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Examining Project Risk Management Challenges in Ghana

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Abstract
The Construction Industry is embedded with risky situations that affect construction projects and therefore requires systematic processing to achieve project objectives and ensure business sustainability. In achieving project and business objectives, Contractors usually experiment many techniques and management practices in addressing construction risk. This study aims to assess the risk management practices of Ghanaian Contractors towards typical construction project risk factors. The risk factors (RF) were identified and their severity on construction projects assessed. The study investigated the relative use of various risk management practices and the popularity of available analysis techniques. The objectives of this research have been achieved through a questionnaire survey, which was used for data collection and the SPSS and relative importance index were employed for analysis. The results of analyzing the 41 questionnaires that were received from contractor respondents concluded that 41 out of the 42 listed risk factors were overwhelmingly identified as risk factors that significantly affect construction projects in Ghana, with the exception being „Lower work quality in presence of time constraints". The most important risk factors that affect construction projects based on the assessed severity are: Inflation, Delayed payments on contract, Difference in actual quantities and the executed quantities, Defective design and Poor safety procedures. The study findings show that contractors mostly refer to previous and ongoing similar projects for accurate program as the most effective used method for risk prevention. Close supervision of subordinates have also been found to be the most used remedial method in addressing risk factors in construction. The results however discovered that Contractors do not utilize risk analysis techniques but resort to the use of comparison of projects for the purposes of analysis. The results of this study recommended that there should be a compensation mechanism in place to mitigate or offset the impact of this risk on the financial wellbeing of the Contractor. The payment regime for executed contracts should be streamlined to offer financial stability to Contractors. The Contractor should be involved with a competent designer in the design process of projects to prevent situations where defective designs are passed to the Contractor. Contracting firms should utilize computerized approaches used for risk analysis and evaluation. Contractors should work on training their personnel to properly apply risk management principles.
Keywords: *Project Management, Project Risk Management, Project Execution, Project Management Practices*

1. INTRODUCTION

The construction sector is a critical part of the economy of most countries. The construction sector forms an important aspect in the socio-economic direction of emerging economies. For instance, in various emerging economies, construction activities are responsible for about Eighty Percent (80%) of gross equity assets, Ten Percent (10%) of Gross Domestic Product and over Fifty Percent (50%) of wealth invested in fixed assets. Probably next to agriculture, the construction industry has been a major source of massive employment opportunities (Jekale 2004; Ofori, 2006). According to the Revised Gross Domestic Product (2014) by Ghana Statistical Service, published in January 2015, of all the industrial activities the Construction subsector recorded the highest growth of 7.4% in 2014, contributing up to 12.3% to the GDP, only second to the crop sector of the Agricultural industry with 15.2%. Although developmentally, the input of the construction industry to the economy of developing nations is significant, and plays key role in terms of development, the industry has over the years experienced low performance and has not been able to achieve the desired results. Considering the vital position of the industry in Ghana and other emerging economies, vis-à-vis the poor performance of the construction sector in these emerging economies, working to achieve the desired growth indicators should be a major agenda. Considering that Construction firms are one of the industry major stakeholders and the makers of the completed physical output, the capacity of Contractors towards improvement in terms of developmental initiative has to be explored (Ofori, 2006).

International donor agencies continue to register their displeasure over the manner in which funds allocated for poverty reduction and development projects are recklessly managed. World Bank's Vice President for Poverty Reduction and Economic Management, Danny Leipziger was reported in the 5th December 2008 edition of the Ghanaian Times as saying "Transparent public institutions and the fight against corruption are key for poverty

reduction and economic growth," he added that "The current financial crisis shows how important transparency, good governance, and effective regulation are in all parts of the world". On his part the UK Minister for International Development, Ivan Lewis also exclaimed that good governance is at the heart of development and poverty reduction and that "DFID is committed to the global effort to build effective states that serve the needs of their citizens and stamp out corruption. The government partnership facility being envisaged by the Donor Agencies will help create the conditions that will enable millions of people in the developing world to step up from poverty".

Ghana's development partners are worried that if funds for poverty reduction projects were not properly managed the necessary safety nets and structures can hardly be established to shelter the vulnerable and keep up the development momentum. Bert Koenders, the Netherlands Minister for Development and Cooperation did not mince words in asserting that" corruption and bad governance obstruct equitable development of poor countries, and that is unacceptable." Norwegian Minister of Environment and International Development, Erik Solheim also lambasted the executives of developing countries when he indicated that"… several hundred billions of US dollars are illicitly transferred from developing countries each year and this undermines the mobilization of domestic resources, reduces funding for development, facilitates criminal activities, weakens accountability and increases inequality. On the local front, the educational sector has a catalog of abandoned government projects. The new Chemistry Department of the University of Ghana, for instance, commenced in 1979 when Dr. Ivan Addae Mensah was only a lecturer at the science faculty. He rose through the ranks to become a full professor and even the vice chancellor of the university before the project was completed in 2002.

The yet to be completed tallest building in Accra near the British Council Library or the Cedi House, funded by Social Security and National Insurance Trust, had its sod cut in 1998 when Jerry Rawlings was in the helm of affairs at the Osu Castle. One is at a complete loss as to when this building project would be handed over for commissioning. Perhaps it might be needless to ascertain the number of upward adjustments to the cost of this project that has been made. Street lighting project commenced decades ago, has not been managed successfully. Traffic lighting systems, even in the capital cities are in deplorable state. Some Traffic lighting systems at intersectional roads in Accra have been permanently out of order for long periods resulting in serious vehicular accidents thereby defeating the rationale behind the installation of these traffic control lights. What exactly might have happened to the project management skills of the officials entrusted with the day to day management of these traffic lights?

