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Performance Evaluation of Private Contractors in the Eastern Region of Ghana

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Abstract This study investigated contractor performance in the Akwapim South Municipal Assembly (ASMA) and the New Juaben Municipal Assembly (NJMA), two major districts of the Eastern Region of Ghana. To address the major influencers of contractor performance, the author conducted questionnaire surveys of and structured interviews with construction company chief executives, business proprietors, contractors and stakeholders. The results showed that various factors adversely influenced contractor performance including communication bottlenecks, credit inaccessibility, dearth of skilled artisans, inadequate project management, lack of subcontractor commitment and red tape.

Keywords Contractor performance, Credit, Artisans, Project management, New Juaben, Akwapim, Eastern Region, Ghana

1. Introduction

This paper examined the main factors of influencing construction contractor performance in the Eastern Region of Ghana. The core themes of the research results reported here were the extensively revised, abridged and updated version of the author's bachelor's degree thesis of 2012. [1]

Many factors influence construction contractor performance in all of Ghana. Among the persistent influencers often reported in the construction literature are: Acts of God, contractor inexperience, customer vacillations, fraudulent practices, frequent change-orders, improper time management, inaccurate estimates, inadequate planning and preparation, ineffective contractor-stakeholder relationship, injured workers, irregular scheduling, labor scarcity, missing materials, nonexistent benchmarks, nonpayment of workers' wages, old equipment and technology, poor inter-discipline coordination, price fluctuations, procurement inefficiencies, project complexity and politicization, regulatory inadequacies, resource uncertainties, risk mismanagement, rudimentary inspection protocols, sporadic or incomplete communication, untimely disbursement of funds, un-functional contractor logistical support, waste and wrong materials. These influencers are exacerbated by negligible use of non-cloud-based or cloud-based construction project management software and the non-existence of light and heavy construction equipment sales and rentals with competent operators in most major towns and cities across the country.

To address the major influencers related to private contractors, this study conducted questionnaire surveys of and structured interviews with construction company chief executives, business proprietors, contractors and stakeholders in the Akwapim South Municipal Assembly (ASMA) and New Juaben Municipal Assembly (NJMA), two major districts in the Eastern Region. The results showed that various factors adversely influenced contractor performance including communication bottlenecks, credit inaccessibility, dearth of skilled artisans, inadequate project management, lack of subcontractor commitment and red tape.

2. Definition of Performance, and Construction

The Oxford English Dictionary (OED) *Online*, December 2014 Update defines "performance" as "Something performed or done; an action, act, deed, or operation" or "The quality of execution of such an action, operation, or process; the competence or effectiveness of a person or thing in performing an action; spec. the capabilities, productivity, or success of a machine, product, or person when measured against a standard". [2] The OED also defines "construction" as "the action of framing, devising, or forming, by the putting together of parts; erection, building". [3] The former definition was applied to this study because in construction projects, the quality of an action or operation executed successfully was as important as the achievement of labor productivity targets and the meeting of national or international benchmarks. The latter definition was applied to cover all types of construction including additions,

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air-conditioning, alterations, bore-hole drilling, bridges, buildings, culverts, electrical work, electric-power, distribution lines, gas and petroleum pipelines, interior finishing, hydro and irrigation dams, lifts, malls, plumbing, railways, rehabilitations, remodeling, renovations, roadways, roofing, septic tanks, sewers, sidewalks, signal towers, storage tanks, water-supply and the erection of telephone lines.

3. The Construction Industry in Ghana

The construction industry plays a major role in Ghana's economy and the industry is growing fast in all ten administrative regions: Ashanti, Brong Ahafo, Central, Greater Accra, Northern, Upper East, Upper West, Volta, Western and Eastern (Map 1). [4] Some of the key companies that have been contributing a lot to the country's construction industry include: Devtraco Ltd., CP (Construction Pioneers) and OCEL Ghana. Strengthened by the publication of the national policy on Public Private Partnership (PPP) in 2011, [5] new oil production, rising economic prosperity, the country became a hotbed for all kinds of infrastructural development including the construction of a new 3-tier $85.93 million Kwame Nkrumah Circle highway interchange in the capital city, Accra by the Brazilian company Queiroz Galvao [6] and the $31.6 million Adomi Bridge rehabilitation project in the Easter Region by the Austrian company, Bilfinger MCE. [7]

Segmentation of the construction ecosystem shows that the industry is dominated by foreign-owned companies (Figure 1).

The above graphic shows only a sample of the construction companies in Ghana that have strong Internet presence. The ecosystem analysis revealed that several construction companies in the country were offering various services including: air conditioning, carpentry and joinery, civil, design, development, drilling, electrical, electronics, gas, geotechnical, hydraulic, mechanical, precision and structural engineering, plastering and screeding, plumbing, project management, property development, quantity surveying, roofing, sand blasting, metal sheeting, steel fabricating, stone quarrying, procuring, utilities, welding and well-boring.

To calculate the construction industry's value-add to the economy, it was hypothesized that if the value-add was "x" in 2008, and the industry grew at 10% each year, then in "n" years the industry's value-add to the economy would be "y"; formulated as $y = x(1+0.1)^n$. Or if the value-add for 2008 was $2,500 then the value-add for 2014 was given by: $y = 2500(1+0.1)^n$, where n = 2014 - 2008 = 6. Therefore, the value-add for 2014 was: $\$2,500(1+0.1)^6 = \$4428.90$.

