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Examining Costs and Project Variable Relationships in Determining Project Success Factors in Ghanaian Construction

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ABSTRACT

In developing countries, 60% of project management professionals appear to lack knowledge that timely completion, budget fidelity, and high quality are critical success factors for completion of construction initiatives. The purpose of this correlational study was to examine the relationship between project budget and the independent variables of safety, environmental impact, and site disputes in the Greater Accra Region of Ghana, using the underpinning of the theories of accident causation, scientific management, and strategic management. One hundred and sixteen project managers, randomly selected from the population of construction professionals in the Greater Accra Region of Ghana, completed the survey entitled the Six Key Performance Indicators developed by Ngacho and Das (2014). The application of multiple linear regression for the analysis of data, indicated a weak positive correlation between the independent variables (safety, environmental impact, and site disputes) and project budget, F(1, 114) = 37.08, p < 1000.001. Site dispute recorded the highest beta ($\beta = .29$) followed by environment ($\beta = .22$), quality ($\beta = .06$), and safety ($\beta = .04$). Attention to key performance indicators associated with dispute and environmental impact could improve project outcomes in the Ghanaian construction sector. The study findings could be useful to improve the quality of projects and may benefit the lives of professionals and community members in the area.

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Introduction

Examining the Relationship Between Budget and Project Success Factors in the Ghanaian Building Construction Sector

Background of the Problem

Mir and Pinnington (2014) observed, that researchers have often attempted to conceptualize what constitutes project success. Many researchers hold the view, that it is important to overcome the limitations of the traditional performance evaluation criteria of time, cost, and quality (Ngacho & Das, 2014) typically used to assess project success in the construction sector. Practitioners and researchers have expressed concern about the isolated study of factors that may influence project management success, such as the environment, site disputes, and customer satisfaction (Ngacho & Das, 2014). There could be value in studying the major factors influencing project success together, rather than in isolation.

Project managers and leaders in construction companies often lack the knowledge in understanding successful project outcomes. The lack of knowledge may affect the ability of construction companies to improve business performance and increase revenues with successful contract bids (Lu & Hao, 2013). The findings of this study could be of value to the quest of project managers and leaders to gain a better understanding of the implications of project success in the building construction companies of Greater Accra, Ghana. We used the research instrument known as the Six Key Performance Indicators developed by Ngacho and Das (2014) to examine project success in the construction sector of Greater Accra Region, Ghana.

In developing countries, 60% of project management professionals appear to lack knowledge (Mousa, 2015) that

Problem Statement

professionals appear to lack knowledge (Mousa, 2015) that the projects completed on time, within budget, and meeting quality requirements represent the critical success factors to ensure successful completion (Drury-Grogan, 2014). In Africa, 87% of all construction projects have experienced time overruns (Ngacho & Das, 2014). The general business problem is that project managers and leaders often do not use one acceptable standard to define project success (Ngacho & Das, 2014). The specific business problem is that some project managers and leaders in Ghanaian construction companies fail to adequately assess the relationship between safety, environmental impact, site disputes, and budget.

Purpose Statement

The purpose of the quantitative correlational study was to examine the relationship between safety, environmental impact, site disputes, and budget. The predictor variables were safety, environmental impacts, and site disputes. The dependent variable was budget. The target population for the study was the 158 building construction companies in the Greater Accra region of Ghana, in Africa. The findings from the study may raise awareness among project managers and leaders in construction companies regarding the appropriate and comprehensive estimation of building project success. The findings of this study may also contribute to the success for all stakeholders by conferring construction companies with financial abilities to offer better affordable and quality homes for Ghanaian residents.

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Nature of the Study

The aim of the quantitative study was to examine the possible relationship between budget (dependent variable) safety, site disputes and environmental impact (predicting

variables) in Ghana. The use of the quantitative methods facilitated the assessment of the relationship between the predicting variables and the dependent variable (Ngacho & Das, 2014). The design for the study was correlational, as the intent, to examine the strength of the relationship between safety, site disputes, and environmental impact (predicting variables) and budget (dependent variable) (see Ngacho & Das, 2014). Regression and correlation are useful for testing a null hypothesis and for examining the relationship between the dependent variable and predictive variables (Nimon & Oswald, 2013). After evaluating various quantitative designs, choosing correlation over regression was the logical choice for the study. With the correlational design, it was the possible to compute the correlational coefficient and measure the strength of the linear association between the dependent variable and the predicting variables (see Puth, Neuhauser, & Ruxton, 2014). Relationships of cause and effect generally require quasi-experimental and experimental designs (Orcher, 2014). The objective in this study, was to determine the relationships between variables, not to evaluate cause and effect; therefore, quasi-experimental and experimental designs were inappropriate for the study.

Significance of the Study

The findings of the study may be of significance to project managers and leaders in construction companies to gain a better understanding of project outcomes and success. The study findings could also increase the knowledge of project managers and leaders on project success criteria in construction companies. The results of the study could enable project managers and leaders to execute projects more efficiently within stipulated budgets and time and per customer specifications. The outcome of the study was to answer the research question: What is the relationship between safety, environmental impact, site disputes, and budget? The findings from the study could potentially reduce the inefficiencies in construction project management and performance in Ghana. The project managers and leaders in the construction companies could gain more knowledge to improve services and win bids to increase revenues from business ventures.

The findings from the study could also serve the aims of project management professionals, to contributing to increased project success. The results of the study could contribute to improving environmentally friendly practices by construction companies in Accra Ghana, including lowering environmental degradation and indiscriminate deforestation and promoting sustainable practices such as the use of reusable and recyclable materials. Other stakeholders could become informed about the fact that using recyclable materials from the environment could lead to an affordable cost of buildings and at the same time prevent natural resources from being depleted. Construction companies may invest surpluses and provide affordable homes to stimulate economic growth through the creation of jobs for the local inhabitants. The knowledge from the study may contribute to bringing about positive social change because the standard of living of the building contractors could improve through successful business bid wins (Lu & Hao, 2013). Residents of Greater Accra, Ghana may become enlightened about environmental degradation and pollution and ensure that

building constructors adopt proper disposable processes of toxic construction waste. Institutions and organizations could also gain from the project knowledge by promoting afforestation and the construction of septic disposable waste systems, which could reduce the contamination of local sources of drinking water.

Research Question

The overarching research question for the study was: What is the relationship between safety, environmental impact, site disputes, and budget?

