Journal of Construction in Developing Countries, 28(1), 267–291, 2023

Critical Determinants of the Competitiveness of the Ghanaian Construction Industry

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First submission: 20 July 2021; **Accepted:** 21 March 2022; **Published:** 26 June 2023

To cite this article: Abdul Manaan Osman and Liu Yi Sheng (2023). Critical determinants of the competitiveness of the Ghanaian construction industry. *Journal of Construction in Developing Countries*, 28(1): 267–291. https://doi.org/10.21315/jcdc-07-21-0110

To link to this article: https://doi.org/10.21315/jcdc-07-21-0110

Abstract: Construction industry's contribution to the development of nations has been well documented in the literature. Some authors argue that the construction industry offers one of the most significant avenues through which infrastructure is provided for almost every sector of economy. Yet, studies focusing on the development of the construction industry are replete with problems regarding the numerous competitiveness determinants to consider, not only from where and whom to collect the data but also the type and range of data. This study investigates the essential factors influencing the competitiveness of the Ghanaian construction industry (GCI) using Michael Porter's Diamond Model. Factor analysis revealed four underlying constructs that determine the competitiveness of the GCI. These include industrial resources availability, construction business strategies and project management, stakeholders' demands and performance and government role and industry development policy. The study highlights that more emphasis should be placed on macro-variables of GCIs at the national level and senior managers in GCI should integrate advanced management processes and techniques in construction business management to improve upon their performances. In addition, the results from the current study may help inform and direct government policies towards repositioning and engendering the competitiveness of the GCI, while providing international construction firms entering the GCI with first-hand information about the performance of the GCI.

Keywords: Competitiveness, Construction industry, Firms, Ghana, Porter's Diamond Model

INTRODUCTION

The construction industry's contribution to the national development has been well documented (Arthur-Aidoo, Aigbavboa and Thwala, 2018). Perhaps being the only avenue through which infrastructure is provided for almost every sector of the economy—health, transportation, education, industry, telecommunications and housing, sports—its contribution to the gross domestic product (GDP) and employment for most economies worldwide has been unanimously acknowledged (Atuahene and Baiden, 2018; Claver, Molina and Tari, 2003). This unbreakable connection of the construction industry to other sectors of the economy highlights its critical position to achieve sustainable economic growth (Anaman and Osei-Amponsah, 2007).

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Indeed, between 2016 and 2017, the Ghanaian construction industry (GCI) accounted for 13.7% of Ghana's GDP and employed 3% of the active workforce (GSS, 2018). Besides, Fitch Solutions (2021) envisages that the sector will maintain a strong trajectory over 10 years between 2019 and 2028, owing to a comparably favourable business climate, steady economic growth and a stable political landscape.

Despite this promising outlook and high ranking (7th in terms of value, estimated at USD9 billion and 6th based on the market attractiveness) enjoyed by the GCI within Sub-Sahara Africa (Yeboah, 2021), its performance is still below expectations. Compared to the Namibian and South African construction industries (1st and 2nd most attractive construction industries, respectively [Yeboah, 2021]), the GCI trails abysmally in the global effort to improve its performance and competitiveness (Ofori-Kuragu, Baiden and Badu, 2016). Consequently, this culture of underperformance creates exclusivity for a few large construction firms, mostly foreign owned, to win the bulk of important projects in Ghana (Chileshe and Yirenkyi-Fianko, 2012). Given that a competitive domestic industry produces firms for the global construction market (Zhao and Shen, 2008), few or no Ghanaian firms operating in the international arena may indicate the low competitiveness of the GCI.

Moreover, the industry is less innovative, more labour-intensive and less productive. Industry-related reasons for this development include unfavourable business climate, lack of government support (Gyadu-Asiedu, Danso and Asubonteng, 2013), intense competition due to a large number of firms in the industry (Ofori-Kuragu, Owusu-Manu and Ayarkwa, 2016), stiff competition from foreign firms (Assibey-Mensah, 2015) and changing employer and owner needs (Chow [1990], as cited in Betts and Ofori [1994]).

Indeed, apart from Anaman and Osei-Amponsah (2007), who studied the link between the GCI and the macro-economy and its policy implications, the structure of the GCI has not been studied in depth that could be beneficial to the construction business managers. Resultantly, the emphasis of research on project performance has depicted a "short-term orientation" of the construction industry (Dansoh, 2005).

Furthermore, existing studies concerned with construction industry development are replete with problems regarding the numerous competitiveness determinants to consider, from where and whom to collect the data and the type and range of data required (Fox and Skitmore, 2007; Momaya, 1998).

The aforementioned facts aim at contextualising and establishing the need for this study and not initiating a complete benchmark investigation between the GCI and the Namibian and/or South African construction industries. Therefore, the objective of the current research is to use Porter's Diamond Model to obtain the critical factors that can engender the competitiveness of the GCI. The research results may assist the local contractors in formulating their competitive strategies and assist international construction firms with providing first-hand information about the construction industry in Ghana. The results might also inform and direct government policies, especially regarding the growth and competitiveness of the construction industry in Ghana.

