

Assessing the Effect of Risk on Public and Private Construction Projects Performance in Ghana: Consultant Perspective

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Abstract The purpose of the study was to assess consultants' perspective on the effect of risk on public and private construction projects performance in Ghana. The study adopted a quantitative approach involving survey questionnaires administered to respondents of 355 consultants from the Ghana Consulting Engineering Association (GCEA). The data was analysed with SPSS. The study found that the most destructive risk to the construction project performance was related to finances. Further analysis to financial risks relating to public and private projects reveals that the delays in payments, freeze in capital and under-budgeting are rampant in public and private project. The major effects of risk were time-schedule risks, design risks, safety risks and socio-political risks. It is recommended that a prompt payment of construction project by stakeholders is the key to reduce financial risks.

Keywords Consultant, Construction project, Construction industry, Financial risk, Risk

1. Introduction

General risk models accept the fact that production is associated with uncertainties, which may hinder yielding optimum output (Chapman, 2001, Chileshe, 2004). These uncertainties are also known as risks, are usually labelled as happenings or situations that may have influence on the objectives of production of construction project (Ward and Chapman, 2003). Risks therefore causes deviancy of one or more outcomes to one or more impending events from their projected values. The effects of risks may be progressive or unprogressive, but common practice tends to emphasis only on probable damage that may arise and ensue from incurring a cost or failing to accomplish specific benefits. (Muller, 2010, Ijaola, 2012). Therefore, project risks refer to an uncertain occurrence that has a progressive or damaging outcome on the prospects of realizing the project objectives (Ijaola, 2012). A Project risk may, thus, not necessarily be undesirable, such as increased costs or decreased quality. A risk can also be progressive, for example, exhibiting new innovative product due to the use

of new technology or inaugural a new market sector owing to some project modifications (Ijaola, 2012; Eshan et al., 2014).

Studies in Ghana have shown that, the construction industry is mostly challenged by financial risks which stems from overdue payments to contractors, consultants, suppliers, subcontractors (Agyakwa-Baah; 2009; Frimpong et al., 2003; Odonkor, 2011). These studies also indicated that the industry is also exposed to political, natural, construction and design risks, but more are heightened at the construction stage. the study by Agyakwa-Baah (2009) has identified brainstorming as the commonest risk identification method, whereas other studies such as Frimpong et al. (2003) and Odonkor (2011) identified interviews, expert judgement and observations as the main risk identification methods in Ghana's construction industry.

Assibey-Mensah (2008), however noted that in most cases, the risk response strategy is not effective in the construction industry in Ghana resulting from poor project implementation, poor co-ordination among team members, lack of commitment and low competence of contractors and consultants. The impact of the consultant's perspective on project risks is established in the fact that he/she performs duties that cut across important performance areas in the project delivery. Specifically, some of the core responsibilities of the consultant, according to Dadzie et al. (2012), are revising and updating design details, checking

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contractor's operations to ensure timely commencement of operation, revising contractor's programme, carrying out quality control tests, as well as reviewing contractor's monthly invoices and certifying for payment. This paper is part of larger study that focuses on consultants' perspective on risk management practices in Ghanaian's construction. This study therefore focuses on consultant's perspective on effect of risk in construction project performance in Ghana.

1.1. Statement of the Problem

The construction industry is highly risks prone, with multifaceted and ever-changing project environments generating an atmosphere of high uncertainty and risk (Eshan *et al.*, 2010). The industry is susceptible to several technical, socio-political and business risks. As a result, construction firms bear numerous failures, such as failure of abiding by quality and operational requirements, cost overruns and uncertain delays in project completion (Eshan *et al.*, 2014). An effective system of risk assessment and management for construction industry, therefore, remains a perplexing task for the industry practitioners. Given that consultants' perspectives in their field of specialisation directly influences the success of the project (Dadzie *et al.*, 2012), it is important to examine their orientation on their perception on risk based on their experience and knowledge. Moreover, there have been many types of research on risk management in financial, construction project work and application to manufacturing. However, the few types of research on risk in Ghana failed to address risk from stakeholder's perspective. This study, therefore, seeks to address this gap in literature by assessing the effect of risk in the construction industry: The consultants' perspective. The study aimed to assess the effect of risk in construction projects in Ghana: the consultant perspective. The Objectives were to:

1. Identify consultant's perception on some destructive risk in construction industry in Ghana
2. Examine the consultant's perceptions on consequences of risk in construction project.