Hypotheses

Null hypothesis (H_0) : There is no relationship between safety, environmental impact, site disputes, and budget.

Alternative hypothesis (H_a) : There is a relationship between safety, environmental impact, site disputes, and budget.

Theoretical Framework

The combination of appropriate theoretical postulations relevant to the variables under the study served to underpin the study for deeper analysis. Barnes's (1956) theory of the iron triangle, Heinrich's (1931) domino theory of accident causation, Taylor's (1998) theory of scientific management, Drucker's (1954) theory of strategic management, and Edward's (1984) stakeholders' theory were relevant because the propositions in each theory had a bearing on the variables and helped to sharpen the underlying principles of project process in various organizational systems. Heinrich (1931) condensed the accident causation theory into two points, notably that people are the main reasons for accidents, and management has the responsibility, power, and authority to prevent accidents.

Edward (1984) proposed that the stakeholder's theory might help ensure a company's survival and prosperity. The stakeholder's theory includes a focus on environmental protection, management, communication, and cooperation. The stakeholder's theory may be beneficial when applied to balance the needs of internal and external stakeholders. Taylor (1998) proposed the scientific management theory to improve on labor productivity. The four principles of scientific management envisioned by Drucker (1954) include determining and implementing a standardized and systematic way of performing a task. The principles of scientific management include the strategies to select, train, and develop each employee scientifically; to direct and motivate the workforce by instituting rewards and punishment; to divide work between managers and workers and apply the scientific method of planning; and to control systems to perform the task. Drucker introduced the discipline of modern management practices. The principles cover effective time management, strategic decision-making, which can contribute to the growth of the organization, the knowledge and understanding of where and how to mobilize strengths for optimal results, setting the right priorities, and linking management variables with effective decision-making. Barnes (1956), Heinrich (1931), Taylor,

Drucker, and Edward noted that theories and peerreviewed articles when used extensively help to optimize and simplify job performances. Barnes's theory of the iron triangle, Heinrich's domino theory, Taylor's theory of scientific management, Drucker's theory of strategic management, and Edward's stakeholder's theory were valuable sources of reference in this study. The aim of using these theories were to supplement the quantitative data analysis and use the theoretical propositions to understand successful project outcomes considering project manager estimations as applied to building construction companies in Greater Accra, Ghana.

The objective of the study was to gain an understanding of the challenges that project managers in the construction businesses face when executing jobs. e used the quantitative approach with the statistical correlation design supplemented the interpretation of the data analysis with a theoretical lens. The findings from the study could contribute to the existing body of knowledge on the building construction sector and bridge the gap about project manager' estimations of project success in the building construction sector of Accra, Ghana. The findings from the study could also serve to pinpoint other areas in the building construction sector that need further examination.

Discussion on Variables

A brief discussion on the variables examined in this study may be critical for the understanding of the reader, and is the focus in the subsequent paragraphs.

Safety

Sousa, Almeida, and Dais (2015) noted that there has been a growing concern about occupational risk by various bodies in the construction sector. The health rate risk continues to be higher in the construction industry despite the tremendous improvement made in the industry. Swuste, Frijters, and Guldenmund (2012) defined safety as an organizational guarantee that an acceptable level of safety secured for a specific process, or for the duration of the project lifecycle. Safety management in construction companies characterized as an organic structure. The organic structure of the companies could manifest low standardized work performance and a culture of opposition to rules and procedures (Swuste et al., 2012). The human factor receives widespread recognition as the cause of most accidents in the construction sector. The external factors influence management decisions on safety are laws and regulations, costs of accidents, and national safety campaigns (Swuste et al., 2012).

The safety of employees at the worksite, considered critical to the security of the workplace (Yau, 2014), reflects an accepted premise in the construction industry. Employee and employer positive attitude toward safety plays a significant role in the achievement of safety compliance as outlined by the Occupational Safety and Health Administration (OSHA). The cause of an accident in the workplace often attributed to noncompliance represents a challenge;

however, compliance with safety facilitates the undertaking of work efficiently and safely (Faridah & Zin, 2012). Effective communication is an essential consideration for a safe and efficient workplace (Yau, 2014). The training and education can significantly increase safety awareness (Faridah, & Zin, 2012) and change the behavior of employees (Tabassi, Ramli, & Bakar 2012). Insufficient safety training for the employees is the general cause of accidents on the construction sites. Many supervisors and employees do not have the knowledge, education, and skills to recognize potential hazards at the construction site (Yau, 2014).

Occupational stress is noticeable, often affects the health of employees in workplaces, and the situation is acute in the construction industry. Cattell, Lingard, Edwards, and Bowen (2014) recognized occupation stress as primarily attributed to the existence of work and lifestyle imbalance. Errant behavior of construction employees, who disregard the rules of safety is often troublesome; unsafe behavior is the leading cause injuries (Yu, Leung, Chan, 2012). Female employee professionals often experience more stress than professional male counterparts in the work environment (Lingard, Edwards, & Bowen, 2013). Yu et al., (2012) stated that goal setting is a significant factor in the reduction of an unsafe work environment.

Project Disputes

Conflicts in projects are often imminent and can escalate into a dispute if members of a project team refuse to solve personal differences (Pan, Zhang, & Lu, 2015). The transaction costs represent pre-contract and post-contract costs (Li, Arditi, & Wang, 2013). The cost associated with project consists of the money paid in settlements and transaction costs. One damaging effect of a transaction is the lack of future cooperation from both parties involved in the project. In the construction industry, owners wield power (Lu & Hao, 2013) as such during times of dispute, buyers suffer the most lost. The reputation of the seller normally is at stake and requires spending a large sum of money to gain a competitive advantage in the industry (Lu & Hao, 2013). In such circumstances to regain competitiveness, necessitates contract firms to cut down on a bidding price that potentially affects profitability (Pan et al., 2015). The most common disputes in the construction industry are contractor related and include disagreement on the quality of work, cost negotiations in tendering, and delay in exceeding stipulated timelines (Cakmak & Cakmak, 2014).

