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ENGINEERING, CONSTRUCTION AND ARCHITECTURAL MANAGEMENT

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Contribution of Procurement Capacity of Public Agencies to Attainment of Procurement Objectives in Infrastructure Procurement

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ABSTRACT

Purpose: Effective procurement of infrastructure is linked to the attainment of the sustainable development goals set by the United Nations. While the capacity of organisations is generally thought to be related to organisational performance, there is a lack of empirical insights concerning the contribution of procurement capacity of public organisations towards the attainment of procurement objectives in infrastructure procurement. Thus, it is unclear which aspects of the capacity of public procurement organisations contribute the most to the attainment of procurement objectives in the procurement of infrastructure. This research sought to address this gap.

Design/methodology/approach: The research used a survey of public procurement professionals which yielded 590 responses.

Findings: Exploratory factor analysis of 23 organisational capacity items revealed three components of organisational procurement capacity: '*management of the procurement process*'; '*human and physical resources*'; and '*financial resources and management*'. Multiple regression modelling of the relationship between the components and the attainment of 12 procurement objectives further reveals that there is a significant positive relationship between the three components and all the objectives. However, '*management of the procurement process*' emerged as the greatest contributor to the attainment of seven objectives, whereas '*human and physical resources*', and '*financial resources and management*' were the greatest contributor to the attainment of one objective and four objectives, respectively.

Originality/value: The study provides strong empirical justification for investment in the development of procurement capacity of public agencies involved in procurement of infrastructure. Furthermore, procurement capacity development of specific capacity components can be prioritised based on the relative contribution of capacity components to the attainment of desired procurement objectives. This should be useful to government policy makers as well as multilateral organisations that fund infrastructure and procurement reforms in various countries.

Keywords: organisational capacity; procurement capacity; procurement objectives; public organisation; public procurement; infrastructure.

Introduction

Several scholarly findings, beginning with the influential work by Aschauer (1989) and policy discussions (e.g., World Bank, (1994)) have all identified adequate infrastructure delivery as a vital vehicle for economic development (Calderon and Servén, 2008). This, according to the United Nations Economic and Social Council (UNESCO) (2016) is also supported by the express need for essential infrastructure like roads, hospitals, water, power generation and schools, which are precursors of achieving the Sustainable Development Goals (SDGs) set by the United Nations. Although the SDG 9 explicitly talks about building resilient infrastructure, all the remaining goals are underpinned by infrastructure development (The Economist Intelligence Unit Department, EIUD, 2009). This assertion was reiterated by a Senior Policy Analyst (Virginie Marchal) in the OECD's Environment Directorate who indicated that infrastructure is really at the centre of the delivery of the SDGs (EIUD, 2009). According to Parente and Prescott (2000), infrastructure for the provision of public services

accounts meaningfully for the difference in productivity between low- and high-income nations; since availability of services such as transport and energy influences productivity, industrialisation and commerce. The Global Construction Perspectives and Oxford Economics (2013) forecasts a 70 percent rise in world-wide construction output by the year 2025. It is anticipated that a greater share of the expected infrastructure growth would be realized in developing/emerging economies while investment contributions are made to bridge the infrastructure gap.

Governments employ public procurement processes to deliver vital infrastructure to support socio-economic development at different scales. Public procurement involves several activities including: planning, identifying needs, inviting of tenders, tender evaluation, awarding contract, contracting and contract administration (United Nations Office for Project Services (UNOPS), 2014). Procurement within the public sector is estimated at fifteen percent of the gross domestic product (GDP) of nations globally (Organisation for Economic Co-operation and Development (OECD) and World Bank, 2004; United Nations Development Programme (UNDP), 2010). However, it may account for about seventy percent of GDP in developing nations (Anvuur et al., 2006; UNDP, 2010; Asiedu and Alfen, 2014). Thus, the greater part of the budget of most developing economies could be said to be spent on public procurement activities (African Development Bank (AfDB), 2013).