Brigham and Ehrhardt (2005) argue that "as businesses and projects become increasingly complex, it is more and more difficult for the CEOs and directors to know what problems might lie in wait. Therefore companies need to have someone systematically looking for potential problems and design safeguards to minimize potential damage". This is where projects and businesses ought to have 'risk managers' who assume risk management responsibilities. According to March and Shapira (1987), Risk management involves identifying the risks faced by the project, measuring the potential effect of each risk and deciding how each relevant risk should be handled. Baird and Howard (1985) further added that risk management attempts to reduce the probability of occurrence of an adverse event, reduce the management of the loss associated and totally avoiding the activity that gives rise to the risk.

The industry, like any other business, has its own risks and challenges arising from the changes inherent in the construction industry. It is also pointed out in (Kartam & Kartam, 2001) that, there exist high levels of risk attached to the sector owing to the nature of the sector‟s business, chain of activities, external influences and firm‟s organizational structure. Regarding risk linkages, Shofoluwe & Bogale (2010) asserted that, construction project entails risks and uncertainties, irrespective of size, but then the relation is such that the risk associated to a project is directly proportional to the size and complexity of a project. Given the project complexity and changing situations of construction projects, the sector is susceptible to risk in which a climate of great risk and uncertainty is created. The precipitating risk factors to the construction industry abound including various technical, socio-political and commercial risks. Historically these risk have proven to be detrimental to the growth of construction sector. This situation has a limiting effect on construction project participants with the results being quality compliance difficulties, overheads and project specific requirements, cost escalation and unforeseen time overrun of the project scheduled completion date (Abu Mousa, 2005). Project management uses skills, tools and techniques to accomplish project objectives aimed at meeting or exceeding the expectation of stakeholders. Risk management is an important part of the process to identify potential project risks and respond to such risks. It takes into consideration processes geared towards maximizing the effect of positive events whiles minimizing the influence of negative events (PMI, 2013).

The ten knowledge areas as listed and described by the Project Management Institute (PMI, 2013) among others also include Risk Management. Additionally, risk management in the area of managing construction projects is to identify a 3 comprehensive and systematic manner, analyze and respond to risks to achieving the project objectives (ICE, 2005; PMI, 2007). It is widely conceived that there is a choice in finding risk in a particular environment and cannot be reduced to mere fate and that the fulfillment of project and company business goals can be affected by the

innate uncertainties in the system. Risks exist in all project tasks, but the amount varies from one activity to another (Ehsan et al, 2010).

1.2 Problem Statement

In construction projects, it is virtually not possible to record a zero risk. Risk is inherent in all construction activities. The inherent nature of risks contributes to the inability in achieving the triple constraint factors of time, budget, and quality objectives (Loosemore, 2006). Construction projects can be very complex and full of uncertainties. The risks and uncertainties can have potentially harmful effects on projects (Mills, 2001; Flanagan et al, 2006). In order to fulfil project objectives with specific attention on quality, environmental sustainability, time, cost and safety, Construction Project Risk management has been identified as a key step to undertake. In a twist of events, most studies conducted in the area of risk management have directed attention on certain aspect of construction project risk management to the neglect of a comprehensive and holistic approach with a focused view aimed at identifying construction risks, their probability of occurrence and the impact on project objectives (Abu Mousa, 2005). The construction sector with its myriad of activities arguably is embedded more with risks and uncertainties compared with other industries. In dealing with risks, some industries have developed suitable risk management techniques to make them more proactive in handling risk associated with projects.

The usage of these risk management techniques is not popular within the construction industry and therefore not generally used. Risk is inherently part of all projects, irrespective of area of operation and magnitude of project. There isn‟t any absolute risk free project and therefore if the risks are not carefully identified, properly analyzed and workable risk management strategies put in place, then the likelihood of the project failure will be high (Mahendra et al., 2013). From the aforementioned insights on risk and its management, it can be pointed out that players within the construction industry are faced with a challenge of an effective risk assessment and management system needed to help in the risk management process. Construction Risk management is presented to aid in identifying project risks, systematically analyze them and use appropriate tools and techniques in managing them. Hence, in order to unravel project complexity and reduce construction risk, there is the need for systematic risk management (Al-Bahar, 1990). From the above foregoing challenges and issues relating to risk in the construction sector and using the Ghanaian Construction sector, this study sought to identify risks in the current construction sector and evaluate the severity through an extensive study of literature and to examine the risk management techniques and practices if any being used by the Contractors.