COMPETITIVENESS: DEFINITION, THEORIES AND MEASUREMENT

Definition of Competitiveness

Competitiveness is an omnibus construct with multi-level perspectives. Though the researchers have not yet reached any consensus on a standard definition of the competitiveness construct (Lu, Shen and Yam, 2008), meaning and coverage of competitiveness have garnered some consensus from scholars. In this article, the competitiveness of an entity is defined as its ability to become the preferred stakeholder choice among its competitors for goods, services and investment. Therefore, the competitive construction industry must work at maximum efficiency, create high-quality products, generate wealth for stakeholders (investors, workers, tax revenue for government) and duly playing its crucial role as a superior contributor to the GDP. In addition, the competitive construction industry must development the ability to retain and attract more investment and talents compared to other sectors of the economy and uphold sustainable construction for the general good of society.

Theories and Measurement of Competitiveness

This study encompasses and reviews various theoretical and empirical literature on competitiveness. A vital question in this literature is how competitiveness is achieved by a firm or a particular industry within a country. Previous studies have drawn on two major theoretical perspectives in answering this question: Porter's Diamond Model (Porter, 1980; 1981) and the resource-based view (RBV) of a firm (Barney, 1991). The Diamond framework of competitiveness argues that market structure and industry factors affect the firm strategy and performance determinants. This framework elucidates how countries develop their industries for successful international competition based on four main factors, namely (1) factor conditions, (2) demand conditions, (3) firm strategy, structure and rivalry, (4) related and supporting industries. Governement policy and chance events are often added to the model to make it six.

Building on the insights of Porter's (1990) framework, Cho (1994) developed a nine-factor theory regrouping Porter's (1990) factors into two primary constructs: physical factors and human factors. Acknowledging the role of these factors in competitive advantage, Cho (1994) argues that human factors utilise and manage the physical elements to obtain a competitive advantage. However, Rugman and D'Cruz (1993) had earlier contributed to the theme with the Double Diamond Model and highlighted corporate strategy and process as a source of competitive advantage in a global context.

Other models for measuring competitiveness are the Asset-Potential-Performance (APP) framework (Ambastha and Momaya, 2004; Momaya, 1998) and the Competitiveness Triangle (Lall, 2001).

Following the above theoretical arguments, several researchers have investigated factors that impact the competitiveness of firms within an industry (Ambastha and Momaya, 2004; Buckley, Pass and Prescott, 1988; Chang et al., 2017; Deng, Liu and Jin, 2013; Deng et al., 2014; El-Diraby, Costa and Singh, 2006; Ericsson, Henricsson and Jewell, 2005; Flanagan et al., 2005).

However, a firm's competitive advantage depends on several key competitiveness factors of its local industry (Rugman and D'Cruz, 1993). Thus, arguably, to engender competitiveness of the firm, factors that govern the competitiveness of the operational arena of the firm need further investigation.

This outside-in approach enables a firm to diagnose the factors affecting the competition in the industry and its underlying causes and then develop suitable strategies to sustain competitiveness. This approach is in tandem with Porter's Diamond Model which has been used to study various industries including construction. According to Ericsson, Henricsson and Jewell (2005), the Diamond framework is the most established, criticised and adopted framework of competitiveness. The model has been employed successfully to analyse several industries such as hospitality (Wu, Lin and Chen, 2007), education (Curran, 2000) and tourism (Bobirca and Cristureanu, 2008). Deng, Liu and Jin (2013) employed the framework in the construction industry to analyse the Chinese construction industry. Betts and Ofori (1994) found that strategic planning in construction to be useful. Moreover, Öz (2001) adopted the same framework for the Turkish construction industry. Therefore, the model was chosen as the conceptual framework to obtain factors for the competitiveness of the GCI.

Admittedly, whilst competitiveness factors may be common for the construction industries across different countries, there may undoubtedly be some particular factors for specific countries due to variability in economic, social and cultural conditions (Ye, Lu and Jiang, 2009).

Indeed, authors such as Korkmaz and Messner (2008) and Ambastha and Momaya (2004) argued that without changing strategies, products and services, sustaining competitive advantage will be difficult due to the dynamically changing global market forces and the general business environment.

Besides, construction products "exist in the internationally interdependent marketplace", and construction firms consider both local and international markets when developing their strategies (Martek and Chen, 2014). Therefore, results from this research will inform international construction firms about what strategies to deploy when entering the construction industries of developing countries (Lu et al., 2013).

Based on Porter's Diamond Model, this research draws upon and modifies several factors from existing literature to empirically investigate the principal components of the competitiveness of GCI.

Indeed, Ghana's context is unique regarding a long, unbreakable political stability in Sub-Sahara Africa, an open market system and the recent influx of foreign construction firms into the country. Therefore, this study offers a subtle and distinct explanation of factors that will accelerate the construction industry's competitiveness and can act as a good reference for government policy, provide a better understanding of the construction industry for the existing firms and give valuable information for new entrants to the construction industry.