The computation shows that the construction industry value-added 8.8% every year to the GDP during the past seven years. [8] Value added is defined by the Word Bank as "the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources". Two years prior, the construction industry and other economic activities instigated the World Bank's reclassification of Ghana from a low to a low-middle class country. [9]

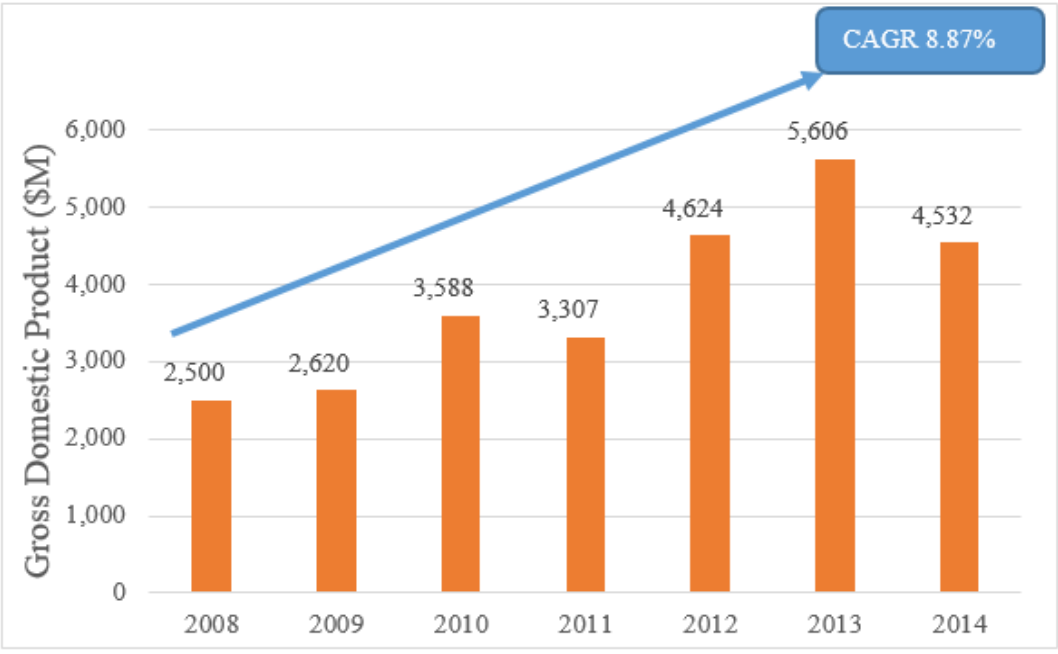

Chart 1. Construction Industry Value-Add to the Ghanaian Economy. Source: Ghana Statistical Service, 2014