2.0 LITERATURE REVIEW

By definition, risk is generally uncertainty circumstances or events which can produce a positive or negative impact on a project, if it occurs. Jaffari‟s definition in the year 2001 was however complex, as it considered loss/gain and magnitude. In other words, risk is the exposure to gain or loss, or the probability of its occurrences multiplied by their 17 respective magnitude. Jaffari (2001) further explained that a certain event is 100% if their probabilities of occurrences are achieved and conversely an uncertain event is when the probability of occurrence is zero. There are wide variations in between the two stated extremes opined by Jaffari. A simpler definition by the Project Management Institute (1996), described risk as separate and unconnected occurrences that positively or negatively affects a project. Kartam (2001), asserted that risk may be defined as the probability of occurrence of some unpredictable, uncertain and even undesirable events that may change the profitability on a given investment‟s prospects (Kartam, 2001). Any situation or thing that can cause harm may be defined as hazard and the likelihood that a recipient of harm could be influenced by hazard as the extent of exposure. Exposure is taken to imply notions of frequency and probability while hazard relates to damage, injury, loss of performance and finance. Risk is the triple characteristic of any project decision in the situation of uncertainty. The existence of a number of possibilities that has unknown occurrence is termed as uncertainty (Yoe, 2000).

Yoe (2000) further affirms that not all uncertainties are risks but some risks are uncertain. Risks and uncertainties however share similar characteristics in services, production and exchange. Planning, monitoring, implementation, adjustment, behaviour and explain choices are the fundamental variables that are influenced by risks and uncertainties according to Okema (2001). The nature of the risk and its application are the basis to define risk with a common element of subjectivity. The specification of correctly predicting the exact period during a project in the construction industry where certainty exists or assured is very uncommon (Flanagan and Norman, 1993). Some researchers based their definitions on the outcomes and probability of a project outcome been realised. Risk may exist when a decision is expressed in terms of range of possible outcomes and when known 18 probabilities of the outcomes are attached, while as uncertainty is when there is one possible outcome of a course of action. There are unknown outcome of the probability of each outcome and in some occasions there are no reference to the chance of bad consequences on risk. Thus, good consequences should be relevant in the definition of risk (Education and Learning

Wales, 2001). Some renowned writers like Flanagan and Norman (1993), clearly distinguished between the definitions of risk and uncertainty. For risk to occur, the main dependent is probability which could be expressed quantitatively. Uncertainty, however, might be defined as a situation in which there are no historic data or previous history related to the situation being considered by the decision maker.

Risk is an element subjected to empirical measurement, while uncertainty is of a non-quantifiable type as stated in the findings of a research conducted by ADB (2002). Thus, a situation where there are indication of its likelihood of the realized value of a fallen variable within stated limits is risk related and can be described by the fluctuations around the average of a probability calculus. If the fluctuations of a variable are such that they cannot be described by a probability calculus, the situation is described as uncertainty. Greene (2001) viewed risk as the probability an adverse event that occurs during a stipulated time period, or results from a particular challenge. Greene (2001) also opined that there is the likelihood that statistical theory obeys all the formal laws affecting probabilities. Greene (2001) however asserted that, the main disadvantage about these statistical theories is that they depend mostly on guess work or the approximation of what is to occur. In summary, a systematic way of dealing with hazards can be considered as risk. The assumption that there are uncertainties with predictions of hazard affirms that there are only uncertainties simply because there are only ever a prediction of likely events. For 19 risk to exist there should be hazard, hence their correlation but hazards are entirely subjective and centered around previous experience, specialist training in an area of field of expertise, and cultural values to which the hazard relates (Greene, 2001). According to a research conducted in 2007, the findings proved that the government of Ghana is the biggest client in the industry (Agyakwa-Baah, 2007; Tuuli et al., 2007).

Frequent delays and cost overruns on a lot of projects are some of the challenges of the construction industry despite its contribution to economic development and growth (Frimpong et al., 2003) There are the need for serious measures and the right risk management processes to be put in place to prevent these cost overruns and delays as opined by Ahadzie et al.(2008), who observed that overall project cost and quality should be viewed as the most important criteria of success in the project performance in Ghana. Rapid growth in most construction industries around the world brings about infrastructural development. The growth in the construction industry leads to increases in GDP of a nation and it is very essential to prioritize infrastructural development and make the necessary provisions in most governments‟ budgets to finance such operations (Odeyinka et al., 2007). Most at times new challenges are faced considering the risks involved in the design and production in construction projects. By nature, risk management in construction industry allows for a lot of scope for many environmental and socio-political problems dating from pre contracts, contract up to post-contract stage leading to completion time problem, cost overruns and poor quality work (Okuwoga, 1998).

In as much as project managers try to limit cost overruns, it is inevitable and will definitely affect project especially when it involves large amount of money (Odeyinka et al., 2007). In order to avoid or reduce the losses, management of the risk involved in the 20 construction project is required. The components and materials needed for assembling, designing and producing by different suppliers from diverse disciplines and technological disparities so as to develop a build environment is the construction process. PMI (2008) describes any temporary endeavour with the aim to create unique service or product as a project. The difference between project and an organisation‟s normal operation is that project eventually comes to an end. Projects are temporary in existence and therefore have a fixed lifeline and according to PMI (2008) every project must fulfil its explicit objective with a one-time effort within a specific time. Projects may vary within levels of an organization, while a project may be about one department of an organization, others might cut across all departments within the organization. Usually project might involve several or specific group of personnel in a team or a single person.

It begins by discussing what is risk and risk management, managing risk in projects, principles, and process of risk management and risk assessment. It also takes a critical look at project managers and risk management, technical risk factors and risk monitoring. A risk is an uncertain event or set of events that, should they occur, will have an effect on the achievement of objectives. It consists of a combination of the probability of a perceived threat or opportunity occurring, and the magnitude of its impact on objectives, where: ***Threat*** *is used to describe an uncertain event that could have a negative impact on objectives and* ***Opportunity*** *is used to describe an uncertain event that could have a favorable impact on objectives* In the context of a project, it is the project's objectives that are at risk. These will include completing the project to a number of targets, typically covering time, cost, quality, scope, benefits, and risk.