RESEARCH METHODOLOGY

Since the nature of this study is exploratory, a two-level approach was employed to obtain the determinants of competitiveness of the construction industry. Firstly, through a literature review and based on Porter's Diamond Model, several determinants of competitiveness were collected and administered to specialists

in the construction industry. These specialists consisted of 10 industry experts and five experts in academia. These experts were responsible to suggest other suitable factors and help modify those from the literature to suit the Ghanaian context. Subsequently, 400 questionnaires were administered to construction industry professionals in both private and public organisations by trained high national diploma (HND) building technology graduates in Accra, Kumasi and Tamale between December 2020 and February 2021. There were 160 questionnaires answered and returned to the authors. Due to the low number of responses, a telegram platform was created and its link was shared among industry stakeholders. This allowed the respondents to join and answer the questions developed using Microsoft forms willingly. Respondents who had participated in the initial round were disqualified from answering the questionnaire again. At the end of March 2021, 76 additional responses were received, giving a total of 236. However, two responses were incomplete and thus 234 were retained for further analysis (response rate of 59%).

The questionnaire had three main sections. The introductory part had a concise description of the competitiveness of the construction industry. Directives/ guidelines on answering the questionnaire were given with assurance that data sought from respondents would be used for only research purposes. The respondents were given a choice to withdraw from answering the questions any time they deemed fit. The second part sought information about respondents' characteristics such as qualification, affiliation and professional registration status. Finally, years of working experience and their primary duty in the organisation were requested from the respondents.

Based on the literature (e.g., Porter, 1980; 1981; Barney, 1991), the last part of the questionnaire asked the respondents to rate on how significant of the 38 predetermined factors (as shown in Table 1) affect the competitiveness of the GCI, using a five-point Likert scale, where 1 = "Negligible", 2 = "Not important", 3 = "Neutral", 4 = "Important" and 5 = "Extremely important".

Table 1. Competitiveness factors of the construction industry

No.	Measured Variable	No.	Measured Variable
Factor Conditions		Firm Strategy, Structure and Rivalry	
1.	Availability of cheap and experienced personnel (Ericsson, Henricsson and Jewell, 2005; Deng, Liu and Jin, 2013)	21.	Competition intensity (Porter, 1990; Deng, Liu and Jin, 2013)
2.	General employee working conditions (Ericsson, Henricsson and Jewell, 2005; Deng, Liu and Jin, 2013)	22.	Market concentration (Chiang, Tang and Leung, 2001)
3.	Health and safety culture (Orozco et al., 2014; Mengistu and Mahesh, 2020)	23.	Corporation-related corruption (Deng, Liu and Jin, 2013)

(*Continued on next page*)

Table 1. (*Continued*)

No.	Measured Variable	No.	Measured Variable
4.	Continuous professional development of industry workforce (Fox and Skitmore, 2007; Deng, Liu and Jin, 2013)	24.	Joint-venture practices (Porter, 1990; Deng, Liu and Jin, 2013)
5.	Stable currency and exchange rate regime (Fox and Skitmore, 2007)	25.	Power of trade unions (Fox and Skitmore, 2007)
6.	Cost of credit from financial institutions (Fox and Skitmore, 2007; Deng, Liu and Jin, 2013)	26.	Project management competencies (Manaan et al., 2014)
7.	Machinery and equipment availability (Mengistu and Mahesh, 2020)	27.	General business management practices (Orozco et al., 2014; Tansey, Spillane and Meng, 2014)
8.	General information technology use in the industry (Premdilip and Uma, 2020)	28.	Firms' strategic perspectives (Dikmen and Birgönül, 2003; Kale and Arditi, 2002; Oyewobi et al., 2019)
9.	Geographical location and political stability (Fox and Skitmore, 2007)	29.	Firms' internal research and development activities (Orozco et al., 2014)
10.	Availability of cheap and quality materials (El-Diraby, Costa and Singh, 2006; Fox and Skitmore, 2007; Danso, Obeng-Ahenkora and Manu, 2021)	30.	Power of construction professional associations (Fox and Skitmore, 2007)
Demand Conditions		Related and Supporting Industries	
11.	Quality of construction research and education (Ofori, 1993; Ericsson, Henricsson and Jewell, 2005)	31.	Performance of mass housing/ real estate sector (Ahadzie, Proverbs and Olomolaiye, 2008; Manaan et al., 2014)
12.	Complex customer demands (Porter, 1990; Deng, Liu and Jin, 2013)	32.	Performance of architecture and engineering design consultants (Ofori, 2012; Ling et al., 2012)
13.	Size and structure of the industry (Porter, 1990; Ofori, 1993; Deng, Liu and Jin, 2013; Mokhtariani, Sebt and Davoudpour, 2017)	33.	Performance of subcontractors and material suppliers (Badu, Edwards and Owusu-Manu, 2012)
14.	High infrastructure deficit (Deng, Liu and Jin, 2013)	34.	Favourable equipment and machinery hire/ purchasing conditions (Mengistu and Mahesh, 2020)
Government		35.	ICT industry (Premdilip and Uma, 2020)
15.	Procurement practices (Mengistu and Mahesh, 2020; Oyewobi et al., 2019)	Chance Events	
16.	Stable macro-economic regime (Ofori, 1993; Deng, Liu and Jin, 2013; Assibey-Mensah, 2015)	36.	Opening of profitable sub-regional market centres within Economic Community of West African States (ECOWAS) (Ofori, 1993; Fox and Skitmore, 2007)

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Table 1. (*Continued*)