Environmental Impact

The construction industry generates an enormous amount of construction material waste, and it has raised concerns because on the environment (Zillante, Chiveralls, Zuo, & Udawatta, 2015). The amount of waste also generated affect the productivity and profitability due to extra time and overhead cost required to clean the accumulated waste created. The estimated material waste generated in the construction industry ranges from 21% to 30% and often contributes to cost overruns (Ameh, & Daniel, 2013). Researchers have suggested increasing landfill disposal cost for disposing of construction waste to deter the construction industry from increasing waste (Poon, Yu, Wong, & Yip, 2013). Poon et al. (2013) noted that the increase in landfill disposal of construction waste did not significantly reduce the construction site material waste. Poon et al. (2013) recommended the use of financial incentives to motivate the reduction of construction site waste.

Zillante, Chiveralls, Zuo, and Udawatta (2015) emphasized education and training of employees as another strategy to eliminate waste. Yuan (2013) stated that an effective way of educating and training was to make employees understand how waste can affect productivity and profitability of the business. Yuan (2013) advocated the establishment of recycling market to recycling raw material waste. Zillante et al. (2015) suggested an attitudinal change as one of the possible ways to curtail construction waste. Through attitude change, employees will understand and display wariness about the environment by safeguarding it against the fast rate of depletion of the natural resources on which all depend on (Zillante et al., 2015).

The sustainability of the construction industry is imperative for overall improvement in developing countries. Mousa (2015) indicated that 76% of contractors, consultants, engineers, and developers have some level of knowledge about the durability of building projects. Only 40% of the contractors, engineers, consultants, and developers have claimed to understand the concept of sustainability concerning the impact on cost, the environment, and durability (Mousa, 2015). The acceptance of sustainable construction development had received low patronage (Samari et al., 2013). The lack of sustainable beliefs attributed to poor communication and ignorance have contributed to the environmental impact on cost (Serpell, Kort & Vera., 2013). Other common barriers to the sustainable transformation included factors such as the lack of incentive for new developers, lack of demand, and the high cost of resources (Samari et al., 2013). In Ghana, the lack of awareness by the public and cost constitute the major barriers to sustainable development in the construction industry (Ametepey, Aigbavboa, & Ansah, 2015). The absence of technical knowledge to manufacture sustainable materials required by the industry has been a major setback (Ametepey et al., 2015). Some developers see environmental sustainability as something beyond individual capacity, but rather something for intellectuals to handle as an academic discipline (Ametepey et al., 2015). To stakeholders, justifiably the idea of sustainability is often perceived as an added cost, luxury, and unnecessary, as it increases the cost of investment (Mousa, 2015).

Participants

The selection criteria for the participants in the study included only project managers and leaders in the building construction sector in Greater Accra. The inclusion criteria entailed project managers and leaders with a minimum of 5 years of experience and those who handled multiple building construction projects. The other eligibility criteria included requiring project managers and leaders to hold PMP (project management professional) or any other project management qualifications and/or certifications. The Ghana Real Estate Developers Association (GREDA) database served as the resource for the retrieval of contact numbers, e-mail addresses, and postal addresses of all 158 respondents from the registered list of members. Eligible, qualified, and screened participants recruited through telephone calls and emails were scheduled for an appointment on a date and time of personal convenience, a principle suggested by researchers (James, 2015).

After appointments were scheduled, field data collectors visited the designated meeting place in person with a hard copy of the questionnaire to gather responses through face-toface administration of the survey (see Liu & Wang, 2015). The assistants included graduates from universities in the region who were trained and had graduate level education qualifications to assist in administering the survey. For this study, the traditional approach of a pen-and-paper survey to collect data from the participants was necessary because in Greater Accra Ghana Internet connectivity is not as advanced as it is in the United States. we did not experience any problem getting access to the participants (see Campbell, Cherry, Rverson, & Jones. 2014). In the study, informing the participants about the purpose of data collection and treating such information as confidential was important (see Burgess-Proctor, 2015). Instead of identifying participants with personal names on the survey paper, we used codes and numbers to ensure anonymity. There was no incentive offered to participate in the study other than communicating the possible positive social change and other associated benefits that could result from the study.

Research Method and Design Research Method

The research methodology chosen for this study was quantitative. The rationale for choosing quantitative methodology over qualitative methodology hinged on the need to assess the relationship between the identified predicting variables and the dependent variable (see Nimon & Oswald, 2013). The examination of the relationship between research variables required data collection and analysis using a specific instrument that aligned with the research objectives. The Six KPI instrument developed by Ngacho (2014) was used to measure the relationship between the dependent variable and predicting variables. Unlike qualitative methodology, a quantitative study requires the use of statistical analysis (Caravon, Kianfa, Li, Xie, Alvousef, & Wooldridge, 2015). The Pearson product-moment correlation coefficient was used to analyze the responses from the survey administered to project managers in Accra, Ghana. Because the research involved a relatively large sample, the findings could be generalized to building construction companies in Ghana and to other developing countries with a similar project management environment. The reason for choosing the quantitative method over mixed methods and qualitative research was that it was an efficient way of gathering information from a large sample drawn from the population (see Masue, Swai, & Anasel, 2013). With quantitative methodology, the researcher can apply a statistical test to analyze the data (Carayon et al., 2015).

Research Design

The correlational design was needed for the study. The statistical technique of correlation aided in examining the relationship between budget (dependent variable) and safety, site dispute, and environmental impact (predicting variables) and in measuring the relative strength of association between these variables (see Washburn, 2012).

Regression and correlation were useful for testing the null hypothesis and discerning any association between the dependent variable and predicting variables (see Ngacho & Das, 2014). Careful consideration prompted choosing the analytical technique of correlation over regression. Computing the correlational coefficient was a useful approach in measuring the strength of the linear association between the dependent variable and the predicting variables (see Puth et al., 2014). Examining relationships of cause and effect requires quasi-experimental and experimental designs (Orcher, 2014). Because our objective was examining the associations between variables, not cause and effect, quasiexperimental and experimental designs were inappropriate for this study.

Population and Sampling

The population of the study was property developers from the Ghana Real Estate Developers Association (GREDA). The GREDA is the umbrella body for the housing development companies in the construction industry of Ghana. Opting for simple random sampling helped meet the objectives of the study as this technique ensured the focus of collecting data from the cross-section of appropriate and qualified participants in the building construction in Greater Accra. The GREDA database that contains the study population in Accra included158 project managers. Using the sampling function of Excel helped me to randomly select and administer the survey to participants. Researchers have used the 2013 version of the Microsoft Excel RAND sampling function to randomly select participants in a study (Heist, 2011), and this feature aided in random participant selection drawn from the population of project managers. Administering the survey only to randomly selected participants ensured every member of the population had an equal chance for selection. Simple random sampling of participants from a population ensures that every member stands an equal chance of selection (Acharya, Prakash, Saxena, & Nigam, 2013). A large randomly selected sample also makes study findings generalizable to other populations with similar characteristics (Aune-Lundberg & Strand, 2014).