Risk and Uncertainty: Risk and uncertainty are present in most projects. Risk represents the chance of adverse consequences of loss occurring. Generally, risks can be identified and once identified the probability of the risk occurring needs to be assessed. However, there may also be doubt about the validity of qualitative or quantitative data: this is called uncertainty. We can also use the term uncertainty to mean a state where too little is known about something, and the very lack of knowledge represents a danger that can only be addressed by gathering more

information. Any person preparing a proposal must take risks and uncertainties into account. To do either requires first that areas of uncertainty and risk are identified. At the stage of making proposals, perceived risks must be brought clearly to the attention of those in authority for the decision to be made in the matter – i.e. the problem is 'escalated' to more senior managers. The problem may then be delegated to someone with the express purpose of investigating further. Crock ford (1980) listed the following categories of risks: fire and natural disaster, accident, political and social risk (war, civil disturbance, theft, and vandalism), technical risk, marketing risk, labour risk (stoppages and strikes, turnover of personnel) and liability risks (product liability, safety)

High-Risk Proposals: It is likely that the potential for variation of costs should be considered a risk if novel elements predominate in a project. Proposals involving research, development or immature technologies tend to be of higher risk than projects in more mature areas such as civil engineering. However, Chicken (1994) notes that major civil engineering projects which are novel, such as the Sydney Opera House, the Thames Flood Barrier and the Channel Tunnel, suffer from variation in costs, often by factors of from 10 to 200 times original estimates. Information systems developments are particularly prone to this problem, as the designers must often design today for tomorrow's technology, while their experience gained in yesterday's project becomes rapidly obsolescent.

Three dimensions of risk exist: Size, Technological maturity (the incorporation of novel methods, techniques, materials etc), Structural complexity

The larger a proposed project is the greater the risk. Increase in size usually means an increase in complexity, including the complexity of administration, management, communication among the participants and so on. Technological risks lie in the extent to which the technology and the methods proposed to be used are new and untried, innovative or unfamiliar. Structural complexity refers both to the arrangement of the component parts of the proposed project and to the structure of teams, management, and relationships between groups.

Risk Management: While risk is unavoidable, it is manageable. We can manage the risk in such a way that it is either passed on to others or considerably reduced or reduced. Let us say that we are building a house and are afraid that the iron rods price may rise. If we want to eliminate this risk, we can purchase the bars and hold them in stock. (Though one risk is eliminated, other risks may crop up like the risk of stealing, the risk of obsolescence or risk of damages.) Risk management is the identification, assessment, and prioritization of risks (defined in ISO 31000 as the effect of uncertainty on objectives, whether positive or negative) followed by coordinated and economical application of resources to minimize, monitor, and control the probability and/or impact of unfortunate events or to maximize the realization of opportunities. Risks can come from uncertainty in financial markets, project failures, legal liabilities, credit risk, accidents, natural causes and disasters as well as deliberate attacks from an adversary. Several risk management standards have been developed including the Project Management Institute, the National Institute of Science and Technology, Actuarial Societies, and ISO standards. Methods, definitions, and goals vary widely according to whether the risk management method is in the context of project management, security, engineering, industrial processes, financial portfolios, actuarial assessments, or public health and safety. The strategies to manage risk include transferring the risk to another party, avoiding the risk, reducing the negative effect of the risk, and accepting some or all of the consequences of a particular risk. Certain aspects of many of the risk management standards have come under criticism for having no measurable improvement on risk even though the confidence in estimates and decisions increase. In ideal risk management, a prioritization process is followed whereby the risks with the greatest loss and the greatest probability of occurring are handled first, and risks with lower probability of occurrence and lower loss are handled in descending order. In practice, the process can be very difficult and balancing between risks with a high probability of occurrence but lower loss versus a risk with high loss but lower probability of occurrence can often be mishandled. Intangible risk management identifies a new type of risk that has a 100% probability of occurring but is ignored by the organization due to a lack of identification ability. For example, when deficient knowledge is applied to a situation, a knowledge risk materializes. Relationship risk appears when ineffective collaboration occurs. Process-engagement risk may be an issue when ineffective operational procedures are applied. These risks directly reduce the productivity of knowledge workers, decrease cost effectiveness, profitability, service, quality, reputation, brand value, and earnings quality. Intangible risk management allows management to create immediate value from the identification and reduction of risks that reduce productivity. Risk management also faces difficulties in allocating resources. This is the idea of opportunity cost. Resources spent on risk management could have been spent on more profitable activities. Again, ideal risk management minimizes spending and the negative effects of risks. After analyzing the situation the next is to decide what to do about the risks. This is called risk management: the 'identification of countermeasures necessary to meet the requirements identified in risk analysis' (PRINCE, 1993, p. 5). Risks identified in the risk analysis should be tackled in the following order: High-impact, high-probability risks, High-impact, lower-probability risks, Low-impact, high-probability risk, and Low-impact, low-probability risks. Low-impact, low-probability risks are probably not worth expending much effort on (but see the discussion of risk acceptance below). The manager can then look at these high-impact or high-probability risks one

by one to determine whether there are ways either to reduce the impact if the risk occurs or to reduce the probability of the risk occurring, or both.