2. Literature Review

2.1. Risks in Construction Projects

Atta Agyeman and Adu Gyamfi (2017a) in their study found that the major causes of risk in construction are usage of substandard materials in construction industry, harmful work-related experience, and the dangers in construction. Ali and chike (2017) identify key construction risk in Italy and found that delays in payments, client variations, design variations, inaccurate cost estimates, and tight project schedules are key risk confronting construction project. Akintoye and Macleod (1997) have distinct risk about construction as a variable in the course of a construction project whose variation leads to uncertainty as to the final cost, duration and quality of the project. According to

Tymvios, and Gambatase, (2016) in their study about perceptions about design for construction worker safety, identified the existence of economic, legal, and contractual obstacles as risk to design for construction worker's safety.

Atta Agyeman *et al* (2017b) posited that critical risk factors militating against included high-performance expectations, tight project schedule, poor program planning, excessive approval procedures, bureaucracy of government, variations by client, and design variation t construction project delivery. Owing to construction projects difficulty and distinctiveness, but risk in construction is not different from other industries, but the risks is dynamic from construction project to project (Panthi *et al.*, 2009; Ghahramanzadeh, 2013). Risk is an unavoidable phenomenon in an organisations as dynamic as construction, regardless of the size of the project. For example, Zou *et al.* (2006) maintain that in construction, decisions including the scope of the project, the quality standards, time, purchases and costs, communication channels and the contract management options vary from one project to the next. Smith (2003) establishes that the construction industry is riskier venture due to distinguishing characteristics of construction such as financial concentration, multifaceted procedures, prolonged duration, offensive environment and dynamic arrangements of organizations. Numerous other reasons impacting on the level of risk comprising state of market, level of competition, size of the project, political and economic disparities, and expertise of parties (Flanagan and Norman, 1993; Akintoye and MacLeod, 1997; Smith, 2003; Smith *et al.*, 2006; Ghahramanzadeh, 2013). These risks are spread over the whole project life cycle and some of the risks may occur at more than one segment.

2.2. Impacts of Risks on Construction Projects

The presence of risks in construction projects requires that preventive measures must be put in place to militate against the possible negative impacts of the risks on the construction project (Akintoye and Macleod, 1997). Adams (2008) established that the impacts of risks or the threat of risks leads to the administration of certain preventive, control and responsive measures which are economic, socio-political or relational.

The concern about economic risk factors is of supreme prominence given that the construction companies are saddle with many challenges that places it at risk of economic crisis. There are issues of price controls, exchange rate volatility, and internal crisis, such as cost overrun, which make budgeting a difficult activity in the construction industry (Berggren, 2005). The relevance of these factors lays in the fact that the industry deals with huge investments and a slight increase in cost percentages could amount to hefty amounts in actual currency value. Figueiredo and Kitson (2009) highlight that price fluctuations and high inflation have led to substantial uncertainty in the industry.

Gunhan and Arditi, (2007) posited that financial risks are

key to companies and the economy as a whole. Freezes on capital, delays in payment, bankruptcy of stakeholders or financial failure all generate problematic conditions for organizations carrying out projects. As a common practice, contingency costs are added to budgeted costs to cover unexpected price increments, inflation, unfavourable exchange rates that might increase the cost of exports, accident claims and other unexpected expenses (Hopkin, 2012). This requires accurate forecasting based on past experiences or econometric models. Thus, the threat of risks leads to additional budgets, which may strain the client of financial resources.

The socio-political risk factor may occur in the form of change of government and change in government policies, which in Hubbard's (2009) opinion are ever-present risk factors, especially for public works. Therefore, the inference to be drawn is that most payments of project funded by government are halted when there is change of government in the country. (Davis et al., 2008). This circumstances creates difficulties for the industry because monies due to contractors are inaccessible rendering organisations unable to take different job due to financial challenges.