The factors considered when calculating the sample size for the study were the power of a test, test effect, significance level, tail test, and model (test). Power analysis was critical in calculating the sample size required so that we could reasonably detect the effect of a given size. The power is the probability that the researcher correctly rejects the null hypothesis when the alternative hypothesis is true (Ellingson, 2013). Using the power analysis helped me to calculate the minimum sample size required in a study of construction project management professionals in the Greater Accra Region. The factors that determine power are the sample size, alpha, and magnitude of the effect in the given population. Tabachnick and Fidell (2007) stated that to determine the proper sample size, statistical tests and power are imperative. Statistical power when set at 0.8 or 80% generally means there is a 20% chance of accepting the null hypothesis in error. The conventional medium power used was 0.8, with a medium effect size of 0.3, to measure the magnitude of the correlation between the predicting and dependent variables. The hypotheses were nondirectional, which necessitated the use of the two-tailed test. The level of significance was 0.05 (see Ellingson, 2013). We used the G*Power 3.1 software to determine the minimum sample size. When using the G*Power to calculate the sample size with the Point Biserial model for correlations at a two-tailed level, an effect size of 0.3 (medium), an α of 0.05, and a power of 0.80, the minimum sample size was 82.

A type II error can occur when the researcher fails to reject a false null hypothesis attributed to too small a sample size. Collecting data from 82 participants minimized the probability of committing a type II error. The G*Power calculation indicated the participation requirement of at least 100 project management professionals, and the recruitment of these individuals from the Greater Accra Region denote alignment with the study objectives. With the expected response rate from the participants, the number was more than adequate to meet the minimum sample size and minimized the probability of committing a type II error in the statistical analysis.

Data Collection Instruments

The quantitative instrument known as the Six KPIs' developed by Ngacho and Das (2014) served as the data collection instrument for the study. The estimation of project success originally guided the development of the instrument to collect data and examine the relationship between safety, site disputes, environmental impact, and budget (Ngacho & Das, 2014). The high level of validity in predicting general project success represented adequate justification for choosing the Six KPIs' as the research instrument for the study. The rationale for choosing the Six KPIs' as the research instrument for the study stemmed from its high level of validity in predicting overall project success. The Six KPIs' is a 5-point assessment scale from "strongly disagree"

to "strongly agree" was used to rate the overall project success using Six KPIs'.

The project managers as participants in the study recorded responses to the survey. Survey statements were based on a Likert scale of 1 (strongly disagree) to 5 (strongly agree) for each statement/question in the survey. The score from the overall survey statements from the participants provided the numerical data for analysis in respect of examination of degree and extent, or lack thereof in correlation between the six main factors, identified as Key Performance Indicators by the authors of the research instrument (Ngacho & Das, 2014). The response choice of not applicable, for any non-response indicated missing data, possibly when the participant did not have an answer to a survey statement or question. Addressing the missing data included the approach of using an educated guess as to why the data was missing, and the use of median replacement function in SPSS served to reduce potential biases. The smaller the score for each survey question may suggest the result of the project as less desirable, and a larger score may indicate that the project has a higher beneficial effect on the business and expectedly the same propositions envisioned by the authors of this instrument would similarly hold true in this study (Ngacho & Das, 2014).

Data Collection Technique

The GREDA database served as the resource for the retrieval of contact numbers, e-mail addresses, and postal addresses of all 158 respondents from the registered list of members. The efforts at securing appointments on a date and time of convenience of the researcher and potential study subject respectively, involved recruiting eligible, qualified, and screened participants through telephone calls and e-mails, a strategy favored by researchers (James, 2015). After obtaining an appointment, visits with assistants in person with a hard copy of the questionnaire with and eliciting responses through direct a face-to-face administration of the survey (Liu & Wang, 2015).

Participant access through GREDA facilitated access, however, there was no prior personal association or acquaintance. To administer a paper and pencil survey, the help of assistants was in conformance with a common research practice (Campbell et al., 2014). Selecting educated and trained assistants helped to their services did not in way influence participant responses. The role of the assistants was mainly to assist in the distribution of the survey (Ngacho & Das, 2014). The assistance of external help was necessary in administering the survey due to the large sample size for the study. Conducting the data collection in Accra, Ghana, was not possible to use electronic media because of limited access to the internet. With the limitation, to personally survey all participants, using assistants who were business graduates from accredited universities in Ghana aided in administration.

The aim of the study included collecting a considerable amount of information from a large group of people in a short period in a relatively cost efficient manner. The advantage of quantitative research is in the feasibility of rapid assembly and analysis of by the researcher by using advanced analytical statistical software packages, such as SPSS. Quantitative data analysis is more scientific and objective (Westerman, 2014) compared to other forms of research hence enabling the obtained usefulness in testing new hypotheses or to new theories. The final study sample size of 82 drawn, adequately represented the population of 158 project management professional (Johansen, Halvorsen, Haddadi, & Langlo, 2014). Each of the participants received and completed a survey questionnaire aligned with the objectives of the study, with approval obtained in advance from the developers of the instrument Ngacho and Das (2014).

Data Analysis

Research Question

The central research question for the study was: What is the relationship between safety, environment, site disputes, and budget?

Hypotheses

The hypothesis framed for the study was:

Null Hypothesis (H_0) : There is no relationship between safety. Environmental impact, site disputes, and budget.

Alternative Hypothesis (H₁): There is a relationship between safety. environmental impact, site disputes, and budget.