Managing Risk in Project: Projects are risky undertakings, and modern approaches to managing projects recognize the central need to manage the risk as an integral part of the project management discipline. Managing Risk in Projects places risk management in its proper context in the world of project management and beyond, and emphasizes the central concepts that are essential in order to understand why and how risk management should be implemented on projects of all types and sizes, in all industries and in all countries. The generic approach detailed by David Hillson is consistent with current international best practice and guidelines (including 'A Guide to the Project Management Body of Knowledge' (PMBoK) and the 'Project Risk Management Practice Standard' from PMI, the 'APM Body of Knowledge' and 'Project Risk Analysis & Management (PRAM) Guide' from APM, 'Management of Risk: Guidance for Practitioners' from OGC, and the forthcoming risk standard from ISO) but David also introduces key developments in the risk management field focus on their relevance to practical application. Throughout, David Hillson's goal is to offer a concise description of current best practice in project risk management whilst introducing the latest relevant developments, to enable project managers, project sponsors and others responsible for managing risk in projects to do just that – effectively. For each risk to be managed, the project manager needs to identify what cost-effective countermeasures can be applied. These may need to be specified in great detail, depending upon the complexity of the countermeasures. Possible countermeasures are: avoiding the risk, reducing the risk (likelihood or impact), transferring the risk to others (insurance), contingency plans (to be implemented should the risk occur) and accepting the risk (just monitor the situation)

Avoiding the risk: Avoiding the risk means removing the risk totally from the work to be done. Avoiding a risk may mean not doing the project if the risk occurs in one of the key elements of the project. It may be possible to redefine the project to exclude the risk area.

Reducing the risk: Reducing the risk means reducing either the likelihood or the impact of the threat (or both). Risk reduction is an important strategy; it can be an expensive one or it can be a very cheap one, but in most cases, it is likely to be cost-effective when compared to the cost of incurring the unreduced risk.

Transferring the risk to others (insurance): Insurance is a means of transferring the financial impact of having a risk occur. Insurance against fire or theft simply provides financial compensation for losses actually incurred. Compensation as the result of an insurance claim may not be adequate to keep a project on track, because the financial compensation may only be enough to compensate the organization for time and resources lost, not for repairing the damage so that the project can continue. Subcontracting the risk to a specialist subcontractor can reduce the risk considerably by combining two risk management strategies: risk reduction and risk transfer. The risk reduction element arises if the subcontractor has specialist skills in this area of work and so is less likely to fail to meet standards. The risk transfer element arises if the subcontractor undertakes to complete the work to the standard required at the time required at a fixed price. If the subcontractor is reliable and backed by sufficient resources to cope with the identified risks (which should, of course, be discussed with the subcontractor) then the risk will be effectively transferred. However, transferring the risk doesn't always help in the long run.

Note that, while a contractor or client may wish to transfer risk to a subcontractor, it is not always clear in such a situation as to who will be held responsible should a risk actually occur and result in problems. The client or contractor needs to give a detailed specification to the subcontractor which includes known risk factors and the parties need to understand clearly who has identified the risks, what those are, who will be responsible for risk management and who (if worst comes to worst) will have to shoulder the financial and legal responsibilities, and this should be backed up by the wording in the contract and other documents. The most that the client can gain from risk transfer is some financial protection in the event that the project fails. Risk transfer does not guarantee that a project will be completed successfully, and the financial protection may not be sufficient to prevent the bankruptcy of the client if the project was key to his or her business. The project manager can't simply dispose of his or her responsibilities by subcontracting and ensuring.

Contingency plans: Contingency planning involves 'identifying the range of alternative options for providing acceptable recovery strategies in the event of a loss' (PRINCE, 1993 p13). Contingency plans can involve the allocation of a fund to cover minor cost-overruns or elaborate plans for alternatives or the restoration of lost resources, work or services. For each alternative option identified, its benefits and disadvantages must also be identified so that the optimum solution can be presented to management for a decision. General contingency strategies are:

- Do nothing (choosing this option should be a positive choice, not a default because no one has taken the time to identify other possibilities)
- Alternative procedures, previously identified and described in detail (for example, a retreat to an earlier stage in the project so that work can recommence), to find alternative ways to proceed from the point at which the hazard occurs

- Reciprocal arrangement with other organizations, the client, contractor or subcontractor to provide specific resources and facilities in the event of a hazard arising.

Depending upon the risk, contingency plans can be quite detailed. If the risk probability is high and the impact could be severe, it may even be wise to distribute copies of the detailed plan to all likely participants and even to hold rehearsals on what to do should the risk actually occur. Rehearsal has the advantage of helping to highlight any problems that may exist in a contingency plan, enabling the project manager to alter the plan accordingly.

Accepting the risk: The final strategy for managing a risk is the possibility of risk acceptance: the project manager decides nothing can or needs to be done at present, but notes that the situation needs a review from time to time during the course of the project. It will be too costly to develop a contingency plan against everything that could go wrong. During the course of the project's execution it will be necessary to review the list of risks and risk factors to determine:

- Whether any risk has become or is likely to become critical at any time soon
- Whether any new risks have arisen which require assessment and possible planning or even immediate action? In any case, each risk and any management and contingency plans should be reviewed on a periodic basis to ensure that, should the worst happen; the project manager will have given some thought about what to do.