No.	Measured Variable	No.	Measured Variable
17.	Deliberate construction industry development policy (Ofori, 1993, 2012; Ofori-Kuragu, Baiden and Badu, 2016; Dansoh, Frimpong and Oteng, 2017)	37.	Joint ventures between foreign companies with financial muscle (Fox and Skitmore, 2007)
18.	Presence of a central agency responsible for the construction industry (Ofori, 1993, 2012; Fox and Skitmore, 2007; Ofori-Kuragu, Baiden and Badu, 2016; Dansoh, Frimpong and Oteng, 2017)	38.	Introduction of favourable regulation by the government for the construction sector (Ofori, 2012; Fox and Skitmore, 2007)
19.	Tax discounts and rebates (Badu, Edwards and Owusu-Manu, 2012)		
20.	Investment in research and development of Building and Road Research Institutes (Ofori, 2012)		

The sample adequacy, internal reliability and consistency measures of the questionnaire were assessed using Cronbach's alpha (α). As shown in Table 2, Cronbach alpha was > 0.80 for each factor, indicating the reliability of the questionnaire.

Table 2. Reliability and internal consistency of measured constructs

Construction Industry's Competitiveness Factor	Cronbach's Alpha (α)
Factor conditions	0.913
Demand conditions	0.850
Government	0.849
Firm strategy, structure and rivalry	0.870
Related and supporting industries	0.841
Chance events	0.867

Data Analysis

Overall, 234 valid responses were imported into the Statistical Package for Social Sciences (SPSS) version 20 for analysis. Due to a large number of factors and the overall aim of investigating the most critical competitiveness factors, 38 factors were ranked based on the relative importance index (RII) (Holt, 2014). The RII is frequently used to analyse survey data in construction management research (Holt, 2014). The RII is expressed as in Equation 1:

$$\text{RII} = \frac{\sum W}{AN} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_3 + n_1}{5N} \quad \text{Eq. 1}$$

where, *w* is the weighting as assigned on the Likert's scale by each respondent within a range of 1 to 5 (1 = "Negligible"; 2 = "Not important"; 3 = "Neutral"; 4 = "Important" and 5 = "Extremely important"), *A* denotes the highest weight (here it is 5) and *N* represents the total number in the sample.

The results of RII are expressed in simple percentages, with factors scoring at least 70% considered critical and retained for further analysis (as shown in Table 3). 24 factors scored at least 70% and were included for factor analysis, a statistical technique used to identify relatively few variables which may reflect relationships between several interrelated factors (Bartlett, 1950; Pallant, 2005).

The factor analysis consists of five steps starting with assessing the suitability of the data set for factor analysis, factor extraction, determination of the suitable number of factors to extract, rotation method to use and interpretation and labelling of extracted factors (Williams, Onsman and Brown, 2010). First, the 24 critical factors were subjected to a suitability test to ensure the suitability of the data set for factor analysis. Although the sample size is essential in factor analysis, opinions and several guiding rules of thumb vary; Tabachnick and Fidell (2019) suggested that at least 300 cases for factor analysis. Contrastively, Hair (2011) opined that sample sizes should be ≥ 100 to allow for factor analysis.

Pallant (2005) argued that "the larger, the better". Since 234 respondents were used in this study, the Hair (2011) rule of thumb was adopted. However, other researchers argued in favour of the sample size and the ratio of variables to cases. The literature suggests a proportion of 10 cases to one variable or at least five cases to one variable. In this study, 234 cases and 24 variables also met this criterion.

Further, the correlation matrix was also constructed to assess the correlation among variables to determine their suitability for factor analysis. Following Tabachnick and Fidell (2019), the correlation matrix was inspected using a correlation coefficient of ≥ 0.30. Thus, the correlation matrix of variables used was calculated and their relative strengths captured by factor loading were also determined. Next, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (Kaiser, 1970) and Bartlett's test of sphericity (Bartlett, 1950) were performed to determine the accuracy and suitability of the data set for factor analysis. Regarding factor extraction, there are numerous ways to extract factors, including principal components analysis (PCA), principal axis factoring (PAF), image factoring, maximum likelihood, alpha factoring and canonical. However, PCA and PAF are widely used and are most common in literature (Williams, Onsman and Brown, 2010).

However, we employed PCA for extracting the factors since the differences between PCA and PAF are often insignificant. The scree plot and parallel analysis were done to supplement the factor extraction. The results of the factor analysis are presented in the next section for further discussion.

Table 3. Critical competitiveness factors

Construction Industry's Competitiveness Factor	Negligible	Not Important	Neutral	Important	Extremely Important	Total	Sample Size (*N*)	*A*N*	RII (%)
Availability of cheap and experienced personnel	33	13	31	79	78	858	234	1,170	73
General employee working conditions	19	23	30	96	66	869	234	1,170	74
Health and safety culture	28	19	14	78	95	895	234	1,170	76
Continuous professional development of industry workforce	25	16	22	80	91	898	234	1,170	77
Stable currency and exchange rate regime	5	14	38	88	89	944	234	1,170	81
Cost of credit from financial institutions	9	12	40	88	85	930	234	1,170	79
Machinery and equipment availability	25	11	27	83	88	900	234	1,170	77
Availability of cheap and quality materials	32	16	40	88	58	826	234	1,170	71
Quality of construction research and education	10	19	31	91	83	920	234	1,170	79