An efficient public procurement process is an important vehicle for realising infrastructure (Lewis-Faupel et al., 2016). Consequently, procurement reforms have been promoted and supported by institutions such as the United Nations Office for Project Services (UNOPS), United Nations Development Programme (UNDP) and World Trade Organisation through capacity development initiatives with funding as well as design of frameworks and policies (OECD, 2002, 2006; Evenett & Hoekman, 2005; UNDP, 2006; World Bank, 2013). The nature and the size of public procurement makes it an important determinant of the social and economic development of various countries worldwide. Within the developed and developing economies, governments use procurement to attain key policy objectives like the maximization of competition, economic goals, environmental protection or green procurement, social goals, and the likes (Offei et al., 2016). To attain these objectives, the governments must strive hard to build the capacity of the agencies through which public procurement is undertaken.

It is established that the strengthening and usage of national procurement systems is a key factor in scaling up for more effective aid. According to the UNDP (2006), the commitment to this assertion was reaffirmed by The Paris Declaration and the Accra Agenda for Action to carry out diagnostics, develop sustainable reforms and monitor implementation, as well as commit sufficient resources to supporting and sustaining medium and long-term procurement reforms and capacity development. The procurement capacity includes individual, organisational and environmental elements (UNDP, 2006). Jensen (2009) noted that to widen the procurement capacity building of institutions, it is important to pay attention to human resources as well as intensification of managerial systems.

With the benefits of strengthened national public procurement not restricted to arguments relating to aid delivery, public procurement of goods, services and works accounts for a significant amount of national expenditures. Globally, public

procurement is estimated at about 15% of the world's GDP, but in some developing countries, it may account for as much as 70% (International Trade Centre, ITC, 2014). This is particularly the case in Least Developed Countries (LDCs) and post conflict countries, where underdeveloped private sectors require public sectors to play a major role in the delivery of services and the provision of much needed economic infrastructure (UNDP, 2006). Improved public procurement capacity will therefore impact on economic and social results. Unfortunately, this is not the case as several challenges have been identified to be associated with the implementation of public procurement (Okunlola et al., 2011; Mensah and Ameyaw, 2012; World Bank, 2013; Addo-Duah et al., 2014; de Mariz and Abeillé, 2014). Notwithstanding the existence of these challenges, the extent of impact of organisational procurement capacity on effective procurement of infrastructure by public institutions has attracted limited empirical investigation.

This study therefore investigates the contribution of procurement capacity of public agencies to the attainment of procurement objectives in the procurement of infrastructure. This has become important because adequate capacity is an important component of any sound public procurement system. In particular, the research seeks to establish the aspects of organisational procurement that contribute the most to the attainment of procurement objectives in infrastructure procurement. The paper first discusses the significance of infrastructure to socio-economic development and then reviews literature on procurement capacity and procurement objectives. Subsequently, the research presents the research methodology, findings, discussion, and conclusion.

Significance of Infrastructure to Socio-Economic Development

McCarthy (2006) describes infrastructure as the physical structures and the networks that offer significant services for the social and economic needs of the public. It comprises: transport infrastructure (e.g. airports, bridges, roads, seaports and railway); utilities infrastructure (e.g. water, gas, and electricity supply systems); and social and health infrastructure (e.g. hospitals and schools) (Newell et al., 2009). Infrastructure has been observed to affect economic growth in two keyways - directly enhancing activity and supporting productivity. It is also significant in generating services, reducing trade and operation costs, furthering economic activities, minimizing production costs, and improving market competitiveness. Research regarding the role of infrastructure to productivity, output and welfare abound (e.g. Rioja, 1999; Cadot et al., 2006; Lakshmanan, 2011). The attention of a significant portion of empirical research regarding the significance of the provision of municipal infrastructure has focussed on its impact on the rise in productivity. Majority of the research reveal a positive impact of infrastructure on productivity (e.g. Cadot et al., 2006; Sahoo and Dash, 2009). Other studies assessed the consequences of infrastructure on income disparities (e.g. Calderón and Servén, 2014). According to Calderón and Servén (2008), the underlying reason is that the provision of infrastructure is expected to have an uneven effect on the living standards of the poor by increasing the worth of their assets. Additionally, provision of infrastructure is likely to lower the cost of transaction for accessing the markets by the poor. Other related studies have also examined the consequences of some specific infrastructure projects on the less privileged (e.g. Van de Walle, 2009; Gebregziabher et al., 2009).