2.1 Overview of Ghana`s Economy and the Construction Industry

The construction sector is a critical part of the economy of most countries (Ofori, 2006). For instance, in various emerging economies, construction activities are responsible for about Eighty Percent (80%) of gross equity assets, Ten Percent (10%) of Gross Domestic Product and over Fifty Percent (50%) of wealth invested in fixed assets. Probably next to agriculture, the construction industry has been a major source of massive employment opportunities (Jekale, 2004). According to IMF (2014) Ghana achieved a high growth of 15percent in 2011 though it could not be sustained in the subsequent years. However it is always above the average for the sub-Saharan region. In 2012 and 2013 Ghana`s growth rate was 7.9 percent and 5.4 percent respectively, showing a decline from the 2011 growth rate. Every sector of the economy is responsible for this growth and the construction industry is not an exception. According to the 2014 Revised Gross Domestic Product by Ghana Statistical Service, (2015), of all the industrial activities the Construction subsector recorded the highest growth of 7.4 percent in 2014, contributing up to 12.3 percent to the GDP, only second to the crop sector of the Agricultural industry with 15.2 percent. Considering the 10 vital position of the industry in Ghana and other emerging economies, vis-à-vis the poor performance of the construction sector in these emerging economies, working to achieve the desired growth indicators should be a major agenda. (Ofori, 2006). The construction industry in Ghana thrives through various projects, which has to be managed to give the desire result or minimize risks and maximize benefits.

2.2 Overview of Project and its lifecycle

In defining a project, Larson and Gray (2011) described it as a non-permanent venture carried out to create a specific outcome of product, service, or results and it"s characterized by the following: A set objective, Time constraint, Budget constraint, desired performance criteria, and Engagement of distinct sectors and professionals. Kerzner (2001) on the other hand describes a Project as a chain of activities with a set start and close date that holds a specific objective to be realized within the constraint of time, cost, and resources. A project has a life cycle that defines how it begins and ends. The stages of the project life cycle vary depending on the source of the classifications or groupings. Larson and Gray, (2011) described the stages to include the following: Defining stage, Planning stage, Executing stage and Closing stage. PMI (2004), illustrated five stages of the project life cycle as seen in Figure 2.1. 11 It is worth noting that the monitoring and controlling captured with the PMI (2004) has been fused with the executing stage in the case of Larson and Gay (2011).

Initiation Stage: This stage sets out the initial range of the project taking into consideration the environment and integrates the needed resources using Preliminary Scope Statement. Mainly consist of the key constraints such as cost, tasks and time schedule. Also includes the contract documentation, list of required equipment and required budget for the project. (PMI, 2004).

Planning and design Stage: The aim of this stage is to illustrate the management of the project through the rest of the stages. During this stage, tasks are defined, the sequence of operations set out and the needed resources determined against the various grouped activities. It makes sure that a project meets its target population and can be fulfilled within the identified constraints of the project which may include duration and budgetary limitations (PMI, 2004).

Execution Stage: This is the implementation phase of the project. The activities that have been defined in the Project Management Plan (PMP) are done in pursue of realizing the project objective. This also takes into account

integrating activities and the coordination involved mainly of people and other resources to achieve the desired outcome as outlined in the Project Management Plan (PMI, 2004).

Monitoring and controlling Stage: This stage mainly involve review of the progress in the project execution phase with the sole purpose of identifying execution challenges and to strike actions to rectify problems. This stage takes into account tasks that are still being done, the actual cost in executing the tasks, the duration within which the tasks have been carried out, and the effort invested in these tasks. All these are compared against the budgeted cost, estimated time and the expected output rate as indicated in the Project Management Plan. This stage also takes a closer view of the Project Performance Baseline, assess risks and set up corrective actions (PMI, 2004).

Closing Stage: This stage is the phase at which the completed project is officially handed over to the client with a formal acceptance. Tasks across the project are completed and certified at this stage, and contracts relevant to the project is finalized and closed out (PMI, 2004).

2.3 Construction Projects

A construction project is defined as a physical structure that is initiated by the designers‟ drawings and gets transformed into finished product through a set of methods and processes (Levy, 2000). Executing a construction project is defined as a process of putting up an infrastructure. Extensive planning is key for a project to be executed successfully. Before the construction execution phase begins, the design together with 13 the budgeted cost and timelines will have to be completed and approved. (Clough, 1979). According to Levy, (2000) for construction projects to be successful and achieve the set objective, the following key criteria must be met: Complete Project within the estimated time, Actual cost in executing the project is not more than the budgeted cost of project, The project should be claims/disputes free during and beyond the project lifecycle, Good working rapport between Contractors and other stakeholders and The output of work meets the desired quality. Construction projects have different stakeholders involved in it, but the following are the key players or participants: Clients: They provide the financial resources needed for construction projects. The client‟s expectation is to receive the completed project within the budgeted cost and estimated time (Altoryman, 2014).