(*Continued on next page*)

Table 3. (*Continued*)

Construction Industry's Competitiveness Factor	Negligible	Not Important	Neutral	Important	Extremely Important	Total	Sample Size (*N*)	*A*N*	RII (%)
Complex customer demands	13	29	43	74	75	871	234	1,170	74
Size and structure of the industry	15	25	32	99	63	872	234	1,170	75
Stable macro-economic regime	10	16	26	121	61	909	234	1,170	78
Deliberate construction industry development policy	18	15	24	84	93	921	234	1,170	79
Presence of a central agency responsible for the construction industry	11	20	45	68	90	908	234	1,170	78
Investment in research and development of building and road research institutes	17	11	31	93	82	914	234	1,170	78
Competition intensity	9	20	37	104	64	896	234	1,170	77
Market concentration	8	14	44	110	58	898	234	1,170	77
Power of trade unions	8	10	46	72	98	944	234	1,170	81
Project management competencies	4	10	34	74	112	982	234	1,170	84

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Table 3. (*Continued*)

Construction Industry's Competitiveness Factor	Negligible	Not Important	Neutral	Important	Extremely Important	Total	Sample Size (*N*)	*A*N*	RII (%)
General business management practices	2	14	28	122	68	942	234	1,170	81
Firms' strategic perspectives	2	12	38	96	86	954	234	1,170	82
Performance of architecture and engineering design consultants	11	9	21	110	83	947	234	1,170	81
Performance of subcontractors and material suppliers	2	17	21	104	90	965	234	1,170	82
Introduction of favourable regulation by the government for the construction sector	18	54	43	24	95	826	234	1,170	71

RESULTS

Background of the Respondents

Table 4 shows the socio-demographic characteristics of the respondents. Out of 234 valid responses, about half (50.5%) attained post-graduate degrees. Most of the respondents were general managers (20.1%), project managers (5.6%), quantity surveyors (16.2%), architects (17.5%) and engineers (13.7%). More than half (53%) had ≥ 10 years of working experience in the construction industry. Also, 62.1% of them worked in the construction industry either as consultants or contractors, with 23.9% being subcontractors and suppliers in the industry.

Table 4. Background of the respondents

Characteristics	Frequency	%
Affiliation		
Building and civil engineering contractor	68	29.1
Architecture and engineering consultant	60	25.6
Government agency	19	8.1
Private developer	19	8.1
Educational/Research institution	12	5.1
Subcontractor/Supplier	56	23.9
Primary Role in the Organisation		
Project manager	13	5.6
Architect	41	17.5
Quantity surveyor	38	16.2
Civil/ Structural engineer	32	13.7
Academic	35	15.0
General manager	47	20.1
Other	28	12.0
Professional Affiliation		
Ghana Institution of Architects	66	28.8
Ghana Institution of Engineers	42	16.1
Institution of Engineering and Technology	46	17.8
Ghana Institution of Surveyors	50	19.5
Other	25	13.6
Freelance	5	4.2

(*Continued on next page*)

Table 4. (*Continued*)

Characteristics	Frequency	%
Highest Qualification		
Post-graduate (MSc/PhD)	118	50.5
Bachelors (BSc)/HND/Others	116	49.5
Working Experience		
Less than 5 years	32	8.5
5 years to 10 years	79	37.3
11 years to 15 years	76	28.0
16 years to 20 years	24	14.4
More than 20 years	23	11.9

Factor Analysis

In addition, the results of one-way within groups analysis of variance (ANOVA) showed a statistically significant difference in opinions among building and civil engineering contractors, architecture and engineering consultants, government agencies, private developers, educational or research institutions and subcontractors or suppliers for only four out of the 38 competitiveness factors ($p < 0.05$). These factors were "Continuous professional development of industry workforce" ($p = 0.004$), "Stable currency and exchange rate regime" ($p = 0.001$), "Complex customer demands" ($p = 0.025$) and "Introduction of favourable regulation by the government for the construction sector" ($p = 0.008$). The difference in opinion may be due to the nature of the business establishment of the respondents and their operational targets. For instance, while clients are increasingly transferring contract risks to the consultants and contractors, both are trying to mitigate those risks, leading to disagreements regarding some of the clients' demands.

Regarding the RII, 38 factors are expressed as simple percentages. The highest-rated factor was "Project management competencies" with 84% while the lowest factor was "Opening up of profitable sub-regional markets within ECOWAS" which scored 50%. Thus, factors scoring ≥70% were considered critical and hence retained for further analysis. Factors with the variance of opinions based on the respondent's affiliation all scored above 70% were included in the factor analysis. In all, 24 competitiveness factors scored at least 70% and were retained for factor analysis. A preliminary test to check the suitability of the data revealed that the sample of 234 was adequate for factor analysis.

Further, the correlation table reveals that the correlation matrix coefficients are at least 0.30. Furthermore, the KMO test revealed a measure of sampling adequacy of 0.803, exceeding the recommended value of 0.6 (Kaiser, 1970). Bartlett's test of sphericity (Bartlett, 1950) achieved statistical significance (approx. chi-square = 2887.461, df = 276, $p < 0.000$). These results suggest that the correlation matrix is not an identity matrix. The PCA revealed five components with eigenvalues > 1, explaining 22.98%, 17.87%, 9.67% and 8.67% of the variance, respectively. The drawback of depending only on the eigenvalues is that it sometimes leads to retaining too many components (Pallant, 2005).