Concerning the association between risk factor and project it is important that effective communication is employed for project success and must be initiated early in the project (Chileshe and Yirenyki-Fianko, 2011). The project objectives must be clear to all stakeholders and if necessary community sensitisation might be needed to gain community support for the project, especially for public works. Thus, the threat of relationship risk might in the end lead to additional pre-project execution time to build a solid relationship and understanding among the major stakeholders of the project, as well as the beneficiary community (Claycamp, 2012).

In developing African countries, resource is major risk factor. Funds to construct factories and securing equipment are a main problem for many construction companies, especially local firms, but it is easy to get labour for construction projects (Chileshe and Yirenyki-Fianko, 2011). One main challenge revealed by specialists who work for local organizations was that local construction companies are slowly fading out because foreign firms carry out virtually all the projects, leaving very few projects for local organizations (Oladinrin et al., 2013). The threat of out-competition by foreign firms also becomes a major factor for local firms. The impact can only be assuaged if local firms become as resourced as foreign firms, and operate in a structure that out-competes or at least are at par with the structure of foreign competitors (Buertey et al., 2012).

3. Research Methodology

3.1. Study Design

An important aspect of any research is the design. It is the logical sequence that connects the empirical data to the initial questions of the study and, ultimately, to its conclusions (Sarantakos, 2005). Quantitative research technique was employed for this study, which represent observations under study numerically and explain the phenomenon that mirror those observations (Babbie, 2005). This permitted the gathering of quantitative data and also allowed the use of quantitative approaches in the analysis of data.

The research designs adopted were the descriptive. Key (1997) reports that methods involved in a descriptive study design range from the survey which describes the status quo, the correlation study which investigates the relationship between variables, to developmental studies which seek to determine changes over time. Sarantakos (1998) confirms that descriptive research aims at describing social systems, relations or social events and providing background information about the issue in question and also to stimulate explanations. A descriptive design was therefore adopted because the study ultimately sought to find consultants' perspective on the effect of risk on public and private construction project performance in Ghana.

3.2. Study Sample

The target population was 722 members of the GCEA. However, a sample was taken due to the relatively short period for the completion of the study, as well as resource constraints and the fact that a representative sample could be generalised for the entire population (Creswell, 2003). According to Krejcie and Morgan's (1970) table for determined sample size from a given population, a population of 700 had sample size of 248; while population of 750 had sample size of 254. However the study population was 722 which should have sample size of 255 by krejcie table for determined sample size. The study sampled 355 to represent a population of 722. The underlying construct for Krejcie and Morgan's (1975) estimation is based on equal population proportions for consultants as the study population, as well as a t-statistic of 1.95 at an alpha level of 0.05.

3.3. Sampling Procedure

The calculated sample of respondents was selected using the simple random method; specifically, the lottery method. The sampling frame consisted of a numbered list of all the members of the GCEA. The computer software, Q-Basic was programmed to generate 355 random numbers from 1 to 722 and the corresponding names to the sampling frame were selected.

3.4. Sources of Data

All the data for the study was collected from the consultants and from books, articles etc. The general purviews of risks in the construction industry were covered by the study. These were collected as primary data as they

were directly elicited from the respondents and those collected through books, articles and literature searches were secondary data.

3.5. Instruments for Data Collection

The primary data were gathered from the consultants by questionnaire this was possible because these groups of people are knowledgeable and can read, comprehend and also response to the items on the questionnaire by themselves. Questionnaires were also employed by Adu Gyamfi et al (2016), Chileshe and Yirenkyi-Fianko (2011), Buerthey et al. (2012), and Adu Gyamfi and Boadaa (2015) and in their studies on risks related issues in the Ghanaian industry.