Investment in infrastructure is considered very significant in every country. Studies conducted by Oxford Economics (2017) suggest that USD \$94 trillion investment is required between 2016 and 2040 to bridge the gap in infrastructure. Investment yearly is therefore expected to be around USD \$3.7 trillion which is 19% higher than the current investment being made. To meet this global need, the current annual GDP allocation to infrastructure must be increased from 3.0% to 3.5%. The Americas and Africa currently have the largest infrastructure gap while Oxford Economics (2017) forecast suggest that Asia will continue leading the global infrastructure market. It is expected that up until 2040, the Americas and Asia will account for 22% and 45% of investment in infrastructure worldwide. Consequently, by 2040, India, China, Japan, and the US alone will constitute over fifty percent of investment in infrastructure worldwide. The forecast further suggest that funding required in the Americas and Africa are 47% and 39% respectively; greater than what exist under current trends. At present, while the African region offers substantial growing potential, its infrastructure market remains small in absolute terms considering the region only accounts for 6% of worldwide infrastructure investment. Electricity and roads which are the two most important sectors together account for more than 66% of worldwide funding requirement. It is projected that an estimated USD \$1.9 trillion will be required in order to meet the SDGs for sanitation and drinking water while provision of global access to electricity by 2030 will be daunting for the world's poorest countries requiring about USD \$3.9 trillion of investment. The deduction therefore is that countries worldwide will need to spend heavily on infrastructure to satisfy the populace and underpin productivity throughout their economies. In doing this, effective procurement is needed. However, how can effective procurement be enforced if the procurement capacities of the various agencies are not enhanced? This question therefore leads to the subsequent section under the literature review where procurement capacity is discussed.

Procurement Capacity

Capacity can be described as the ability of organisations, people, and society to effectively manage their affairs (OECD, 2006). The UNDP (2010) describes it in terms of procurement capacity development as the way organisations and individuals over a period of time acquire, strengthen, and sustain their abilities to attain their objectives for development. The UNDP (2006) offers a procurement capacity assessment framework which considers procurement capacity as composing the individual aspect (i.e. staff experience, expertise and level of understanding); the organisational aspect (i.e. the processes, policies and schemes inside an organisation that help procurement functions); and the enabling national environment.

The organisational aspect is mostly based on human resources and the creation of an enabling organisational environment as well as intensification of managerial systems for wider institutional capacity building (Jensen, 2009). The following areas of organisational capacity are considered as part of the Millennium Challenge Corporation's (MCC) procurement maturity model: staffing (recruiting); human resources capabilities development (mentoring, training); professional improvement (promotion, retaining); risk management; procurement organisation; information systems management; procurement management; leadership and organisational culture; and performance management (Meyer, 2014). The OECD and World Bank (2004) similarly highlight the following as key organisational areas: organisational structure; staffing profile; budgeting and planning process; information technology

infrastructure and skills; and human resources function. The UNDP (2006) summarises organisational procurement capacity based on eight core areas which are presented in Table 1. The core areas include leadership, policy framework, mutual accountability mechanisms, public engagement, human resources, financial resources, physical resources, and environmental resources. A brief description of the various areas has further been presented in Table 1. Building a sound capacity in procurement is imperative for successful project implementation and the attainment of procurement objectives, as well as its sustainability. The subsequent section thus conducts a review on procurement objectives.

[Insert Table 1]

Procurement Objectives

Analogous management objectives for public procurement exist in many countries across the globe (e.g. Jones, 2002; Qiao and Cummings, 2003). For instance, following a forum by members of the Asia-Pacific Economic Cooperation (APEC), the expert groups in procurement put together a number of values or objectives such as open and efficient competition, transparency, fairness, value for money (VfM), accountability and due process (Rothery, 2003). Other jurisdictions include procurement principles such as compliance, promotion of equality, diversity and opportunity, private sector participation and standardisation of procurement procedures (e.g. Ndou, 2004; Kwak et al., 2009). Notwithstanding, the suitability of the principles are decided by respective countries taking cognisance of the exact features of the economies and the trade-offs in adopting those specific measures.