Consultants: These professionals are chosen by the client to represent and protect the interest of the client. They are resourced and backed by their professional expertise. They consultant may be a group of Designers, Project Managers or Specialist Engineers. The client seeks and receive advice on various section of the project from the consultants and in doing so, the consultants put in place management practices to take care of risks arising from incorrect advice which may lead to claims and disputes (Altoryman, 2014). Contractors: They are responsible for the execution of the designed work and their product ranges from a building to varying form of construction unit. Contractors work to maximized profit from any project. Examples of contractors are: main contractors, subcontractors, Suppliers, etc. (Altoryman, 2014). 14 Usually, the inability of a Contractor to achieve the project objective of completing it within the budgeted cost and estimated time duration and required specifications may be as a result of ineffective management practices (Flanagan, 1993). The main linkage of claims and disputes is traced to the disruptions and delays in Contractor‟s progress (Braimah and Ndekugri, 2008). Construction projects are grouped into four categories (Gloud, 1997): Residential construction, Construction for businesses, Infrastructure and heavy construction and Industrial construction projects. This study is relating to construction projects. Gloud (1997), related that construction projects are deemed technically sophisticated than others, and client preferences determine the responsibility of the field of construction management. That means that the clients choose whether a consultant firm or a contractor firm is responsible for managing the construction projects.

2.4 Project Management

Project Management (PM) entails the process of planning, organizing and managing available resources in order to complete a project successfully within the defined project objectives. However, Project Management is defines as “the art of directing and coordinating human and resources through the life of a project by using modern management techniques to achieve pre-determined goals of scope, cost, time, and quality and participants satisfaction”. There are a lot of constraints on projects but the triple constraints of time duration, budgeted cost and the pre-determined scope of work affects every project (PMI, 2004). According to Kerzner (2001), the planning stage of project management is made up of scope of work, quantity and quality of work and the required resources for the project. This is followed by the monitoring stage which consists of progress tracking, comparison between the actual and predicted outcome, impact analysis and adjustment making. Achieving the project objective within the designated time and budget is called successful project management. A successful project manager is required to achieve the project objective successfully. A project manager is defined as a person who is responsible to manage a project through coordinating and integrating project activities to achieve the desired objectives (Fewings, 2005). Therefore, the project manager should have excellent communicative and interpersonal skills (Kerzner, 2001). According to Nicholas (2004), the project manager‟s role is central, as it is the communication hub, the decision maker as well as an

entrepreneur. Project management has a lot of benefits as mentioned by Kerzner, (2001), and includes: Identification of tools and techniques for analysis, early identification of problems, Enhance skills for future projects, easily identify whether the objectives would be met or exceeded and Examine time and achievements against schedules and plans.

2.5 Project Management Processes

Owing to the complex nature of projects, various projects may demand resources differently. For effective management of the complex nature of projects, there is the need to break down the project into separate interconnected parts capable of being handled by the manager as Walker, (2000) mentioned. Hillson, (2002) agreed that a system approach is required to handle the separate constituents of a project. There exist 10 project management areas designed to offer a helping hand in handling the separate constituents of a project which are listed below (PMI, 2013): Project integration management, Project scope management, Project time management, Project cost management, Project quality management, Project human resources management, Project communications management, Project risk management and Project procurement management and Project Stakeholders Management. These 10 knowledge areas are critical for the successful completion of projects. However, this study concentrates on risk management and the subsequent sections and sub-sections will elaborate more on it.

3.0 RESEARCH METHODOLOGY

The chapter gives the procedure which was used in collecting data for the study. Information regarding the strategy, design, target population and drawn sample size are also described. A detailed methodology and tools used are described. Two methods were used in achieving the aim and objectives of this study. First of all vital information relating to the thesis topic was gathered through the literature review and the second, was through questionnaires survey by sending structured questionnaires to targeted respondents in order to obtain feedback. Once the data was available, analyses was made and the yielded results discussed, and finally recommendations made.

3.1 Research Strategy

The suitable methodology to address the identified research questions and hypothesis of a study is said to be research strategy (Bouma and Atkinson, 1995). Kothari (2004) suggested that, qualitative and quantitative researches are the recognized forms of research strategy. Kothari (2004) further explained that Quantitative or qualitative strategy is adapted based on the object of the study, the research aim and objectives and the information available. Berg (2001) indicated that Qualitative research emphasize on the ways of understanding social theories by stressing on the linkage between the study area and the researcher in question. Berg (2001) further opined that, qualitative is subjectivity in nature because it seeks the views of people by observation, descriptions and making implied meanings into a concept. 50 Creswell (1994), quantitative data is a numerical investigation into world issues by testing theories or hypothesis to know the viability and the trueness of such theories. Bouma and Atkinson (1995) opined that, it is better to use quantitative data if the study want to achieve objectivity, credible and real features of the world. Quantitative data are expressed with numbers and uses statistical tools for analysis (Burns and Grove, 2001).

3.3 Research design

Research design involves the organization of scientific investigation. The process of designing study entails a plan that will serve as a guide for the collection and analyses of data (Polit & Hungler, 1985). A questionnaire is an instrument for soliciting information for statistical purposes with regard to a given topic. When properly constructed and responsibly administered, questionnaire become a vital instrument by which statements can be made about specific groups or people or entire populations (Berg, 2001). In designing the questionnaire, the objectives of the study were first established. This was done to help in determining what questions to ask and how to ask them. Again, very short and concise questions were fielded as questions that are long and wordy may appear confusing to respondents.

3.4 Research population

Statistically, Population is explained to be units that have the chance to be involved in the survey sample. The units could be people, employee or members of a particular set (Groves et al., 2009). For the purposes of this study, the considered population is the number of identified first class (D1K1) building contractors registered with the Ministry of Water Resources, Works and Housing and have on-going projects within the cities of 51 Accra, Kumasi and Tamale. Sixty (60) of such contractors were identified and considered as the population. The choice of first class building contractors for this study is based on the consideration of their strong organisational nature coupled with their financial and technical capacity in the execution of very large demanding projects.