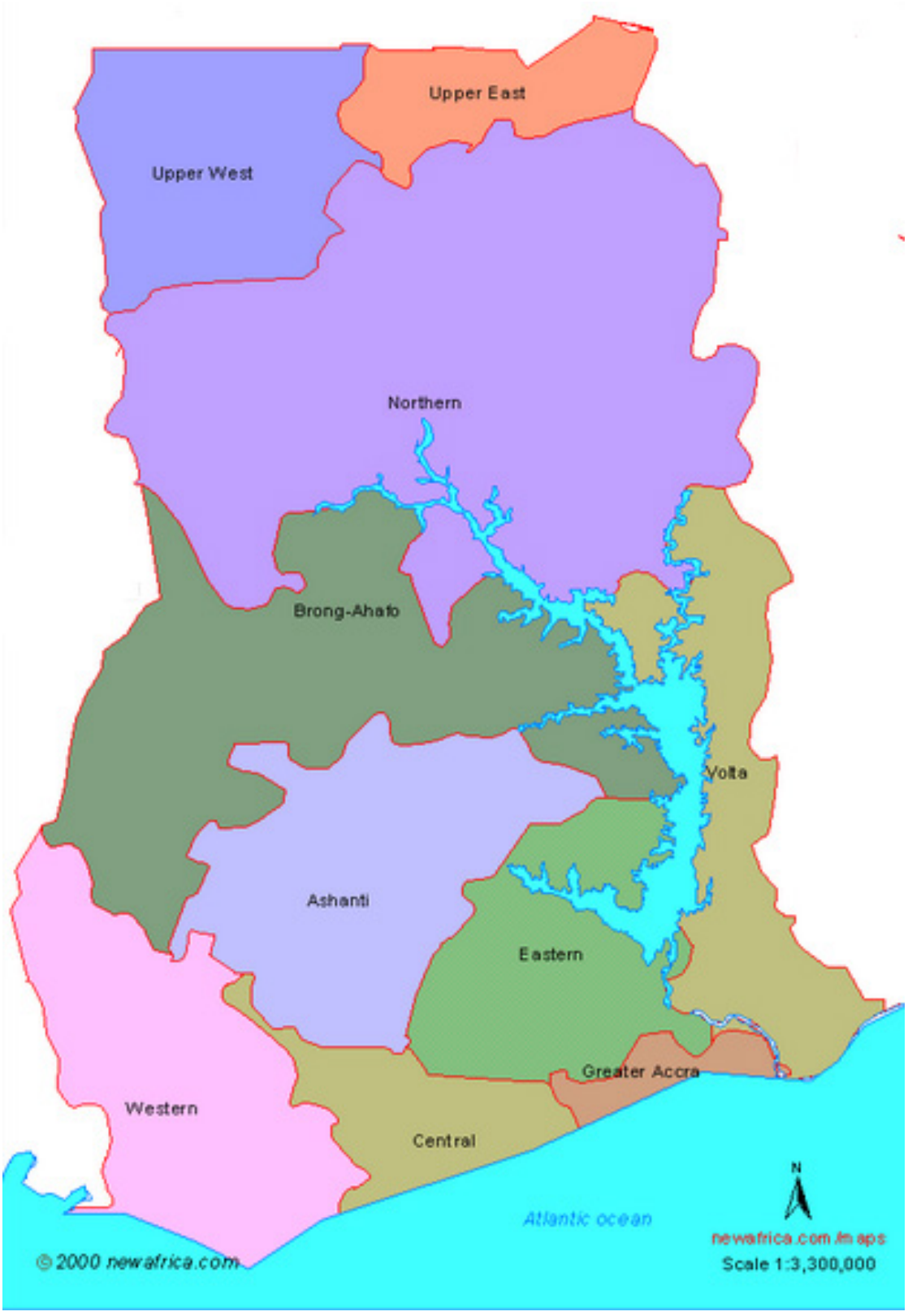

Figure 1. Regional Map of Ghana

Figure 2. Ghana Construction Industry Ecosystem

4. Background of Eastern Region

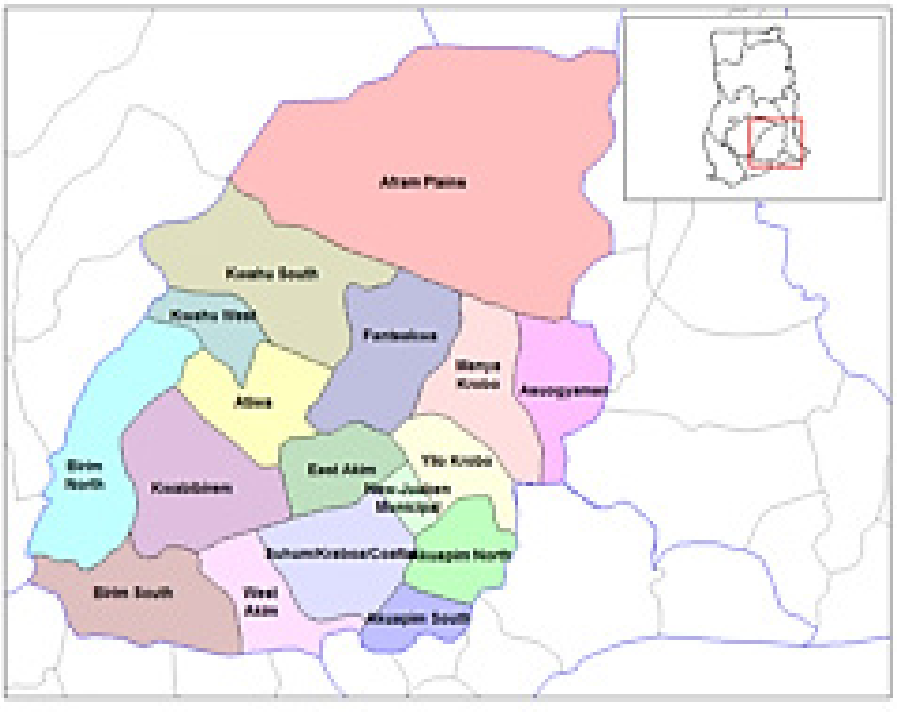

Figure 3. Map of the Eastern Region

Table 1. Eastern Region: Business Focus of Construction Companies

Company	Business	Company	Business
A. Naggeston Ent.	Water reserviour	Kwadjei Const. Wks	Institutional Buildings
A.S.K. Ent.	Residential Buildings	Kwality Const. & Invest. Ltd.	Commercial Buildings
Adjeenest Ventures	Commercial Buildings	Love Afriyie Ltd	Educational Buildings
Anoco Ltd	Residential Building	M.D. Ampomah Ent.	Drainage Systems
Bomaf Ventures	Culverts	Malkna Ltd.	Water Reservoirs
Dadco Contract Works	Feeder Roads	Malteo Ltd.	General Building Works
Danmawus Ent.	Drainage Structures	Manyeyo Ent.	Drainage Structures
Daragy Co. Ltd	Commercial Buildings	Martk Dzata Const.	Industrial Buildings
Defacto Ltd.	Educational Structures	Nana Yamoah Ltd	Commercial Buildings
Dzienyo Const	Industrial Buildings	Noskway Ent. Ltd.	Residential Buildings
Emelia Pobee Ent.	Residential Buildings	S&M Ventures	Feeder Roads
Etakosta Ent.	Educational Building	Samquats	Commercial Buildings
Forbiri	Residential Buildings	Soadjei Const.	Educational Buildings
Gh. Concrete Ltd	Concrete Products	Stevicent Ent.	Residential Buildings
Gyaase Complex Ltd	Pothole Repair	T.K. Amoh Const.	General Civil Works
Harscom Ltd.	Commercial Buildings	Toddisco Const. Works	Residential Buildings
Hodor Co. Ltd.	Feeder Roads	Tsik Co. Ltd.	Drainage Systems
J.F.B. Const.	Educational Buildings	Uncle Kingful	Medical Buildings
Jiaguu Ent. Ltd.	Commercial Buildings	Uwaco Ltd	Commercial Buildings
Josams Co. Ltd.	Electrical Works	Vicnack Co. Ltd	Concrete Products
K. Abronoma Ent.	Culverts	Victagoe Ltd.	Residential Buildings
Kasmo Co. Ltd.	Road Railings	Vitakings Ltd.	Medical Buildings
Kwa Asiamah Ent.	Residential Buildings	Yeboah Okyere Const. Ltd.	Plumbing Works