Therefore, the scree plot (as shown in Figure 1) and the parallel analysis (as shown in Table 5) were further conducted. Consequently, four PCAs were retained with eigenvalues > 1 and ranged between 2.09 and 5.52 on average, as shown in Table 6.

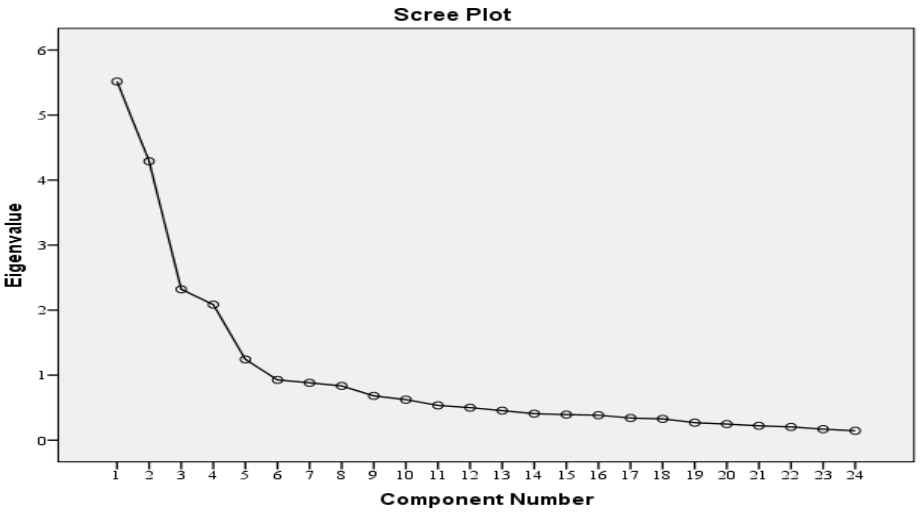

Figure 1. Scree plot

Table 5. Comparison of eigenvalues from PCA and corresponding criterion values from parallel analysis

Component Number	Actual Value from PCA	Criterion Value from Parallel Analysis	Decision
C1	5.516	1.6369	Accept
C2	4.289	1.5265	Accept
C3	2.32	1.4489	Accept
C4	2.085	1.3816	Accept
C5	1.242	1.3198	Reject

Table 6. Extract of rotated factor loadings

Construction Industry's Competitiveness Factor	Components				Descriptive Statistics	
	C1	C2	C3	C4	Mean	Std. Dev
Continuous professional development of industry workforce	0.851				3.84	1.30
Health and safety culture	0.835				3.82	1.36
Availability of cheap and experienced personnel	0.822				3.67	1.36
General employee working conditions	0.802				3.71	1.21
Stable currency and exchange rate regime	0.742				4.03	0.99
Machinery and equipment availability	0.711				3.85	1.27
Cost of credit from financial institutions	0.633				3.97	1.04
Availability of cheap and quality materials	0.630				3.53	1.31
Firms' strategic perspectives		0.795			4.08	0.90
General business management practices		0.763			4.03	0.85
Market concentration		0.759			3.84	0.98
Project management competencies		0.735			4.20	0.96
Competition intensity		0.735			3.83	1.05
Power of trade unions		0.675			4.03	1.05
Size and structure of the industry			0.817		3.73	1.16
Quality of construction research and education			0.788		3.93	1.09
Complex customer demands			0.755		3.72	1.20
Performance of subcontractors and material suppliers			0.573		4.03	1.01
Performance of architecture and engineering design consultants			0.570		4.05	1.01

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Table 6. (*Continued*)

Construction Industry's Competitiveness Factor	Components				Descriptive Statistics	
	C1	C2	C3	C4	Mean	Std. Dev
Deliberate construction industry development policy				0.800	3.94	1.20
Stable macro-economic regime				0.780	3.88	1.01
Investment in research and development of building and road research institutes				0.774	3.91	1.15
Eigenvalues	5.516	4.289	2.320	2.090		
% variance explained (Total = 59.20)	22.980	17.870	9.670	8.670		

Note: KMO and Bartlett's test = 0.803 (approx. chi-square = 2887.461, df = 276, $p < 0.000$); Cronbach's coefficient (α)= 0.810; Extraction method: PAF; Rotation method: Varimax rotation with Kaiser normalisation; Rotation converged in five iterations.

For detailed discussions, these components were subjectively renamed as: (1) C1 – "Industrial resource availability, (2) C2 – "Construction business strategies and project management", (3) C3 – "Stakeholders' demands and performance" and (4) C4 – "Government role and industry development policy". In the following sections, these factors are discussed.