Regression and correlation are useful statistical techniques for testing the null hypothesis, in discerning the association and strength of the relationship between the dependent variable and predicting variables (Puth et al., 2014). With the invocation of the Pearson correlation (r), the data analysis included the appropriate level of statistical analysis. The r is a measure of the linear correlation (dependence) between two variables X and Y inclusive (Puth et al., 2014). The value of r lies between 0 and 1 and could be negative and positive. When r is zero, then it could indicate that there is no linear association between safety, site disputes, environmental impact, and budget. In correlation, if r equals 1, that indicates a perfect positive linear relationship between the variables. When there is a perfect correlation, all individuals sampled would lie exactly on the same straight line with a positive slope (Haerling & Prion, 2014). The interpretation of the strength of relationship entailed using the values -1.0 to -0.5 or 1.0 to 0.5 (Strong), -0.5 to -0.3 or 0.3 to 0.5 (Moderate), -0.3 to -0.1 or 0.1 to 0.3 (Weak), and -1.0 to 1.0 (perfect correlation). The first assumption usually made in using r as a measure of correlation is that the individuals in the sample are statistically independent of each other. The second assumption typically, is that the population for the sampling has a bivariate normal distribution for the two traits of interest (Puth et al., 2014; Haerling & Prion, 2014).

An overview of the data analysis included the characteristics of the projects and respondents' demographic profile and the related descriptive statistics. The principal component analysis used with varimax rotation helped to identify the underlying factors involved in the study (Hair, Black, & Babin, 2013; Malhotra & Dash, 2011). An explorative factor analysis (EFA) also served to assess the performance of the 35 measurement variables. Before carrying out the EFA, confirmation of the overall significance of the correlation matrix and its' factorability entailed testing with Bartlett's test of sphericity and Kaiser-Meyer- Olkin (KMO) measure of sampling adequacy respectively (Rogers, Dossa, & Bilala, 2014). Addressing any missing data in the study included the approach of using an educated guess as to why the data was missing, and the use of functions in SPSS helped to reduce potential biases. For this study, SPSS Version 20.0 served as the statistical tool to analyze the data.

In the study, the null and the alternate hypotheses were: Ho: p = 0 – There is no correlation

Ha: $p \neq 0$ – There is correlation

The study reflected a two-tailed test because the hypothesis was non-directional. The population of the study was 158 project management professionals from the GREDA from which randomly selected participants constituted the sample as explained under the topic, population and sampling. The aid of G*Power 3.0.10 software helped to determine the minimum required sample size. The factors considered when calculating the sample size in the study were the power of a test, test effect, significance level, tail test, and model (test) (Bong & Jeehyoung, 2013). The power is the probability that the test correctly rejects the null hypothesis when the alternative hypothesis is true (Ellingson, 2013). Using the power analysis helped to calculate the minimum sample size required in a study of construction project management professional in the Greater Accra Region. Conventionally, statistical power (P) set at 0.8 or 80%, meant. that there was a 20% chance of accepting the null hypothesis in error (Tabachnick & Fidell, 2007; Ellingson, 2013). For the analysis, using a medium effect size of 0.3, in measuring the magnitude of the correlation between the predicting and the dependent variables. In the study, the level of significance, was set equal to 0.05. When using the G*Power to calculate the sample size with the Point Biserial model for correlations at a two-tailed level, an effect size of 0.3 (medium), and α =0.05, with a power of 0.80, the total calculated minimum sample size was 82. A Type II error could occur when running statistical analysis where the tests could provide results failing to reject a false null hypothesis attributed to a very small a sample size. By collecting the 82 responses from participants, and achieving the computed sample size or more, we minimized the probability of committing a Type II error.

The *r* is a measure of the linear correlation (dependence) between two variables X and Y inclusive (Puth et al., 2014). The value of r lies between 0 and 1, and it could be negative and positive. If r is zero, then this indicates that there is no linear association between safety, site disputes, environmental impact, and budget. The consequence of Type I and Type II error is often misinterpretation (Zhao, Sarkar, & He, 2015) of the study findings could inhibit project managers and leaders' ability to understand the relationship between project success and time. The minimum required sample size of 82 computed using G*Power 3.0.10 software expectedly considerably reduced the probability of committing Type II error in the statistical analysis, as opined by researchers (Tabachnick & Fidell, 2007; Djulbegovice, Hozod, & Ioannidisa, 2013).

Study Validity

The data collection for this descriptive quantitative research included using a random sampling of project managers and leaders from the real estate development from the Greater Accra, Ghana who had at least five years of active participation in project management. The instrument used by Ngacho and Das (2014) in the Kenyan's construction sector demonstrated construct validity of the questionnaire served as the data collection instrument in the study. Ngacho and Das studied the construction industry and sought the expert opinions of participants on the 35 variables of the Six KPIs' of safety, site dispute, environmental impact, and budget. Ngacho and Das administered the same survey to professionals with expertise that matched the sample for the study. The aim of Ngacho and Das was to examine project success in the building construction sector. A test conducted in the Kenyan construction industry on user-friendliness and feasibleness of the questionnaire by the experts suggested some changes to accommodate the educational level of the participants. Participants in the study are in the building

construction industry in Ghana, and included project managers from the real estate development sector having similar expertise in project management as seen in the Kenyan construction industry.

Ngacho and Das (2014) used a correlation matrix to assess the convergent and discriminant validity of the items on the instrument in the study conducted in assessing project managers in Kenya. The inter-item correlation of the scale in this research instrument, referred to as the Six KPIs', had a mean of 0.100, while the smallest inter-item correlation within each performance measure was as follow: time performance factor: 0.100, cost performance factor: 0.280, site disputes factor: 0.573, environmental impact factor: 0.438, quality performance factor: 0.875 and safety performance factor: 0.338. Correlation coefficient and pvalues were as follows: $\rho > 0.15$ denotes p-value < 0.05 or significant at 5% level, $\rho > 0.20$ denotes p-value < 0.01; or significant at 1% level. The correlations were significantly greater than zero (p < 0.000), providing evidence for convergent validity. For discriminant validity to exist, the correlates of each factor in the correlation matrix require counting by the researcher to determine the number of times each Six KPIs' had higher correlations with elements of other factors than elements of its factor in the correlation matrix. The count, when tallied, should be less than one-half of the possible comparisons of each Six KPI with elements of other factors than elements of its factors in the correlation matrix (Djulbegovice et al., 2013).

The examination of the study result revealed that there were 88 violations of discriminant validity out of 378 possible comparisons, hence, indicating the presence of discriminant validity (Ngacho & Das, 2014). The result indicates that the Six KPIs' instrument measures what it purports to measure (Trochim & Donnelly, 2008). So, choosing the Six KPIs' instrument developed by Ngacho and Das (2014) was an appropriate means to collection data on safety, site dispute, environmental impact, and budget.