The Eastern Region was selected for this study for convenience. Covering an area of 19,323 km² with a population of nearly three million and located in the southern part of the country, the region is bordered to the north by Brong Ahafo Region, north west by Ashanti Region, south by Central and Greater Accra Regions and east by Lake Volta. The Eastern Region is divided into 26 administrative districts. It is characterized by the major watersheds of the Kwahu Scarp and the Atiwa-Atwaredu ranges as well as by many long-range forest highlands, making the region one of country's food baskets. Mining and quarrying from these ranges for construction projects also abound. The region is home to the Akosombo and Kpong Dams (completed in 1966 and 1982 respectively), two of the country's biggest electrical power infrastructure construction projects. Some of the recent and on-going construction projects in the area shown in the map below include: the $3 million Suhum to Asamankese road by Mudu Construction Ltd., and the $8 million Asamankese to Adeiso road by General Construction Ltd. (Figure 3). [10]

There were many construction activities in the Eastern Region. Though it was not possible to locate any relevant numbers, field observation revealed that the volume of construction activities in the Region was large (Table 1).

The above table shows the business focus of some of the major construction companies operating in the Region. Many of these companies are preoccupied with the following construction activities: commercial buildings, concrete products, culverts, drainage structures, educational buildings, electrical works, feeder roads, general building works, general civil works, industrial buildings, institutional buildings, medical buildings, plumbing works, pothole repairs, residential buildings, road railings and water reservoirs.

5. Literature Review

Several studies have examined the subject of contractor performance in Ghana. This paper attempts to extend the discourse by systematically analyzing the construction ecosystem in two major districts of the Eastern Region and by highlighting the main influencers of contractor performance in the Region.

Fugar, D.K., and Agyakwah-Baah, A.B. (2010) investigated building construction project delays in Ghana by surveying 54 construction consultants, 39 contractors and 37 clients. [11] Ranking the relative importance of the potential reasons for construction delays, they found that the

major causes were untimely payment, credit inaccessibility and price fluctuations.

One year later, Amoah, P., Ahadzie, D.K. and Dansoh, A. (2011) examined the factors that influenced the operational excellence of small-scale building contractors (SSBC) in Ghana. [12] Using a purposive sampling technique, they surveyed 300 SSBC contractors. [13] After analyzing the responses to 184 questions with 28 variables, they concluded that poor contractor performance was due to low capitalization and "managerial inadequacies".

In another study published by one of the triumvirate of the authors cited above, Ahadzie, D.K. (2011) discussed the performance of the contractors who worked on the Kumasi Metropolitan Authority's projects in Ghana. [14] He evaluated many factors and concluded that "poor project documentation, excessive bureaucratic conditions, and over-reliance on casual labor" adversely influenced the performance of the contractors. Bekoe, R., Quartey, E.F., Dumolga, A. (2013) assessed the technical capability and human resource capacity of local contractors in the Eastern Region of Ghana to execute government contracts. [15] Using a non-probability sample; they selected and surveyed 57 contractors. After analyzing the questionnaire results with Statistical Package for Social Science (SPSS 17) and Microsoft Excel, they found that "most local contractors performed unsatisfactorily due to the use of inferior material even though they were monitored regularly". Fifty three percent of the respondents reported that local contractors did not possess the "technical competences, skills and expertise to undertake projects of quality standards".

A year later, Tengan C., et al. (2014) discussed the workmanship of small scale contractors (SSC) in Ghana; [16] a study that extended the work of Amoah, P., Ahadzie, D.K. and Dansoh, A. (2011). [17] Specifically, Tengan C., et al. identified twenty-one critical factors in the construction literature that were reported to have adversely influenced the quality performance of the country's SCCs. Using relative importance indexes proposed by Soofi (1992) as a supplement to multiple regression analysis, they ranked the factors in order of importance. [18] They found that "fraudulent practices and kickbacks, lack of coordination between designers and contractors, and poor monitoring and feedback" ranked as the first three groups of factors that most adversely influenced the quality of completed projects. They also found that work quality suffered because of contractor inexperience and inadequate leadership.

In same year, Offei–Nyako, K., et al. (2014) investigated the availability of artisanal skills such as carpentry, masonry, painting, plumbing, steel crafting and tile installation in the construction industry in the city of Kumasi in the Ashanti Region of Ghana, using a combination of questionnaire survey and interviews to gather information. [19] Like Tengan, et al (2014) cited above, [20] the authors also used Soofi's relative important indexes technique to analyze the artisanal skills gaps in the industry. The authors found that skilled labor shortage was one of the most persistent problems that adversely influenced contractor performance. They concluded that contractor performance suffered because of many factors including "Irregular and low remuneration, low motivation, the lack of interest by the youth to take up trades like masonship and carpentry as professions, varying working conditions and [lack of] technological advancements".

Ofosu, S.A., Boateng, P. and Asah-Kissiedu, M. (2014) evaluated health and safety practices in the construction industry in the New Juaben Municipality of the Eastern Region of Ghana. [21] After systematically observing construction workers on 30 project sites for several hours, they noticed that the performance of many artisans were adversely influenced by the fact that most of them did not wear protective gear such as goggles, gloves, helmets, high visibility vests, and safety-toed boots with slip and puncture resistant soles. Focus group discussions and interviews with both contractors and government officials revealed that there was no systematic monitoring and reporting of health and safety performance in the construction industry; suggesting that the problem was widespread.