3.6. Pre-test

The study instruments were tested by a qualified consultant in the Ashanti Region as was done by Adu Gyamfi et al (2016). This was done intentionally as the initial testing of the questionnaire for their ability to produce the desired answers for the study. The purpose of the pre-test was to enable the researchers to make necessary changes to items which may be inappropriate, determine the level of ambiguity of the questions for corrections and determine the percentage of responses. Ambiguous items were modified and inappropriate items, made appropriate. The pre-test therefore allowed the investigators to review the contents of the instruments to accomplish the reliability and validity criteria necessary in scientific research.

Validity is the degree to which a test produces what it is

supposed to produce. The researcher tested the face and content validity of the questionnaire. Face validity refers to the likelihood of a question being misunderstood or misinterpreted. Content validity refers to whether an instrument adequately covers all the topics concerned. The validity of the instrument was established through expert opinions, literature searches, and pre-testing of questionnaires. Reliability is the degree at which instrument produces constant result after frequent testing. The questionnaire was administered to the same group of subjects twice in the pilot study with a two-week grace period between the first and the second test and the coefficient of reliability from the two tests correlated. The reliability test produced Cronbach alpha of 0.89.

3.7. Methods of Data Analysis

Statistical product for service solutions (SPSS) was employed to analyse the data. The researcher employed descriptive statistics, chi-square, and t-statistics to analyse the data.

4. Results and Discussion

4.1. Impact of Risks in the Construction Industry

This section analyses the impacts of risks in the construction industry. The consultants were asked to indicate the most destructive risk regarding the categories of risks from their experience in the construction industry. The result is shown in figure 1.

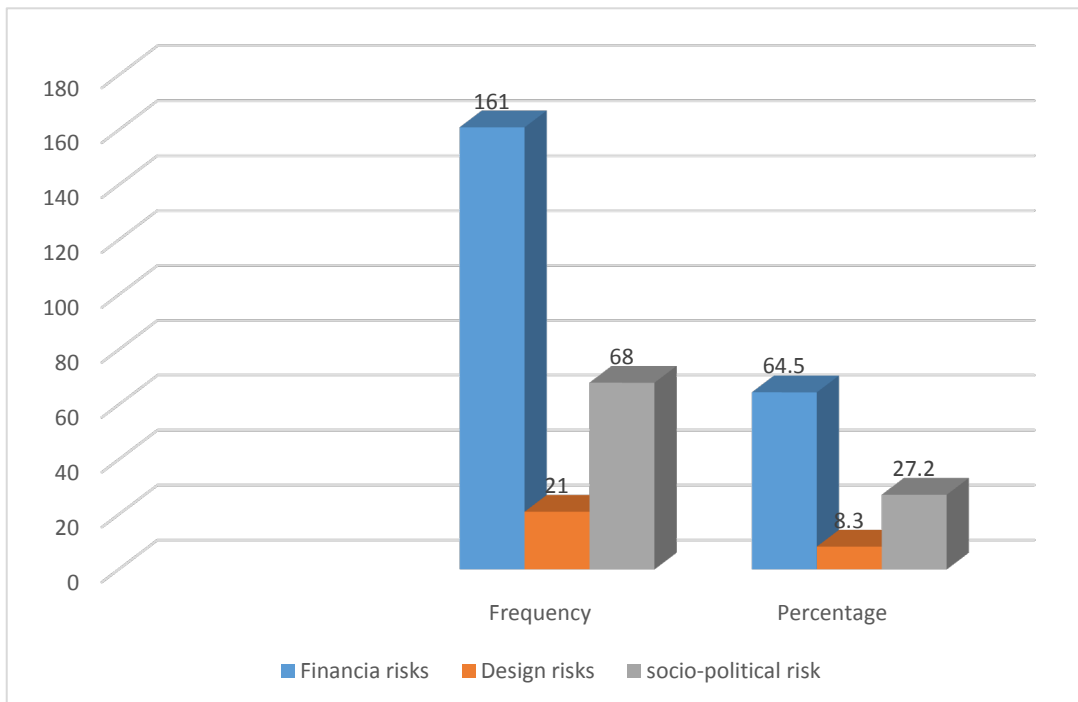


Figure 1. Consultants perception of most destructive risks in construction

According to consultants' perception 64.5 percent of the respondents, the most destructive risk to the construction industry is related to finances. The other major risks, which are most destructive to the construction industry, as noted by the consultants, were socio-political risks and design risks. These were indicated by 27.2 percent and 8.3 percent of the respondents respectively. The finding of the study is in line with Hubbard's (2009). Who posited that socio-political risk factor may occur in the form of change