DISCUSSION

C1: Industrial Resource Availability

As shown in Table 6, the first factor (C1) accounted for 22.98% of the variance explained and encapsulated eight aspects assumed to enhance the competitiveness of the GCI. These constructs include continuous professional development of industry workforce, health and safety culture, availability of cheap and experienced personnel, general employee working conditions, stable currency and exchange rate regime, machinery and equipment availability, cost of credit from financial institutions and availability of cheap and quality materials. Ideally, a firm's resource has been noted as a strong determinant of its survival among other firms. This has been irrespective of the conditions within the industry (Porter, 1980; 1981; Barney, 1991). Barney (1991) observed that with resources at its disposal, a firm could conceive and implement strategies to improve efficiency and effectiveness. Porter (1980; 1981) also argued that resources are the central pillars upon which a firm draw its strengths and weaknesses. The primary resources for stakeholders in the GCI include human, material, plant and capital.

Unsurprisingly, given the labour-intensive nature of the GCI, general labour-related issues featured well in component C1. For example, the lack of skilled labour has been observed by Offei-Nyako et al. (2014). They cited inconsistent or insufficient pay, low motivation and a general lack of interest among young

people in the construction trades as the main reasons for this development. In addition, due to the lack of machinery and the industry's failure to adopt the latest construction technology, Boadu, Wang and Sunindijo (2020) expressed concerns over industry's over-reliance on labour-intensive construction methods and the consequent implications on health and safety.

Thus, we propose a two-way solution. First, a concerted effort to mobilise the youth to take up technical and vocational education through government policy. Second, the Ministry of Employment and Labour Relations, Ghana in consultation with the Ghana Employers Association and the engineering-related professional associations should thoroughly streamline and harmonise employee working conditions of the sector. While the former approach may increase enrolment in technical and vocational education, including construction, the latter may attract and retain talents in the GCI. This finding corroborates Ng et al.'s (2017) assertion that indigenous professionals in construction and allied engineering constitute a great asset. For both developed and developing countries, the role of the skilled labour force for the construction industry's competitiveness has been confirmed by Deng, Liu and Jin (2013) for China in particular and globally by Fox and Skitmore (2007) and Ofori (1993).

Further, the availability and cost of credit is another factor influencing the GCI's competitiveness. For example, recent developments in the GCI indicate that clients hardly make advance payments to contractors. There is evidence of stalled projects due to clients' inability to pay or pay on time (Gyadu-Asiedu, Danso and Asubonteng, 2013). This development affects the liquidity of contractors and leads to default to banks and financial institutions. Consequently, credit from banks to contractors becomes expensive due to the increased risk of default (Fox and Skitmore, 2007). The government of Ghana is the biggest employer in the construction industry and has part of the funding challenges outlined in the present article. As the client, the government of Ghana can resort to public-private-partnerships such as build-operate-transfer (BOT) to finance infrastructure projects. In addition, the country established the Ghana Infrastructure Investment Funds (GIIF) in 2014, with the overall aim "to mobilise, manage, coordinate and provide financial resources for investment in a diversified portfolio of infrastructure projects in Ghana for national development" (GIIF, 2017: 4).

Perhaps it is the most opportune time for all infrastructure projects to be channelled through a board whose mandate includes sourcing funds for critical infrastructure. This will ensure that need-based projects are implemented and not on political expediency. It will also curb the practice where public officials initiate projects without a clearly defined source of funds and payment mechanism. Government of Ghana can also set up the defunct bank for housing and construction as was in the past. The bank's mandate will be to offer the finance to the contractors at reduced interest rates. To avoid default by contractors, all payments will be channelled through this bank. These two approaches can reduce the incidence of non-budgeted projects and provide reliable financing for contractors.

Another factor that loaded significantly on this construct is the availability of cheap and quality materials. Though there have been numerous efforts by the Building and Road Research Institute (BRRI) of the Council for Scientific and Industrial Research (CSIR) to introduce new materials to the GCI, the process has been inhibited by problems with industry-wide adoption and lack of government support (Danquah, 2009). Moreover, even where materials are available, frequent

price fluctuation and supply bottlenecks render project planning difficult and unviable (Danso, Obeng-Ahenkora and Manu, 2021; Kuebutornye et al., 2018). While indigenous alternatives are not readily available, developing nations including Ghana embrace conventional and imported materials, which leads to high construction costs (Ofori, 1993). Thus, for the GCI to become competitive, materials and component manufacturing and supply should be streamlined while government emphasises investment in research and development of local materials. This finding is congruent with Mengistu and Mahesh's (2020), who asserted that material shortages severely constrain Ethiopia's building industry.

C2: Construction Business Strategies and Project Management

C2 group includes firms' strategic perspectives, general business management practices, market concentration, project management competencies, competition intensity and the power of trade unions. However, it is important to note that firms' strategic perspectives recorded the highest factor loading, which is plausible for several reasons. Indeed, most firms in Africa operate despite multiple and interactive challenges posed by the social, political, economic and competitive environment. This is particularly true in Ghana, where bureaucracies at all levels of a project, delays in payments, shoddy work, poor enforcement of regulations and improper monitoring of construction and cost overruns have been cited as key challenges (Anaman and Osei-Amponsah, 2007; Eyiah, 2004).

Dansoh, Frimpong and Oteng (2017), for instance, reported that Ghana is bedevilled with problems including poor economic management, environmental dilapidation and erratic supply of power to the industry, which in turn, have resulted in adverse outcomes in the construction industry. Given such challenges, firms must respond based on their strategic perspectives through which competitive advantage could be achieved and performance increased. In essence, construction firms, guided by their goals and tactics, will need to explicitly define on how they want to compete. Then by internal and external assessments of their strengths, weakness, opportunities and threats from the industry, they can gauge what can be achieved successfully. Thus, the core competencies of the firm will then be tailored to emphasise strategies of either cost leadership, differentiation or focus, or a combination.