6. Methodology

This study used both secondary and primary techniques for data collection. For example, company, country, regional and district information was collected by thorough desk review of published government reports and public company annual reports, while private company information was extracted from records in the Registrar General's Department and the Ghana Revenue Authority. The same method was used to gather theoretical ideas from the current construction literature, while in-depth interviews, construction-site observations and survey questionnaires were used to collect primary information from a purposive sample of the construction population in the Eastern Region. Purposive or judgmental, selective or subjective sample is a type of non-probability sample. Purposive sampling was used as an informant-selection tool because the author was looking for experienced informants in a relatively small sample population. As purposive sampling is "especially exemplified through the key informant technique", using this technique method made it possible to identify the people who were willing to answer questionnaires and/or available for interviews because of their extensive experience or knowledge of the construction business in the Eastern Region. After developing the research problem statement and itemizing the needed information, the author proceeded to select a sample that represented a cross-section of the population while bearing in mind that purposive sampling is an inherently biased method.

The interviews were semi-structured. This meant that the questions changed appropriately depending on the interviewee. During the conversation, interviewees were prompted to talk enthusiastically about their construction experiences and business models as the author deep-dived into new topics suggested by the interviewees, while simultaneously audio or video-recording on an

Android-powered mobile phone with prior permission.

Table 2. Geographical Spread of Respondents

Respondents	District	Number of Questionnaires
Civil Engineer	ASMA	4
Civil Engineer	NJMA	6
Builder	ASMA	7
Builder	NJMA	13
Architect	ASMA	4
Architect	NJMA	6
Quantity surveyor	ASMA	2
Quantity surveyor	NJMA	4
Estate surveyor	ASMA	1
Estate surveyor	NJMA	3
Total		50

Source: Research Questionnaire, 2014

The questions comprised of four sections. Section A consisted of five opened-ended questions about the respondent's background. Section B consisted of one open-ended question about performance parameters being measured, while Section C consisted of one closed-ended question about construction performance influencers that allowed the respondent to rank the influencers in order of importance. Section D consisted of another single close-ended question about the influence of poor construction performance. Prior to distributing the original questions, they were pretested on three contractors in the target population. After making the corrections suggested by the validators and obtaining the author's thesis supervisor's approval, the questions were hand delivered to a purposive sample of 50 companies in the ASMA and the NJMA districts (Table 2). The updated questions did not require the thesis supervisor's approval but they were validated by another group of three contractors.

The questionnaire response rate was high. Forty-six completed questionnaires were collected from the 50 that were distributed, yielding a response rate of 96%. Of these, two or 8% contained no information and were not included in the analysis of the results. Ten respondents from both ASMA and NJMA districts were civil engineers; the rest were: builders (20), architects (10), estate surveyors (4) and quantity surveyors (6). This narrative highlights some of the major findings tabulated below.

7. Research Findings and Discussion

This section discusses the survey results of the various groups of 87 factors listed in the questionnaire. These factors were further divided into ten groups under the following headings: (1) Project-character related; (2) Client-related; (3) Subcontractor-related; (4) Project management-related; (5) Consultant-related; (6) Resource-related; (7) Contract-related; (8) External-environmental related; (9) Procurement-related; and (10) Contractor-related factors. For each group of factors, the respondents were asked to rank the key pain points influencing contractor performance in the Eastern Region as "very high contributing", "medium contributing", "low contributing", and "very low contributing".

The respondents were asked to rank the influence of factors subsumed under the general heading of project-nature related factors on contractor performance (Table 3).

Table 3. Project-Character Related Factors

Performance Factors	Civil Engineer		Architect		Builder		Quantity Surveyor		Estate Surveyor	
	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank
Project-Characteristics Related Factors										
Project Size	72	2	66	2	62.35	4	64	3	60	5
Number Of Floors/Vertical Height	64	5	60	4	63.53	3	68	2	55	6
Site Conditions	54	8	62	3	70.59	1	60	4	65	4
Project Complexity	62	6	68	1	64.71	2	72	1	75	2
Project Design Constructability	56	7	56	6	55.29	7	48	7	70	3
Project Type/Nature	66	4	54	7	54.12	8	52	6	50	7
Project Location	68	3	52	8	58.82	6	36	8	40	8
Project Duration	78	1	58	5	61.18	5	56	5	85	1

The above results show that both civil engineers (78%) and estate surveyors (85%) put project duration in the first place, while architects (58%) ranked it the fifth place. This factor was more important to civil engineers because project delays led to materials cost escalation, revenue loss and profit margin reduction; a finding that validates the results of Bekoe et al (2013) who reported that local contractors lost revenue if they did not complete projects scheduled for six month within one to two years. [22] As for the other factors, builders (70.59%), ranked site condition in the first place, while architects (62%) ranked it in the third place apparently because of the lack of financial resources to hire heavy machinery for difficult site preparation adversely influenced construction performance. Both quantity surveyors (72%) and architects (68%) ranked project complexity in the first place while both builders (64.71%) and estate surveyors (75%) ranked it in the second place.

The respondents were asked to rank the influence of factors subsumed under the general heading of client-related factors on contractor performance (Table 4).

The below results show that estate surveyors (75%) ranked clients' emphasis on quick construction completion instead of quality in the first place, while quantity surveyors (64%), builders (63.53%), and civil engineers (76%) all ranked it in the second place. This factor was important to these respondents because rushed jobs directly influenced contractor performance and typically resulted in inconsistent workmanship. Builders (67.06%) ranked delays in paying contractors in the first place, while civil engineers (74%), quantity surveyors (72%), and estate surveyors (65%) all ranked it in the third place; this finding coincides with Karim and Marosskezy's (1999) conclusion that payment delays adversely influenced contractor performance. [23]

The respondents were asked to rank the influence of factors subsumed under the general heading of sub-contractor-related factors on contractor performance (Table 5).