Presentation of the Findings

The aim of the study was to examine the responses of participants to survey questions, which fell under the overarching research question of this study: What is the relationship between safety, environmental impact, site disputes, and budget? The hypotheses below helped to guide the statistical analyses:

H₀:There is no relationship between safety, environmental impact, site disputes, and project budget.

H_a:There is a relationship between safety, environmental impact, site disputes, and project budget.

To test the hypotheses, we conducted correlation analyses and simple linear regression models to examine the associations between safety, environmental impact, site disputes, and project budget. A final multiple regression model was used to determine whether a combination of safety, environmental impact, and site disputes had a significant impact on project budget. Tests included normality and linearity assumptions as well as multicollinearity assessments for the multiple regression models. Before presenting the results of the analyses, we provide descriptive statistics of the demographics and study variables.

Demographic Information

The summary of demographic data of study participants and include details such as PMP certification, gender, age, highest education level, industry, and years with the company among the 116 study participants. Most participants, both men and women, were not PMP certified (84.5%, n = 98); 14.7% (n = 17) were PMP certified. The distribution implies most project leaders in the construction industry in Ghana do not have project management certification or qualifications.

Most project participants were male, which implies that the construction industry in Ghana is predominantly male. The male participants constituted 90.5% (n = 105) with 19.2% (n = 10) being female.

The largest age group was 31 to 40 and constituted 61.2% (n = 71) of the sample. The age group 21 to 30 constituted 19.8% (n = 23), and the participants over 51 years of age (n = 4) constituted the smallest age group.

For highest level of education in construction engineering, 24.1% (n = 28) had an associate's *or* technical degree. Many of the participants, 62.9% (n = 73), had a bachelor's degree, 11.2% (n = 13) had a master's degree, and 0.9% (n = 1) had some other degree. The education level distribution implies participants with bachelor's degrees dominate the construction industry in Ghana.

When observing industry, almost all participants were in the construction industry (98.3%, n = 114), with 0.9% (n = 1) both in finance/banking and other.

Finally, for tenure in the construction industry, 34.5% (n = 40) stated less than 5 years, 62.6% (n = 61) stated 5-10 years, 5.2% (n = 6) stated 11-16 years, 2.6% (n = 3) stated 16-20 years, and 4.3% (n = 5) stated more than 20 years. On average, most employees had been with the company for more the 5 years.

Presentation of Findings

The measurement of each study variable entailed taking an average of specified survey responses. Participants completed survey responses to Likert-scale statements scored on a scale from 1 (strongly disagree) to 5 (strongly agree). The smaller score for each study variable indicated the result of the project as less desirable, and the larger score indicated that the project had a higher beneficial effect on the business. The dependent variable of project budget factors was encapsulated in Survey Questions 1 through 6, and yielded scores that ranged from 1.67 to 4.67 with an average of 3.10 (SD = 0.66). For the independent variables of environmental impact, safety, and site dispute, the factors related to site dispute were included in Survey Questions 7 to 11 and 13, and scores ranged from 1.67 to 4.67 with an average of 3.34 (SD = 0.53). Safety factors were included in Survey Questions 17, 18, 19, 23, and 24 and scores ranged from 1.60 to 4.80 with an average of 3.09 (SD = 0.71). The factors related to environmental impact were encapsulated in Survey Questions 12, 14, 15, 16, 20, 21, and 22, and scores ranged from 1.00 to 4.71 with an average of 2.76 (SD = 0.57). Overall, the average scores environmental impact was the lowest. Table 1 is a summary of the dependent and independent variables used for analysis.

Table	1.Summary of	Depena	lent and	Inde	ependen	t Varic	ıbles.

20					
Variable	N	Mean	SD	Min	Max
Dependent variable					
Project	116	3.10	0.66	1.67	4.67
budget					
Independent variables					
Site disputes	116	3.34	0.53	1.67	4.67
Safety	116	3.09	0.71	1.60	4.80
Environment	116	2.76	0.57	1.00	4.71

Cronbach's alpha was the measure used to assess the reliability of the scores that made up the dependent and

independent variables in this study. The alpha value for project budget was 0.63, 0.33 for site dispute, 0.67 for safety, and 0.63 for environment. Low alpha values implied that there may have been issues with reliability for each study variable.

Before running the correlation and regression analyses to answer the main research question, we conducted a test for normality to determine whether the dependent and independent variables were normally distributed. Assessing normality necessitated taking into consideration Shapiro-Wilk tests, along with observations of skewness and kurtosis. Although some of the Shapiro-Wilk p values were indicative of nonnormal distributions (p < 0.05), all the skewness and kurtosis values were within the acceptable range for normality (-3 to 3). This indicated satisfaction of the normality assumption for the study variables.

Table 2. Normality Checks for Study Variables.						
Variable	Shapiro-Wilk pvalue	Skewness	Kurtosis			
Project	0.053	0.09	-0.03			
budget	0.000	0.11	0.70			
Site disputes	0.002	-0.11	0.79			
Safety	0.001	0.53	-0.22			
Environment	< 0.0001	0.67	2.61			
		((77.7.7)				

Table 2. Normality Checks for Study Variables.

The research question asked, "What is the relationship between safety, environmental impact, site disputes, and budget?" To answer this question, we used the Pearson's correlation coefficient to assess the degree and extent of linear association between safety, environmental impact, site disputes, and project budget. Table 1 shows the results: Site dispute (r = 0.29 [weak correlation], p = 0.002), and environment (r = 0.22 [weak correlation], p = 0.017), showed significant correlation with project budget. All correlations were positive, which meant that increases in site dispute and environment scores were associated with an increase in project budget scores. The interpretation from a project management standpoint is that higher costs associated with expenses incurred in respect of the dependent variables elevated total project costs and necessitated an increase in budgetary allocations for completion. Site dispute and environment, however, had weak associations with project budget.

Pearson's Correlation

Testing the significance of the correlations between site dispute, safety, environment, and project budget entailed using bootstrapping procedures. Effects were computed for each of 2,000 bootstrapped samples, and a 95% confidence interval was computed by determining the effects at the 2.5th and 97.5th percentiles. The bootstrapped 95% confidence interval for site dispute ranged from 0.09 to 0.50. The bootstrapped 95% confidence interval for time ranged from 0.35 to 0.64. The bootstrapped 95% confidence interval for safety ranged from -0.19 to 0.27. The bootstrapped 95% confidence interval for environment ranged from 0.01 to 0.43. Finally, the bootstrapped 95% confidence interval for quality ranged from -0.15 to 0.27. The bootstrapped 95% confidence intervals for site dispute, time, and environment did not include zero. Therefore, site dispute, time, and environment were all significantly associated with project budget.