Professionalism in public sector procurement relates to the educational attainment of procurement staff and the professional manner in which they discharge their duties (Raymond, 2008). Breaches in procurement is the result of lack of professionalism which ultimately impedes compliance. Capacity issues relating to the procurement of infrastructure have also been attributed to poor performance in developing countries. These issues include lack of technical expertise and competencies, which often result in non-conformance to due process, and misapplication of procurement laws and regulations (World Bank, 1995, 2000, 2003).

Value for money (VfM) is an important objective in public sector procurement, considering governments' resource constraints. VfM, which is one of the fundamental objectives of procurement, is the best combination of quality principles and total life cycle costs (OGC, 2007). Globally, best practices include the strategic use of procurement to attain VfM and sustainability (UNDP, 2010). Sustainable procurement encapsulates the attainment of VfM and consideration of whole life cycle impacts of products and services on the environment and social order at large. In recent years, sustainable procurement has been promoted in countries like United Kingdom through an emphasis on social value considerations in public procurement bids (see Wright, 2015; Awuzie and McDermott, 2016). For procurement of infrastructure to be sustainable, there is a need for the use of contracts and performance management to meet social, environmental, and economic goals (Laryea et al., 2013). These are often achieved through specification, contractor selection and award principles that are based on sustainability and whole life cycle considerations (OGC, 2007). Contractors

are expected to be selected competitively to ensure price optimisation. Competitiveness inspires a bigger supplier engagement at the tendering phase through advertising, sourcing reviews, prequalification and open processes. Procurement requests must be widely circulated to enhance the possibility of receiving a good response from the market resulting in the award of competitively priced contracts.

The principle of accountability in procurement ensures procurement personnel take responsibility for their decisions and choices during the procurement process. This accountability in public procurement is paramount given that infrastructure procurement remains a key avenue for corrupt activities to occur (Locatelli et al., 2017; Owusu et al., 2019). Similarly, the principle of transparency ensures that procurement rules and requirements of the procurement process are publicised to all prospective suppliers prior to they being applied. However, the apparent lack of record keeping and data collection within public institutions can hinder efficient monitoring of the procurement process targeted at enhancing transparency (Bolton, 2006). Public procurement should also be carried out in an equitable manner that reflects fairness. Public procurement reflecting equity is concerned with fairness or economic justice or equitable treatment to all participants. Good public procurement is impartial, consistent, and therefore reliable (Adewole, 2014).

Building on the above review of literature, the next section conceptualises the relationship between procurement capacity of public agencies and attainment of procurement objectives in the procurement of infrastructure.

Conceptual Framework

To clearly conceive the phenomenon under investigation, it is advocated that the investigation must be underpinned by appropriate literature and reference to existing and similar knowledge (Saunders et al., 2007). This provides a theoretical basis as well as practical guide for the conduct of the investigation. Similarly, UNDP (2007, 2010) guidance on assessment of capacity related issues in procurement advocates setting the tone for capacity assessment through a review of evidence in addition to stakeholder engagement to enable identification of an appropriate focus. To this end, the literature review providing the theoretical base of the study has explored areas relating to infrastructure provision and procurement. This has highlighted issues regarding the socio-economic significance of infrastructure, procurement capacity and procurement objectives.

It is well-established, based on studies in several domains (e.g. Tassabehji and Moorhouse, 2008; Smits et al., 2017; Devece et al., 2017; Mahamadu et al., 2018), that organisational capability or capacity has an impact on the fulfilment of a function or performance. For instance, studies conducted by Devece et al. (2017) on the outcome of information management capability on organisational performance, revealed a causal link between capability and three institutional performance measures - competitiveness, customer fulfilment and productivity. Mahamadu et al. (2018) also found a causal link between building information modelling (BIM) capability of construction organisation and the success in delivering BIM. Similarly, Smits et al. (2017) reported a link between a component of BIM implementation capability and construction project performance.

Aligned to the foregoing discussion, procurement capacity of public agencies is thus similarly expected to have an impact on the attainment of infrastructure procurement objectives. However, what remains unclear, is the specific nature of this relationship, regarding an understanding of the degree to which components/elements of procurement capacity contribute to the attainment of infrastructure procurement objectives. In other words, it is unclear which components/elements of procurement capacity have the most impact in achieving specific procurement objectives. A useful step in closing this knowledge gap is to put forward a research framework that ties together the key concepts under investigation to drive the empirical phase of the study. Such a framework is proffered by Figure 1.