The below results show that civil engineers (78%), quantity surveyors (88%) and estate surveyors (80%) all ranked sub-contractors commitment to meet cost, time and quality targets in the first place, while architects (68%) ranked it in the second place. This factor was important to these respondents because meeting construction cost, time and quality targets was the hallmark of an accomplished contractor. Both architects (72%) and builders (76.47%) ranked sub-contractors experience in the first place, while quantity surveyors (76%) and estate surveyors (75%) ranked it in the second place; Bekoe, et al. (2013) found that inexperienced contractors were unable to produce good quality work. [24]

The respondents were asked to rank the influence of factors subsumed under the general heading of project-management-related factors on contractor performance (Table 6).

Table 4. Client-Related Factors

Performance Factors	Civil Engineer		Architect		Builder		Quantity Surveyor		Estate Surveyor	
	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank
Client-Related Factors										
Emphasis On Quick Construction Instead of Quality	76	2	62	3	63.53	2	64	2	75	1
Emphasis On Low Construction Cost	84	1	70	1	61.18	4	48	4	70	2
Ability To Brief Project Objective	62	8	58	4	60	5	52	5	55	5
Contractor Progress Payment Delay	74	3	56	7	67.06	1	72	3	65	3
Financial Preparedness	66	6	58	4	57.65	6	84	1	60	4
Construction Interference	50	10	52	9	56.47	7	60	6	45	8
Approval Delay	70	5	54	8	55.29	8	40	10	50	7
Erractic Changes	64	7	64	2	47.06	10	56	7	40	9
Decision-Making Ability	72	4	58	4	62.35	3	76	2	35	10
Organizatiton Size	60	9	50	10	54.32	9	62	5	55	5

Table 5. Subcontractor-Related Factors

Performance Factors	Civil Engineer		Architect		Builder		Quantity Surveyor		Estate Surveyor	
	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank
Subcontractor-Related Factors										
Subcontractor Commitment	78	1	68	2	57.65	7	88	1	80	1
Artisan Literacy	52	7	64	3	68.24	2	52	8	60	5
Laborforce Skill Training	62	4	62	6	62.35	5	56	7	65	4
Subcontractors Experience	64	3	72	1	76.47	1	76	2	75	2
Subcontractors Interaction	60	5	62	7	63.53	4	60	6	55	6
Timely Payment Of Subcontractors	68	2	64	3	58.82	6	64	5	50	7
Constractors Control Of Subcontractors	50	8	64	3	64.71	3	72	3	70	3
Workers Lingua Franca	54	6	58	8	56.47	8	68	4	30	8

Table 6. Project Management-Related Factors

Performance Factors	Civil Engineer		Architect		Builder		Quantity Surveyor		Estate Surveyor	
	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank
Project Management-Related Factors										
Project Participants Collaboration	70	4	62	4	67.06	3	52	8	60	5
Project Manager's Technical Skills	86	1	74	1	78.82	1	84	1	85	1
Project Manager's Organizing Expertise	74	3	68	2	68.24	2	76	3	75	2
Dispute Resolution	60	8	56	8	57.65	9	40	10	65	4
Information Dissemination	68	5	60	6	61.18	7	56	7	45	8
Design And Construction Integration	66	6	54	10	62.35	6	48	9	50	7
Project Manager's Project Commitment	62	7	62	4	63.53	5	64	6	55	6
Quality Assurance	56	10	66	3	60	8	68	5	70	3
Budget Monitoring	58	9	58	7	50.59	10	80	2	40	9
Change Management	76	2	56	8	64.71	4	72	4	30	10

The above results show that civil engineers (86%), architects (74%), builders (78.82%), quantity surveyors (84%) and estate surveyors (85%) all ranked the project manager's technical skills in the first place. This finding coincides with the results of Enshassi, et al. (2009) who found that the project manager's technical skill influenced construction quality. [25] Technical skill was defined to encompass leadership expertise as in the study of Cheung, et al. (2004) who reported that indecisive leadership adversely influenced contractor performance. [26] As for the project manager's organizational skills, architects (68%), builders (68.24%), state surveyors (75%), all ranked it in the second place, while quantity surveyors (76%) ranked it the third place. This factor was important factor for these respondents

because a project manager's organizational skills ensured smooth project execution to meet construction milestones. As for budget monitoring, quantity surveyors (80%) ranked it in the second place, while architects (58%) ranked it in the seventh place.

The respondents were asked to rank the influence of factors subsumed under the general heading of consultant-related factors on contractor performance (Table 7).

The below results show that both civil engineers (82%) and estate surveyors (85%) ranked consultants' commitment quality execution of construction work in the first place, while builders (61.18%) ranked it in the seventh place. This factor was important factor for civil engineers because of their typical concern with structural integrity; Iyer and Jha (2005) reported a similar finding. [27] Builders (72.94%) ranked design variations in the first place, architects (66%) rank it in the second place and civil engineers (70%) ranked it in the fourth place. This factor was important for builders because it influenced construction performance in terms of time, cost and quality. Architects (78%) ranked managerial oversight in the first place, while quantity surveyors (76%) ranked it in the fourth place. This factor was important factor these respondents because incompetent managerial action invariable led to project failure. Iyer and Jha (2005) found that the velocity and quality management decision positively influenced project quality. [28]

The respondents were asked to rank the influence of the factors subsumed under the general heading of resource-related factors on contractor performance (Table 8).