	Correlation	p value	Bootstrap 95% CI
Site dispute	0.29	0.002	0.09 - 0.50
Safety	0.04	0.707	-0.19 - 0.27
Environment	0.22	0.017	0.01 - 0.43

Simple Linear Regression

To further explore the research question, (Table 4) the results of the simple linear regressions (SLR), with site dispute, safety, and environment were used as independent variables, and project budget as the dependent variable. Similarly, the correlation results, SLR results indicated significant association between site dispute and environment with project budget. The estimation of site dispute, and environment revealed a positive correlation ($\beta = 0.29$ (weak correlation) and 0.06 (extremely weak correlation), respectively, all p < 0.05), which implies that a one unit increase in site dispute and environment scores, will lead to an increase in project budget scores. From a project management scenario, this unit increase reflects the truth. which site dispute and environmental degradation and other issues can be financially debilitating to project expenses and management within budgets. For each model, additionally when observing a plot of the residuals by the fitted values, a histogram of the residuals, as well as a normal probability plot of the residuals, seemed evident and apparent, that all models satisfied the assumptions of normality and linearity.

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Variable	B	SE (B)	B	Τ	R^2	Bootstr ap 95%
						ĊI
Site	0.36	0.1	0.2	3.2	0.09	0.10 -
dispute	*	1	9	5		0.62
Safety	0.03	0.0	0.0	0.3	0.00	-0.17 -
-		9	4	8	1	0.23
Environm	0.26	0.1	0.2	2.4	0.05	0.02 -
ent	*	1	2	3		0.50
*p < 0.05.						

 Table 4. Summary of SLR Analysis for Project Budget.

Bootstrapping

As demonstrated with the correlation results, these effects were tested using a bootstrap estimation approach with 2000 samples. The bootstrapped 95% confidence interval for site dispute ranged from 0.10 to 0.62. The bootstrapped 95% confidence interval for safety ranged from -0.17 to 0.23. Finally, the bootstrapped 95% confidence interval for environment ranged from 0.02 to 0.50. The bootstrapped 95% confidence intervals for site dispute, and environment, did not include zero. Site dispute and environment were all therefore significantly associated with project budget.

For the final analysis, Table 5 shows the results of the multiple regression model, with site dispute, safety, and environment as the independent variables, and project budget as the dependent variable. The results denoted that the predictors explained 29% of the variability in project budget ($R^2 = 0.29$, F = 8.89, p < 0.0001). When adjusting for all other factors in the model, environmental impact still significantly predicted project budget ($\beta = 0.22$, p = 0.030).

Standard multiple linear regression, $\alpha = 0.05$ (twotailed), was used to examine the efficacy of site dispute, safety, and environment in predicting project budge. The independent variables were site dispute, safety, and environment. The dependent variable was project budget. The null hypothesis was that site dispute, safety, and environment would not significantly predict project budget. The alternative hypothesis was that site dispute, safety, and environment would significantly predict project budget. The alternative hypothesis was that site dispute, safety, and environment would significantly predict project budget. The model as a whole was able to significantly predict project budget, F(1, 114) = 37.08, p < 0.001, R2 = 0.25. The R2 (0.25) value indicated that approximately 2.5% of the variability in project budget accounted for by the linear combination of the predictor variables (site dispute, safety, and environment). In the model, environment was statistically significant ($\beta = 0.22$, p = 0.030). Site dispute and safety did not provide any significant variation in project budget. These effects were tested using a bootstrap estimation approach with 2000 samples. The results indicated that environment was significant, with bootstrap 95% confidence intervals that did not include zero (0.02 - 0.48 for environment).

Summary of MLR Analysis for Project Budget							
B	SE(B	B	Τ	Sig.	Bootstr		
)			(p)	ap 95%		
					CI		
0.0	0.12	0.6	0.6	0.52	-0.17 -		
7		0	4	3	0.32		
-	0.10	-	-	0.13	-0.34 -		
0.1		0.1	1.5	1	0.05		
5		6	2				
0.2	0.11	0.2	2.2	0.03	0.02 -		
5		2	0	0	0.48		
0.4	0.60		0.8	0.41	-0.78 -		
9			2	6	1.76		
	0.0 7 0.1 5 0.2 5 0.4 9	$\begin{array}{c c} marge of mar$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	B SE(B) B T 0.0 0.12 0.6 0.6 7 0 4 - 0.10 - - 0.1 0.1 1.5 6 2 0.2 0.11 0.2 2.2 2 0.4 0.60 0.8 9 2	B SE(B) B T Sig. 0.0 0.12 0.6 0.6 0.52 7 0 4 3 - 0.10 - - 0.13 0.1 0.1 1.5 1 5 6 2 0 0.2 0.11 0.2 2.2 0.03 5 2 0 0 0.4 0.60 0.8 0.41 9 2 6 0		

From the results of the correlation and regression analyses, the inference drawn, led to the rejection of the null hypothesis for site dispute and environment. A logical conclusion drawn is that there is a relationship between environmental impact site disputes, and project budget. The interpretation is that one unit increase in site dispute and environmental impact, will lead to an increase in the project budget. The implications of these results are that it is incumbent upon project management companies to pay great attention to site dispute. Any involvement in a dispute can increase costs stemming from compensation that often needs paid out, possible protraction in the project schedule due to negotiations, litigation, and other such factors. Paving attention to environmental issues before, during and after the project can also potentially offset delays, recommended and suggested in site disputes, and the inference drawn from this research and analysis. A one-unit increase in site dispute and environmental impact, will lead to a corresponding increase in the project budget, signifying the association and correlation, with the associated implications.

Applications to Professional Practice

The lack of knowledge can have a detrimental effect on the ability of construction companies to improve business performance and increase revenues with successful contract bids (Lu & Hao, 2013). The adverse effect of the lack of knowledge is that constructions companies fail to innovate, but the infrastructure projects also fail to be on a par with the modern standards of construction.