[Insert Figure 1]

The figure integrates in a unified and coherent manner the main facets of the knowledge gap (i.e. organisational procurement capacity and attainment of procurement objectives). Based on the literature discussed, the figure depicts examples of the constituent of organisational procurement capacity (see the left hand side of Figure 1) and examples of procurement objectives pertinent to the procurement of infrastructure (see the right hand side of Figure 1). Presented as part of the organisational procurement capacity are areas including: leadership; availability of policy, frameworks, rules and procedures for procurement; availability of financial resources for procurement; human resources management; and availability of material resources and infrastructure. The examples of procurement objectives pertinent to the procurement of infrastructure include: transparency; compliance; value for money; innovation; sustainability; accountability; promotion of equality, diversity and opportunity; and competition. The next section presents how the conceptual framework was operationalised.

Research Methodology

The research sought to investigate the extent of influence or impact of procurement capacity components/elements on the attainment of procurement objectives in the procurement of infrastructure. The study therefore adopted a quantitative research strategy (i.e. a survey) as the main strategy of inquiry in line with the conceptual framework. The quantitative approach was adopted due to its suitability for capturing and exploring relationships between factors (Yin, 2009). Other researchers have also adopted the survey strategy to investigate and assess procurement capacity issues (e.g. Basheka, 2010; Addo-Duah et al., 2014; Mahamadu et al. 2018; Manu et al., 2018, 2019). The adoption of this strategy therefore ensured that the experience and views of the procurement respondents were adequately captured.

Survey Design

The study targeted personnel involved in procuring infrastructure in public institutions in Ghana and Nigeria. Three locales were targeted in Ghana (i.e. Ashanti, Greater Accra and Eastern Region) and two locales were targeted in Nigeria (Kaduna and Oyo State). The Greater Accra and Ashanti Regions were purposively selected because of their geopolitical significance. The Greater Accra region houses the capital city of Ghana, which is the largest city by population. The region is where all the various

government ministries and headquarters of quasi-government institutions are located and by extension it has a greater share of infrastructure procurement activities. The Ashanti Region was selected because it has the highest number of districts, and it is the home of the second largest city by population in Ghana. The Eastern region lies between the two regions and it, therefore, serves as an important link between the two largest cities.

Kaduna State and Oyo State were selected because they have key towns in Nigeria; Ibadan in Oyo State and Zaria and Kaduna in Kaduna State. Furthermore, government development plans (see Oyo State Government (2010) and Kaduna State Government (2013)) have revealed serious infrastructure shortfalls in Oyo and Kaduna state. The survey instrument was distributed to personnel engaged in procurement of infrastructure within the public sector in the two countries. The personnel were procurement professionals and staff within the built environment (e.g. architects, quantity surveyors, civil engineers and urban planners) who are engaged in the procurement of infrastructure.

The designed survey instrument sought data on the professionals' background, the adequacy of procurement capacity of their organisation, and the extent to which their organisation achieves procurement objectives in the procurement of infrastructure. The professionals' background, which was the first section of the questionnaire, captured data on their professional role, education, number of years worked within the current role, and number of years worked as an infrastructure procurement personnel.

The second section of the questionnaire was dedicated to the professionals assessing the adequacy of organisational procurement capacity within their organisations. Drawing from the procurement capacity literature discussed above, particularly the organisational capacity facet (e.g. OECD and World Bank, 2004; UNDP, 2006; Geng and Doberstein, 2008; Aliza et al., 2011; Meyer, 2014) 23 organisational procurement capacity items were operationalized. The items are aligned to the areas of organisational procurement capacity of the Millennium Challenge Corporation's (MCC) procurement maturity model (Meyer, 2014) and capacity areas offered by OECD and World Bank, (2004) and UNDP (2006). The respondents indicated the adequacy of the 23 capacity items within their organisation using a five-point Likert scale ranging from 1 (very inadequate) to 5 (very adequate).