In addition, project management competencies have been a cardinal determinant of project success, the success of construction firms and the industry as a whole. Indeed, Bredillet, Yatim and Ruiz (2010) have established a positive correlation between a nation's GDP and project management development. Accordingly, Manaan et al. (2014) documented that the performance of project managers is average which lends credence to the relatively "undeveloped project management environment in the country". Consequently, the competencies of project management practitioners must improve for a competitive GCI.

C3: Stakeholders' Demands and Performance

The third component (C3) is defined by six elements, namely size and structure of the industry, quality of construction research and education, complex customer demands, the performance of subcontractors and material suppliers, performance of architecture and engineering design consultants and the introduction of

favourable regulation by the government for the construction sector. Among these attributes, the size and structure of the industry have the highest factor loading. Like other construction industries in other developing countries, the GCI is fragmented with low-level collaboration among stakeholders (Ofori-Kuragu, Baiden and Badu, 2016; Ofori-Kuragu, Owusu-Manu and Ayarkwa, 2016). Indeed, improving cooperation among stakeholders can lead to developing industry-best practices and culture (Fox and Skitmore, 2007) and a shared goal of performance measures that can improve industry competitiveness (Mengistu and Mahesh, 2020).

Thus, it is clear that a cohesive industry can lead to improved performance of the entire construction value chain – material producers, suppliers and engineering consultants. It can also improve professionalism through industry/academia collaboration and curriculum development and enhance the adoption of new technology, new management techniques and the wholesale acceptance of industry laws and regulations. In Ghana, the traditional method where design and construction are separated, remains the most common method of construction procurement (Ling et al., 2012). Pre-contract and post-contract services performance of design and supervision consultants certainly influences project delivery. The emergence of industry characteristics as a relevant factor in competitiveness is plausible because industry characteristics influence construction technology and its potential for advancement. These characteristics also affect the operation of researchers and industry professionals, production technology and consequently, technological competitiveness of the industry (Nam and Tatum, 1988).

C4: Government Role and Industry Development Policy

Government roles are factors that the construction firms and related entities have no control over. Table 4 shows that C4 is governed by four elements: the presence of a central agency responsible for the construction industry, deliberate construction industry development policy, stable macro-economic regime and investment in research and development of building and road research institutes. Among these factors, the presence of a central agency responsible for the construction industry appears to be the most relevant factor contributing to industry competitiveness in Ghana with a factor loading of 0.81.

Indeed, many authors have bemoaned the challenges in construction industry reform and capacity improvement due to the absence of an authority to oversee the industry in Ghana (Dansoh, Frimpong and Oteng, 2017; Ofori-Kuragu, Baiden and Badu, 2016; Ofori, 2012). For instance, Ahadzie (2009) asserted that it is almost impossible to have a competitive construction industry without a clear-cut development plan spearheaded by a constitutional body. He, therefore, proposed a Construction Industry Development Board (CIDB) to oversee the policy formulation and implementation that will engender local construction capacity. Thus, the authority can undertake a robust and empirically grounded study based on the prevailing situation and the available resources to reveal many aspects of the industry's problems and proffer solutions. Such kind of study by the authority should be subjected to periodic reviews to gauge progress and forecast future issues for in-time solutions. Thankfully, the Construction Industry Development Authority (CIDA) bill was submitted to the government of Ghana for consideration. However, at the time of writing this article, it remains unratified, as bemoaned by Dansoh, Frimpong and Oteng (2017).

CONCLUSION

The research described in this article built on existing literature and expert opinions to assemble 38 factors formulating the competitiveness of the construction industry in Ghana.

Out of 38 factors, 24 had RII values of ≥ 70% and were taken through factor analysis. The factor analysis revealed four fundamental components formulating the competitiveness of the GC1. These components are "Industrial resource availability", "Construction business strategies and project management", "Stakeholders' demands and performance" and finally, "Government role and industry development policy". Overall, these underlying constructs explained 59.2% of the total variance. Notably, apart from the Construction Business Strategies and Project Management, the other three components refer to the operational environment of construction firms. Perhaps, as a country, more emphasis should be placed on the macro-variables of the construction industry in Ghana. Indeed, this dovetails into the concern for an agency to oversee the construction industry. Furthermore, it lends credence to the critical role government has to play in ensuring micro-economic stability as a whole and in shaping the construction research agenda, setting and enforcing standards and norms and engendering effective strategies for a conducive and dynamic local construction industry.

Further, at the firm level, senior managers in the construction industry should integrate advanced management processes and techniques in construction business management to improve performance, not only in product cost, product quality and enhanced delivery period but also in human resource management, health and safety and sustainability.

Though the factors highlighted in this article are specifically for the GCI, the study could be replicated for other countries, especially in Africa. Given that this approach targeted the industry as a whole, it is suggested that future research on competitiveness should target specific participants of the industry such as contractors, architecture and engineering consultants, real estate companies and facilities managers.

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