solely responsible for identification, assessing, measuring, analyzing and controlling of project risks. This tend to allow the project manager to be able to classified the various project risks which will make it effective in dealing with risks. Additionally, project firms should understand the implication of project risk on project success by way of ensuring that business environment is very conducive and free from project risks association. This can be done by way of having mangers that well experience and knowledgeable in the field of project risk. This will allow these managers to be able rank the project risks for further prevention of the risk to ensure positive contribution to project success.

Moreover, in the macro level of analysis, the development of project risk among firms arises from the instability nature of the world market prices which tend to have influence on various ongoing projects. Therefore, there is need for project firms to constantly plan and budgeted for their project by considering the nature of the world markets. This tends to give the project firms a fairly analyzing of the projects in order to prevent project risks.

Directions for future research and conclusion

Content Gaps: The study showed that majority of the study was concentrated on the developed economies based on the systematic review leaving the developing economies. This shows that most of research was based on the conditions of the developed countries which is different from conditions and environment of developing economies such Africa. Therefore, future research needs to conduct a more empirical driven study using Africa as study in relation to project risk.

Methodological Gaps: The study showed that majority of the systematic review made used of quantitative method of analyzing as well as making used of cross-sectional study. Therefore, usage of the cross-sectional survey did not allow the researchers more time to increase the sample size for proper generalization. In this regard, future research should adopt a longitudinal study which give the study the more time proper observation and improve upon the sample in order to give the study an insight understanding of the study. Also, there is need for the study to adopt a multiple source of information and mixed method. This will help each method to complement one another for proper and deeper understanding

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of project risk.

CONCLUSION

In conclusion, the systematic review of empirical project risk tends to directly influence project success. However, the realization of the direct impact of project risk on project success is threatened by the inability for project to be able to classify and prioritize their risks which tend to have an impact of the project success. Also, in spite of the increasing interest in project risk, the field of study is not fully explored and research and hence, is still under-researched. It is therefore strongly believed that when research activities are intensified on several thematic issues and methodological research gaps are identified, it can enrich the project risk dilemma for the betterment of improving project success.

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Received: 15-Oct-2021, Manuscript No. AAFSJ-21-8996; **Editor assigned:** 18-Oct-2021, PreQC No. AAFSJ-21-8996(PQ); **Reviewed:** 01-Nov-2021, QC No. AAFSJ-21-8996; **Revised:** 04-Aug-2022, Manuscript No. AAFSJ-21-8996(R); **Published:** 11-Aug-2022

Citation Information: Lamptey, L.L., & Acheampong, A.K. (2022). Project risk in the construction industry: an empirical study. *Academy of Accounting and Financial Studies Journal, 26*(5), 1-11.