The findings of the study may hold value to project managers and leaders as may advance project leaders understanding of the implication of project success in the building construction companies of Greater Accra, Ghana. The research undertaken for this study involved using the research instrument with Six Key Performance Indicators developed by Ngacho and Das (2014) to examine project success in the construction sector of Greater Accra Region, Ghana. This study entailed the examination of the professional practice of project managers and leaders in the construction industry against a comprehensive system of performance indicators.

The findings from the study would have a contribution to the professional project management practice, as may raise the awareness of project managers and leaders in construction companies regarding the appropriate and comprehensive estimation of success in building projects success. The attention to key performance indicators and factors associated with dispute, environmental impact, and budget, can contribute to improving project outcomes and success. The findings would, in turn have potential effects to the increasing the success for all stakeholders.

Ika, Diallo et al. (2012) supported the five critical success factors (CSF) for project success. The success factors include monitoring, coordination, design, training, and institutional environment. The results of the study can contribute to professional practice in project management, as the knowledge generated can aid in ensuring that professional practitioners and project managers focus on efficient design and implementation of a specific project. In this study, the results indicated, that training for team member and other stakeholders is a crucial contributor to project success and recognized as a CSF for international development projects.

The results of the study can contribute to project management, and the findings, which emerged, may present a clear indication, that project success is inextricably linked to proper training for staff and professionals in the industry. Ika et al. (2012) stressed the importance of documentation, design, training, monitoring, coordination, and institutional environment in projects. Project management competencies can significantly benefit from proper monitoring and documentation, as the repository of knowledge residing in the expertise and acumen of project managers holds the potential of transference from the possessors of information, to others in the project team, and organization, with astute knowledge management strategies.

Implications for Social Change

Projects management and construction projects that are successful have a substantial impact on positive social change because the output of a successful construction project would be beneficial to stakeholders, and society at large. The interests and actions of stakeholders in a construction project at different spatial scales appear affected by locational factors such as local culture, media, political systems, and regulations. To give an example, the construction project must also take into consideration the culture of the society. The results of the study has potential implications for positive social change since the quality of the finished project would also depend on how well the project can accommodate the different cultures of the individuals in the society. In massive construction projects, Chou and Yang (2012) suggested that placing focus solely on the stakeholder management process at early project phases is insufficient to manage stakeholder claims in complex project environments. Fully illustrating that it is critical, that the stakeholder management process at every project stage along the entire life cycle of construction projects undertaken by the government remains a critical undertaking in such projects (Chou & Yang, 2012). The results and findings of this study on project management in Accra, Ghana, will expectedly contribute to positive social change. The study results may have a bearing on the welfare and benefit of construction projects and society, and the results could connote the importance in initial planning and evaluating of the entire life cycle of projects as this would also serve to measure goals, against the overall quality of the finished project.

Stakeholder, individual, and organizations play unique roles in construction projects. The results and findings of the study will likely serve in the dissemination of project management knowledge for stakeholders, individuals, and organizations, on the significant ways they can ensure successful implementation of and execution of project undertaken. Stakeholders provide resources needed by the organization and often have controlled the flow of resources in the process. The role and value of stakeholders after all influence the survival of the organization (Trigunarsyah et al., 2014). Project managers and owners should adopt improved decision-making strategies by creating a plan that will effectively involve stakeholders from the start of the project to the completion phase. Improved decision-making factors mean that the project's managers must be able to properly decide on the different choices such as the site of the construction project and the way of peacefully and efficiently settling disputes, whenever there may be. The early identification and effective involvement of different stakeholders and members in projects are paramount during the project life cycle (Trigunarsyah et al., 2014).

The overall success in the life cycle of projects can beneficially result, with positive social implications with the designation of actionable prioritization and the step-by-step details of the project, with appropriate milestones. Early identification and involvement of stakeholders in the initial phases of the project is the key to success (PMI, 2013).

Positive and beneficial social implications may accrue from the findings of this study, because of the proven importance of the initial phases of the project, to be as important as the execution and finishing steps of a certain construction project. There is clear imperative and need for management to involve stakeholder in every stage of the project management plan. The number of stakeholders in a project introduces some level of complexities especially when the number is large (Bal et al., 2013). The study findings can confer and contribute to positive social implications because knowing the real factors that influence the success of the projects can also contribute to what the project managers must prioritize to achieve a certain goal.

Recommendations for Action

Based on the results and findings of the study, the recommendation is that future actions shall include an overall focus on the different factors that matter. The site of the construction project must be free from proprietary disputes, as much as possible, to avoid legal and other adjudication and settlements and payouts. The recommendation is that since site disputes affect the time of completion, where possible, it often warrants settlement of disputes before the commencement of construction. The imperative in the planning of project completion timelines underscores the importance of realistic goals, compatible with the overall goals of the specific project. Paying emphasis to the safety of the project and construction details represents a significant and necessary resolve, as a lack of safety may detrimentally affect the overall results of the study. The consideration for the protection of environment may also spell consistently progressive results, as the negative consequences of disregarding environmental and ethical norms can pose time, legal, and other challenges, which elongate project timelines and detract from project success. Environmental concerns may raise legitimate issues on whether the construction project may push through with meeting regulatory permissions, codes, and other licenses, as opposed to projects lead to delays.

Recommendations for Further Research

The discoveries of the study may lead to the identification and reduction in the inefficiencies in project

management and performance. To increase knowledge on project management, further research may lead to the path of improvement in practices and strategy, specific to the construction industry, and the following are the recommendations for further research:

1.Conduct a qualitative study, which will facilitate future researcher led studies to focus on gaining insight into the experiences and perceptions of the participants as to the impacts and effects of the different factors variables examined in this study;

2.Undertake a study across various jurisdictions would possibly allow the generalizability of the results of the study and would have a wider scope regarding actual data;

3.Undertake a study based on data collected from stakeholders would garner a recommendation as part of further research because the evaluation of the data from external factors might help the current scenario in project management;

4.Focus on certain types of structures vis-à-vis, other types of structures, may also be beneficial since the system of project management might be different from one infrastructure to another.

Summary and Study Conclusions

The principle purpose of the quantitative correlation study was to examine the relationship between safety, environmental impact, and site disputes, with project budget. The results of the statistical analyses of the data collected led to the conclusion that environmental impact, and site dispute were all significantly associated with project budget. Specifically, environmental impact, and site dispute scores increase, so did scores for project budget. In conclusion, the relationships with environmental impact and site dispute present clear opportunities of focus for future construction project management in Ghana.

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