of government and change in government policies, which in her opinion are ever-present risk factors, especially for public works. Therefore, the inference to be drawn is that most payments of project funded by government are halted when there is change of government in the country (Davis et al., 2008). This circumstances creates difficulties for the industry because monies due to contractors are inaccessible rendering organisations unable to take different job due to financial challenges.

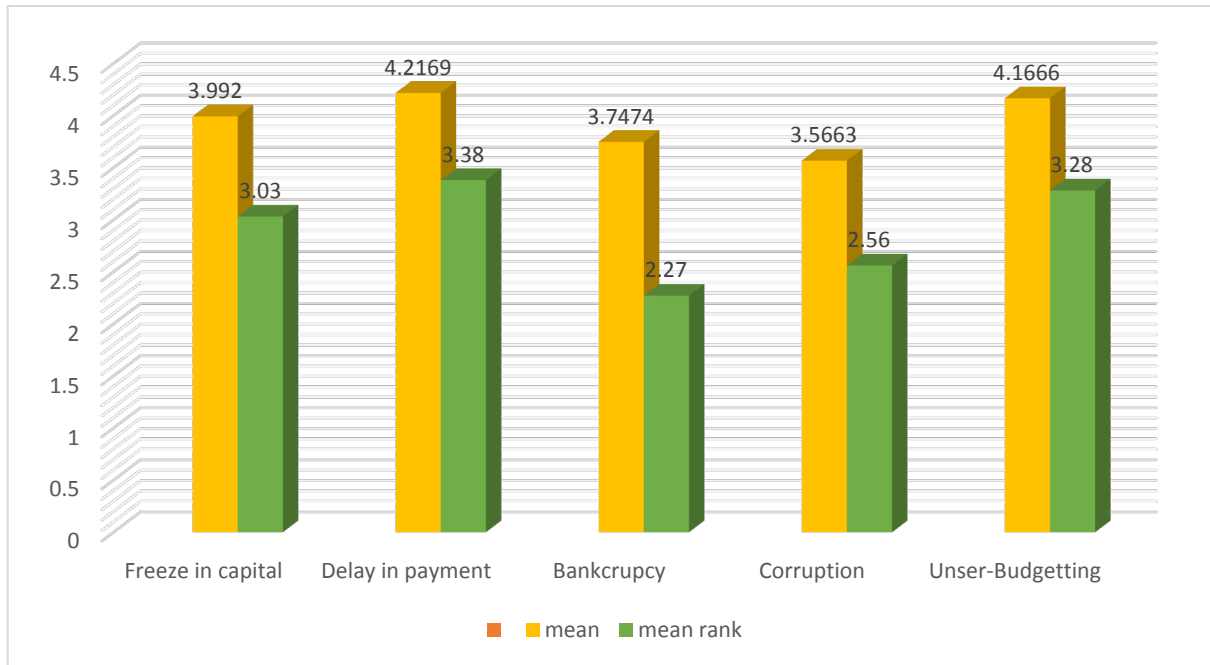


Figure 2. Rating the impact of financial risks on public construction project

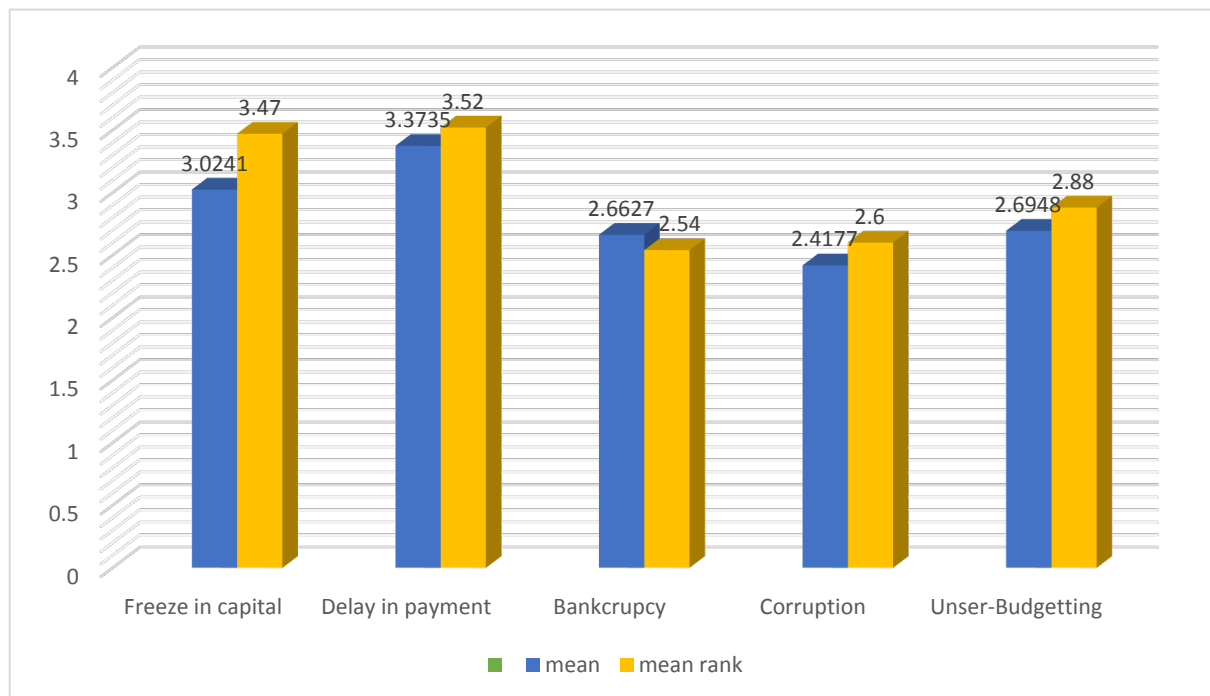


Figure 3. Rating the impact of financial risks on private construction project

The study aimed to segregate the risks involved in public and private project, this was purposed to explain further the financial risks that are prone to projects that require public procurement and those that underwent other procurement procedures as shown in fig. 2. The study revealed that for public projects, the mean score of delays in payments (4.22) was higher than all other stated financial risks. This was followed by under-budgeting (4.16), freeze on capital (3.99), bankruptcy or failure to release funds (3.75), and corruption (3.57). These means corresponded with the Friedman mean ranks, where delay in payment had the highest mean rank (3.38), and corruption in the public sector had the lowest (2.56). The mean ranks were tested for their statistical significance and the results indicated that the differences in the mean ranks of the stated financial risks were significant at an alpha of 0.05 (chi-square = 69.175; df = 4; p-value = 0.000).

The identified financial risks have been captured in literature as some of the influential financial risks in the construction industry. For example, Gunhan and Arditi (2007) and Ali and chike (2017) posited that financial risks are key to companies and the economy as a whole. Freezes on capital, delays in payment, bankruptcy of stakeholders or financial failure all generate problematic conditions for organizations carrying out projects. Similar indications have been emphasised by Hopkins (2012) in an analysis of the fundamental elements of risk management.

The study also investigated the most critical financial risks to the private sector based on initial findings that financial risks were the most destructive to the construction

industry. The results of the study from table 3 showed that major financial risk confronting private construction project is delay in payments which had the highest mean score (MS) of (3.37), followed by freeze in capital, with MS of (3.02) It was found that the highest mean rank that correspond to the highest mean score were delays in payments which had the highest rank of 3.52. The mean ranks were tested for their statistical significance and the results indicated that the differences in the mean ranks of the stated financial risks were significant at an alpha of 0.05 (chi-square = 122.615; df = 4; p-value = 0.000).