The below results show that civil engineers (82%) and quantity surveyors (80%) ranked the availability of credit facilities in the first place, while builders (68.24%) ranked it in the third place. Just as Bekoe, et al. (2005) reported, most local contractors lacked access to credit facilities to pre-finance construction projects and they were often unable to execute projects on schedule. [29] Architects (74%), builders (72.94%) and estate surveyors (85%) all ranked supply of materials in the first place, while civil engineers (60%) ranked it in the seventh place. This factor was important factor for these respondents because construction projects depended entirely on materials input. Irregular supply of materials adversely influenced construction quality; Enshassi et al (2009) reported similar findings. Both architects (66%) and builders (69.41%) ranked artisan skills in the second place, while quantity surveyors (64%) ranked them in the fifth place. [30] One of the persistent issues in the country's construction industry was the dearth of trained and experienced artisans.

The respondents were asked to rank the influence of the factors subsumed under the general heading of contract-related factors on construction performance (Table 9).

Table 7. Consultant-Related Factors

Performance Factors	Civil Engineer		Architect		Builder		Quantity Surveyor		Estate Surveyor	
	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank
Consultant-Related Factors										
Specifications And Drawings Adequacy	72	3	62	5	63.53	5	72	5	70	4
Design Variations	70	4	66	2	72.94	1	68	6	60	6
Mid-Construction Changes	54	10	58	7	54.12	11	56	9	55	8
Design Team Experience	60	8	64	3	64.71	4	60	8	80	2
Specifications And Design Adequacy	62	7	52	11	65.88	3	64	7	75	3
Consultants Commitment	82	1	54	10	61.18	7	48	11	85	1
Mangerial Oversight	74	2	78	1	58.82	9	76	4	65	5
Control Mechanisms	58	9	56	9	62.35	6	84	2	50	9
Contract Modifications	46	11	64	3	60	8	52	10	30	11
Communications	64	6	62	5	57.65	10	88	1	45	10
Brainstorming And Feedback	66	5	56	8	67.06	2	80	3	60	6

Table 8. Resource-Related Factors

Performance Factors	Civil Engineer		Architect		Builder		Quantity Surveyor		Estate Surveyor	
	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank
Resources-Related Factors										
Artisans Experience	58	8	60	5	65.88	4	56	7	65	4
Artisans Skills	62	6	66	2	69.41	2	64	5	55	6
Materials Quality Control	64	5	52	7	63.53	5	72	3	75	2
Materials Supply	60	7	74	1	72.94	1	52	8	85	1
Working Capital	76	2	58	6	57.65	8	60	6	70	3
Equipment Suitability	66	4	64	3	60	7	76	2	60	5
Credit Availability	82	1	62	4	68.24	3	80	1	50	7
Artisan Incentives	72	3	50	8	62.35	6	68	4	40	8

Table 9. Contract-Related Factors

Performance Factors	Civil Engineer		Architect		Builder		Quantity Surveyor		Estate Surveyor	
	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank
Contract-Related Factors										
Managerial Oversight	60	5	72	1	74.12	1	64	4	80	1
Control Mechanisms	82	1	56	3	68.24	2	84	1	65	3
Contract Modifications	78	2	54	4	65.88	3	68	3	45	5
Communications	76	3	58	2	63.53	4	76	2	75	2
Brainstroming And Feedback	70	4	44	5	58.82	5	56	5	60	4

The above results show that architects (72%), builders (74.12%) and estate surveyors (80%) all ranked managerial oversight in the first place, while civil engineers (60%) ranked it in the fifth place. This factor was important for these respondents because bad managerial oversight adversely influenced contractor performance; Laryea (2010) found that insufficient managerial oversight was a problem in the country's construction industry. [31] Civil engineers (82%) and quantity surveyors (84%) ranked project control mechanisms in the first place, while architects (56%) and estate surveyors (65%) ranked it in the third place. This factor was important to civil engineers and architects because inadequate control measures typically resulted in inconsistent contractor performance. Civil engineers (78%) ranked contract modification in the second place, while both quantity surveyors (68%), builders (65.88%) ranked it in the third place.

The respondents were asked to rank the influence of the factors subsumed under the general heading of external environmental factors on contractor performance (Table 10).

The below results show that civil engineers (76%), architects (84%), builders (76.47%), quantity surveyors (88%), and estate surveyors (80%) all ranked red tape or government bureaucracy in the first place. This was not surprising because it is universally acknowledged that too many forms and procedures were required to obtain construction permits from the Ghana government. Both civil engineers (72%) and estate surveyors (75%) ranked political condition or climate in the second place, while both builders (71.76%) and quantity surveyors (76%) ranked it in the third place. This factor was important to these respondents because contracts were typically awarded on the basis of political affiliation in Ghana. Architects (74%), ranked professional ethics in the second place, while both civil engineers (66%) and builders (68.24%) ranked it in the fifth place.

The respondents were asked to rank the influence of the factors subsumed under the general heading of procurement-related factors on contractor performance (Table 11).