The last section of the questionnaire assessed the level of achievement of procurement objectives. Twelve procurement objectives (e.g. value-for-money, transparency, accountability, competition, innovation, fairness, promotion of equality and diversity, and sustainability) drawn from literature (e.g. Walker and Brammer, 2009; Ambe and Badenhorst-Weiss, 2012) were assessed. Similarly, a five-point Likert scale was used: 5 = very high; 4 = high; 3 = moderate; 2 = low; 1 = not at all.

The rate of response of a survey questionnaire is usually influenced by the layout and its physical attractiveness. Therefore, according to Asiedu and Alfen (2015), the organisation and language used in drafting the survey instrument should take into consideration the target respondents considering its general appeal and ease of reading. In a quantitative study, validity examines the extent to which a concept is accurately measured (Heale and Twycross, 2015). In the context of this study, ensuring validity was through pre-testing of the questionnaire to see if it covered the relevant domain related to the construct it was designed to measure. According to Gill

and Johnson (2010), pre-testing questionnaires is a significant step in survey because of the difficulty in knowing how respondents will interpret and respond to the questions. Based on these assertions, the designed questionnaire was pretested amongst public personnel involved in infrastructure procurement to ensure its suitability. In the two countries, questionnaires were hand delivered and collected in 2016/2017. Hand delivery and collection was used to ensure good response rate, as the postal system in both countries can be unreliable for a postal survey. Table 2 shows a summary of questionnaires distributed in each country and their respective response rate. Due to the non-availability of database of public agencies that procure infrastructure within these two countries of study it was difficult to obtain an appropriate sampling frame. Rowley (2014) advised that in such an instance it is appropriate to resort to a non-probability sampling approach. Non-probability sampling allows for the determination of the sample size when there is no existing sampling frame and where they cannot be randomly selected (Rowley, 2014). The purposive sampling approach was therefore employed in this study. The purposive sampling technique was used to reach personnel in public agencies who are involved in the procurement of various types of infrastructure. In all, 853 questionnaires were administered to such personnel comprising of 480 (56%) in Ghana and 373 (43%) in Nigeria. Out of this, a total of 590 useable questionnaires (i.e. 69.17%) were retrieved in Ghana (n = 302; 62.92%) and Nigeria (n = 288; 77.21%).

[Insert Table 2]

Data Analyses

Both descriptive statistics (e.g. frequency and mean) and inferential statistics (i.e. exploratory factor analysis and multiple linear regression) were used to analyse the data. Exploratory factor analysis (EFA) was adopted because of its suitability for data reduction and extracting underlying components or dimensions of a construct/concept (Ahadzie et al., 2008; Field, 2013). EFA was used to extract the components of organisational procurement capacity. Multiple linear regression (MLR), due to its suitability for exploring relationships between variables, was used to interrogate the relationship between the components of organisational procurement capacity and the attainment of procurement objectives. The use of MLR enabled the determination of the contributions of the components to the attainment of procurement objectives.

Results

The results are separated into three sections. The first section presents descriptive statistics of the information on the respondents' demographics. In the second section, the results of the EFA of the organisational procurement capacity items are presented. The third section presents the results of the MLR.

Respondents' Demographic Information

Table 3 presents a summary of the respondent's demographic information.

[Insert Table 3]

The majority of the respondents were procurement officers (35.1%), followed by engineers (24.7%), quantity surveyors (10.7%), administrators (9.5%), purchasing

officers (5.9%), architects (5.4%), estate surveyors (4.2%), builders (4.1%), urban planners (3.9%) and land surveyors (1.4%). The rest of the respondents (6.6%) include accountants, geologist, hydrologist, engineering technologist and environmental health officers. Most of the respondents (66.9%) had acquired a minimum of bachelor's degree while 57.9% had over 5 years' experience in their professional role. The mean experience of the respondents in their professional role is 9.12 (SD=7.29). Similarly, most of the respondents (52.4%) have over 5 years' experience in infrastructure procurement with a mean of 6.62 (SD=5.70). Overall, the respondents to the survey are sufficiently experienced in the procurement of infrastructure and therefore their responses can be deemed a credible representation of reality.