From table 4 paired sample t-test was used to compare the mean scores of financial risks between public funded projects and private funded projects, according to the perspective of the consultants. It was shown that the consultants scored the risks including delay in payments; freeze in capital, bankruptcy, under-budgeting, and corruption in the public sector higher than in the private sector. This was indicated by the positive mean differences in the pairs of variables, after deducting the mean scores for private sector risks from the mean score of public sector risks. The difference in the mean score of risks of freeze capital in public and private sector was 0.97, and this was found to be statistically significant at an alpha of 0.05, given a t-statistic of 13.367 and a p-value of 0.000. Similarly, the mean score in delays in payments in the public and private construction sub-sectors was statistically significant at an alpha of 0.05 (t = 13.890; df = 248; p-value = 0.000).

Table 4. Paired differences in financial risks in public and private construction works

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Public-Private								
Freeze in capital	.96787	1.14255	.07241	.82526	1.11048	13.367	249	.000
Delayed payment	.78313	.88966	.05638	.67209	.89418	13.890	249	.000
Bankruptcy	1.08434	1.54663	.09801	.89129	1.27738	11.063	249	.000
Corruption	1.14859	1.78423	.11307	.92589	1.37130	10.158	249	.000
Under-budgeting	1.52209	.88018	.05578	1.41223	1.63195	27.288	249	.000

Table 5. Consequences of construction risks

Consequences	Time risks (n = 250)	Design risk (n = 250)	Change in regulations (n = 250)	Hostility in community (n = 250)	Safety risk (n = 250)
Time overrun	51.1	13.3	26.5	71.1	30.5
Errors	13.3				
Frustration	9.1				
Rework	20.4	13.3			
Cost overrun	6.1	33.7		28.9	
Relational disputes		32.0			16.5
Structural failure		7.8			
Difficulty in permits			73.5		
Human casualty					23.7
Damage to machines					23.7
Increased liability					5.6

The study further analysed the specific effects of risks in the construction industry. The consequences of time schedule risks, design risks, socio-political risks, and safety risk on the construction projects were analysed as shown in table 5. According to the consultants, in most cases, the most effect of time schedule risks amount to delays in projects (51.1%) and rework (20.4%). The main effects of design risks on construction projects, from the consultants' perspective included cost overrun, relational disputes, with responses of (33.7%) and (32.0%) respectively. Further analysis showed that, from the consultants' perspective, cost overrun was also the most critical consequence of safety risks in the construction sector. This was indicated by 43.4 percent of the responses obtained for the effect of safety risks on construction projects. Following this, 30.5 percent of the respondents were of the view that safety risks induced some project delays, and 23.7 percent of the respondents were of the view that safety risk causes damage to machines and human casualty.

Two socio-political risks, covering the change in building regulations, and building in a hostile community, were identified and analysed. The consultants gave their indication of the effects of these risks on the projects which they have worked on. In most cases (73.5%), the consultants noted that changes in building regulations would make the acquisition of building permits difficult. Concerning building in a hostile community, 71.1 percent of the respondents noted that time overrun was the most critical consequence, whereas 28.9 percent indicated that the project would incur higher insurance coverage costs.

5. Conclusions

The widely accepted model is that production is associated with uncertainties, and these uncertainties, also known as risks. The impacts of risks may be positive or negative, hence the relevance of the study to assess consultant's perspective on the effect of risk on construction projects. The study concluded that the most destructive risk to the construction industry was related to finances, socio-political and design risk. Further analysis of financial risks relating to public and private projects shows, delays in payments, under-budgeting, freeze in capital, bankruptcy of stakeholders, and corruption. Again, the major effects of risk were time-schedule risks which amount to delay in project, and rework. Design risks often led to cost overrun, relational disputes. Safety risks resulted in human casualty, time overrun and damage to machine. socio-political risks, resulted in difficulty acquiring building permits, project incur higher insurance coverage costs.

6. Recommendations

- The prompt payment of construction project by stakeholders is the key to reduce financial risks.

- The Ghana Consulting Engineering Association (GCEA) should organize regular training workshops and seminars on the modern safety precautions in all the phases of the construction project to reduce casualties and safety risks.
- Consultants should use the most effective means of reducing construction risks in Ghana's construction industry.

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