3.5 Sample Size

Wood and Haber (1998) defined the sampling as the process used in selecting representative units of a population for the study in a research investigation. Scientific knowledge are derived from samples. Sampling procedures helps in solving problems in scientific research works (Wood & Haber, 1998). Burns & Grove (1987), posited that historically a minimum of 30 subjects as a sample size can be used but describes 30 subjects as inadequate as a sample size for most research works (Burns & Grove, 1987).

3.6 Sample method

Sampling serves to provide practical ways of ensuring that data collection and processing aspects of research are done whilst making sure that the sample is a true reflection of the population (Fellows & Liu, 1997). Purposive sampling was emplyed to represent the total sample size, since the study is concerned with Contractors having on-going building projects in Accra, Kumasi and Tamale. A list of contractors was compiled from the identification of on-going projects being executed by D1K1 Contractors and the samples were selected from the stratum of target population of these on-going projects.

4.0 CONCLUSION

This research was conducted with the aim of identifying construction project risk factors and their severity on construction projects. The relative usage of various risk management actions and the employed risk analysis techniques were also looked at. The study was conducted from the perspective of Ghanaian building contractors. 5.2.

4.1 Summary of Findings

The research questions that were posed are as follows:

- What are the risks that affect the Ghanaian Construction Industry?
- To what extent do the identified risk affect the Construction?
- What are the risk management techniques and practices being used to control the identified risks?

Identify risk factors that typically affect construction projects in Ghana

The study objective number one was to identify the relevant risk factors in construction projects. Through the process of literature review, the identification and categorization of the relevant risk factors was done. A list of forty-two relevant risk factors (RF) were grouped within nine categories. Taking out Low quality of work risk factor, the other 41 78 listed risk factors have been identified to significantly affect construction projects in Ghana.

Assess the severity of the identified risks on projects

The study also sought to weigh the effects of the identified risk factors on construction projects by their severity. It emerged that most of the identified risk factors (61.90%) have been identified to be High Risk Factors and significantly affect construction projects. In a relative manner, (38.10%) of the risk factors have also been classified as Medium Risk Factors in respect of severity.

Examine the risk management techniques that are being practiced

The management of the identified risk and its impact is an area of interest to the study. The work took into consideration some Preventive and Remedial methods in risk management and as well Risk Analysis Techniques being used by the Contractors. In preventive measures, reference to other projects (previous and ongoing similar projects) in order to obtain precise program with weighted score of (177) is the most used action in construction projects whiles the results shows that Contractors seldom employ the use of quantitative risk analyses techniques as it is the least scored weight with (102).

Examining risk management using the Remedial methods reveal that close supervision to subordinates is the most frequently use method in managing risk with a weight score of (185). Changing the construction method is not the first choice effective action when addressing risk using the remedial method as it is the least ranked action with weight score of (143)

The assessment of the relative use of Risk Analysis Techniques reveals that contractors usually compare analysis of similar projects through similar conditions with weighted score of (197) and use it as the most effective risk analysis technique in construction risk management. Simulation analysis using simulator computer packages is the least used Risk Analysis Technique with a weighted score of (109).

4.2 Conclusion

The construction industry has unique features that differentiate it from other areas of the economy. It is widely dispersed, responds to economic changes, and involves large number of firms. These and among other distinguishing characteristics makes it risk prone. The study thus concludes as follows:

- Almost all the risk factors reviewed affect construction projects in Ghana,
- Majority of the identified risks have significant effects on construction projects with (61.90%) classified as High Risk Factors,
- The finance category has the highest severity impact on construction projects,
- The Physical category has the lowest severity impact on construction projects.

The top ten (10) ranked risk factors affecting construction projects in Ghana are as follows:

- Inflation
- Delayed payments on contract
- Difference in actual and contract executed quantities
- Defective design (Incorrect)
- Poor safety procedures resulting into Accident Occurrence
- Awarding the design to unqualified designers
- Changes in design
- Change of government
- Inaccurate quantities
- Exchange rate fluctuation

- Contractor's reference to other projects (previous and ongoing similar projects) for accurate program is the most used Preventive method for risk management purposes

- Ensuring close supervision to subordinates in order to minimize abortive work is the most used Remedial method for managing risk

- Contractors comparing analysis of similar projects through similar conditions is the most used Risk Analysis Technique by Ghanaian contractors.

4.3 Recommendation

Inflation and routine fluctuation in exchange rate fluctuation should be needs to be looked at as a significant risk factor by stakeholders and appropriate compensation mechanism be put in place to mitigate or offset the impact of this risk on the financial wellbeing of the Contractor. The payment regime for executed contracts should be streamlined to offer financial stability to Contractors. This can help contractors from collapse of their financial resources by using strict and enhance cash flow system and reduce the option of reliance on financial institutions loans. The Contractor needs to be involved with a competent designer in the design process of projects to prevent situations where defective designs are passed to the Contractor and subsequently have to redo the works because of design changes.

Contractors should look at integration of various expert risk management system with other schedules and systems already being operated such as Microsoft Project and Microsoft Excel. Training of staff towards the risk and its management should be a priority in order to advance the business of the firm. This study is limited to the contractors, but future research on the topic should take into consideration the client and the project consultant perspective. Future research should also look into the allocation of risks on a construction project.

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