Exploratory Factor Analysis

The results of the EFA are shown in Table 4. EFA was adopted to uncover the interrelationships that exist among the variables (i.e. the capacity items) in order to find out which variables could be measuring aspects of the same phenomenon that were thought of as contributing to procurement capacity. EFA does not only present the choice of gaining a clear interpretation of the variables, but equally presents an opportunity to use the results in successive analyses (e.g. MLR) (Field, 2013).

However, there is still not a clear consensus amongst statisticians pertaining to the right sample size needed for factor analysis, which has led to the use of several rules of thumb (Field, 2013). For instance, Osborne and Costello (2004) recommend a sample size of at least 100 or five times the number of variables to be included in the principal component analysis. Meanwhile, according to Guadagnoli and Velicer (1988), irrespective of the conventional rules, the correlation between sample size and number of variables is not a significant reason for ascertaining stability but rather component saturation and absolute sample size. On the contrary, Field (2013) suggest that the absolute sample size is not the only variable to consider in ascertaining the suitability for factor solution but the absolute size of the factor loadings. Notwithstanding the several arguments on the suitability of a sample size, the EFA conducted reveals the sample size was favourable. With a sample response of 590, the results showed the average communality of the variables after extraction was more than 0.5.

Additionally, the results of the Kaizer-Meyer-Olkin (KMO) which is used to determine the suitability of sample size recorded a high value of 0.95 while the results of the Bartlett test were significant. Hence, the essential checks for factor analysis to determine the sufficiency of the sample size were favourable. Two stages (i.e. factor extraction using principal component analysis; and factor rotation using varimax rotation) were adopted for the factor analysis. The eigenvalue was set at 1.0 while the factor loading was set at 0.5 resulting in the extraction of three components. The variances explained by each of the components is as follows: Component 1 = 51.377%; Component 2 = 7.255%; and Component 3 = 5.071%; which accumulatively accounts for 63.7% of organisational procurement capacity.

Critical assessment of the latent correlations amongst the variables under each component suggest the following explanation to each component: Component 1 - Management of the procurement process; Component 2 - Human and physical resources; and Component 3 - Financial resources and management.

[Insert Table 4]

Multiple Linear Regression

The factors scores (from the EFA) for the three components of organisational procurement capacity (*management of the procurement process, human physical resources, and financial resources and management*) were further regressed, using MLR, against the 12 procurement objectives. Table 5 shows the regression results for the relationship between organisational procurement capacity and the procurement objectives. The Durbin-Watson test results all fell within 1.50 and 2.50, which shows the residual errors are not correlated (Field, 2013). Additionally, the regression equations were all significant at $p < 0.001$, while the coefficients were all significant at $p < 0.001$. Results of the adjusted R^2 suggest 'management of the procurement process', 'human and physical resources' and 'financial resources and management' explain 28.0%, 29.4%, 27.2%, 30.2%, 25.4%, 30.9%, 35.6%, 31.4%, 31.5%, 33.7%, 28.4% and 30.7% of the variance in transparency; compliance; value-for-money; promotion of equality, diversity and opportunity; private sector participation; innovation; sustainability; accountability; standardization of procurement procedures; competition in procurement process; cost effectiveness; and professionalism; respectively. The regression reveals that all three components of organisational procurement capacity are significantly and positively related to the attainment of all the 12 procurement objectives studied. However, the contributions of the three components (indicated by the b –values) to the attainment of the objectives vary. 'Management of the procurement process', 'human and physical resources' and 'financial resources and management' are the greatest contributors to the attainment of seven, one and four procurement objectives, respectively.

In all, 'management of procurement process' (which encapsulates policy and legal framework, public engagement, mutual accountability mechanisms and leadership) is the most important contributor to the attainment of procurement objectives.

[Insert Table 5]

Discussion

The EFA revealed a clustering of the procurement capacity items into three components (i.e. 'management of the procurement process', 'human and physical resources' and 'financial resources and management') contrary to the eight organisational procurement capacity areas by UNDP (2006). In discussing the results much effort was given to the pattern-matching instead of discussing the individual items under each main component. This thread became necessary because of the need to avoid the repetition of issues that have already been presented and discussed in the conceptual underpinning of this study.