The below results show that civil engineers (74%), architects (74%), and quantity surveyors (80%) all ranked procurement methods in the first place, while estate surveyors (80%) ranked it in the second place and builders (67.06%) ranked it in the third place. This factor was important to these respondents because request for quotations and single-source procurement methods were typically considered to be non-competitive as invitation to submit offers was not advertised but sent to political affiliates thereby putting non-affiliates out of contention; Dreger (1966) found that non-competitive procurement methods adversely influenced contractor performance. [32] Builders (80%) ranked contract integrity in the first place, while quantity surveyors (72%) ranked it in the second place. This factor was important to builders because challenging contract conditions or integrity made it difficult for the contractor to perform satisfactorily. Estate surveyors (85%) ranked tendering method in the first place, while builders (74.12%), architects (68%) and civil engineers (64%) all ranked it in the second place. This factor was important to these respondents because local contractors found it hard to obtain work through competitive tendering for reasons noted above.

The respondents were asked to rank the influence of the factors subsumed under the general heading of contractor-related factors on construction performance (Table 12).

The below results show that estate surveyors (85%) ranked site managers' abilities in the first place, while both civil engineers (74%) and architects (68%) ranked it in the second place. This factor was important for these respondents because while a good site manager ensured that a construction project was executed without cost overruns, bad site management led to high costs and long delays that adversely influenced contractor performance. This finding coincides with the results of Fugar and Agyakwah-Baah, (2010) who reported that poor site management caused construction delays in Ghana. [33] Civil engineers (78%) ranked contractor's experience in the first place, while both builders (71.76%) and quantity surveyors (80%) ranked it in the second place apparently because there was a shortage of experienced contractors in the country. Bekoe, et al. (2013) reported that 53% of respondents in their study said many local contractors lacked experience and the requisite technical expertise to execute high quality construction projects. [34] Architects (76%) ranked construction method in the first place, while civil engineers (72%) ranked it in the third place. Many local contractors were unable to handle construction projects requiring heavy equipment and the application of electronics and wireless technology.

Table 10. External-Environmental Factors

Performance Factors	Civil Engineer		Architect		Builder		Quantity Surveyor		Estate Surveyor	
	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank
External Environmental Factors										
Red Tape	76	1	84	1	76.47	1	88	1	80	1
Physical Conditions	58	9	60	8	67.06	6	64	7	65	4
Technology	62	7	62	7	61.18	11	56	9	45	9
Economic Climate	64	6	58	9	62.35	10	52	10	40	10
Government Policy	68	4	68	5	65.88	7	80	2	70	3
Community Issues	56	10	66	6	64.71	8	68	5	55	7
Weather Conditions	60	8	72	3	74.12	2	72	4	60	6
Political Climate	72	2	54	10	71.76	3	76	3	75	2
Ethics	66	5	74	2	68.24	5	60	8	50	8
Social Climate	54	11	48	11	63.53	9	40	13	35	11
Cultural Climate	52	12	44	12	58.82	12	44	11	30	12
Industrial Relations	70	3	70	4	69.41	4	68	5	65	4
Civil Unrest	44	13	42	13	47.06	13	44	11	30	12

Table 11. Procurement-Related Factors

Performance Factors	Civil Engineer		Architect		Builder		Quantity Surveyor		Estate Surveyor	
	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank
Procurement-Related Factors										
Contract Integrity	63	3	62	3	80	1	72	2	50	3
Procurment Method	74	1	74	1	67.06	3	80	1	80	2
Tendering Method	64	2	68	2	74.12	2	68	3	85	1

Table 12. Contractor-Related Factors

Performance Factors	Civil Engineer		Architect		Builder		Quantity Surveyor		Estate Surveyor	
	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank	% Weighting	Rank
Contractor-Related Factors										
Site Manager's Abilities	74	2	68	2	62.35	9	64	6	85	1
Contractors Experience	78	1	62	4	71.76	2	80	2	75	3
Size of Labor Force	64	5	50	10	68.24	4	56	8	70	4
Construction Method	72	3	76	1	63.53	8	72	4	65	5
Leadership Style	56	8	58	6	61.18	10	44	11	55	7
Equipment Operators Expertise	54	9	56	7	54.12	11	52	9	45	9
Site Planning	66	4	48	11	70.59	3	76	3	60	6
Workforce Literacy	48	11	60	5	64.71	7	60	7	50	8
Site Housekeeping	52	10	64	3	65.88	6	68	5	80	2
Contractor Cash Flow	62	6	52	9	78.82	1	84	1	40	10
Workers Lingua Franca	58	7	54	8	67.06	5	48	10	35	11

8. Conclusions

The results of this study showed that many factors influenced contractor performance in the ASMA and NJMA districts in the Eastern Region of Ghana. The major influencers reported by the survey respondents included inadequate project management, lack of subcontractor commitment and red tape. Communication bottlenecks, dearth of skilled artisans and irregular supply of materials imperiled many projects. Raising the required finances for a project in a timely manner was a tough challenge for many contractors. Few had access to either cloud-based or non-cloud-based construction management software to model the scenarios of construction projects. Similarly, few were able to rent heavy construction equipment for complex projects like 3-tier highway infrastructure development, partially explaining why foreign construction companies are executing these and similar projects in the Region and other in other parts of the country. In addition, inexperienced contractors were unable to handle technically challenging contracts and deliver quality work on time and on budget.

Despite these findings, this study has limitations. First, the study sample is small, only fifty subjects from only two of the region's 21 districts that do not represent the majority of construction contractors. Second, two weeks were not enough to observe all artisans working on various construction projects in the ASMA and NJMA. Third, as noted above, purposive samples have a certain degree of subjectivity; a probability sample from a larger population would have made it possible to extrapolate the findings from the study sample to its universe. It is suggested that interpretation of these findings and further research should take these factors into consideration.

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