The component, '*management of the procurement process*', which is explained by seven variables/capacity items, is observed to be the most significant organisation procurement capacity component, accounting for 51.377% of the variance in

organisational procurement capacity. The seven variables identified under this component are: *internal mechanisms that ensure conformance to national policy and legal frameworks for procurement; internal anti-corruption mechanisms; vision and strategic planning for procurement; effective procurement auditing procedures; dialogue with civil society and stakeholders; application of sanctions for non-compliance; leadership and top management support for procurement; inclusion and participation of civil society organisations and media in the public procurement process; and inclusion and participation of private sector institutions in procurement process.*

The procurement process comprises all activities throughout the project, starting from establishing the client's aspirations and business case through to checking the compliance of the previous requirements (Alencastro et al., 2017). Managing the procurement process therefore implies managing all the activities throughout the project. The BS 8534 (2011) which deals with construction policies, strategies and procedures divides the procurement process into four key parts namely: initiation, procurement strategy, procurement tactics, and managing performance and delivery. Within the initiation phase, the business case is developed, and project objectives, aspirations and needs are further identified (Alencastro et al., 2017). Within the strategic phase, the initial conceptualisation of the project is translated into objective information through the client brief. This will then be followed by an assessment of the procurement method as well as the planning of the appropriate strategy (BS 8534, 2011). During the procurement tactics phase, all supporting activities are defined in order to monitor and make accountable the project performance (Alencastro et al., 2017). In the final phase, which is the management of performance and delivery, the project goals developed in the earlier phases are linked to the specific project outcomes in the design, construction and operation phases of the project (Alencastro et al., 2017).

It is worth noting that operating within these four phases involve the use of resources. However, the resources are more likely to be misappropriated in less formalised public organisations. The poor management of resources affects procuring entities in achieving their intended objectives (Changalima et al., 2020). Since the fundamental principles of a worthy procurement practice include accountability and consistency, which requires entities to engage contractors competitively through a fair process unless prevailing conditions require otherwise (Kakwezi and Nyeko, 2019), the absence of an internal mechanism that ensures conformance to national policy and legal frameworks for procurement may lead to corrective instead of preventive actions. Though there exist mixed reactions concerning the contributions of some of the variables identified in Component 1 towards the effective and efficient management of the procurement process, all the seven variables identified under this component stress the need to properly manage the procurement process as efficiently and effectively as possible. The onus lies with various organisations to strive to properly manage the procurement process through the identification of the needed opportunities when they arise, and properly managing the internal operations. Guarnieri and Gomes (2019) iterated that in managing the procurement process, there is always the tendency of the procurement function to move towards a strategic role within an organisation. There is therefore the need for public procurement entities to ensure that the mindsets of procurement practitioners are directed towards the

strategic perspective of the procurement function (Changalima et al., 2020). In the view of Mrope (2018), this strategic role of procurement can only be attained when it is inculcated in the corporate strategic planning process and implementation at the same level as the other functional areas.

Component 2 (i.e. *human and physical resources*) from Table 3 extracted seven variables: *highly motivated and satisfied procurement staff; physical and logistical resources that support procurement (e.g. means of transport, office space etc.); well remunerated/compensated procurement staff; training and effective procurement personnel capacity development; computing and ICT facilities; effective human resource management of procurement staff; and number of qualified procurement personnel*. These variables together account for 7.255% of organisational procurement capacity.

The human resource refers to the people whose knowledge, skills and abilities are utilised to create and deliver the product and service (Guests, 2019). This resource is considered as any organisation's greatest asset because an organisation cannot be properly managed or create and deliver products and services without using the knowledge, skills and abilities of its workforce (Guests, 2019). This implies that for any procurement authority to be on top of its activities it must pay attention to its human resources. A proficient procurement staff is therefore considered one of the pillars of the basis for procurement reforms and mainstreaming (Adjei-Bamfo and Maloreh-Nyamekye, 2019), which directly has an impact on professionalism. Just as the human resource strategic plan of an entity will seek to attract the right types and number of people, develop the knowledge, skills and abilities of employees, and retain the employees within the entity (Guests, 2019), successful procurement entities pay particular attention to its procurement staff. Since procurement staff can be confronted with various issues including the absence of data about the procurement processes, and principles and legal frameworks, there is the need for procurement entities to spend adequate time in training its human resource to ensure compliance with procurement rules. As extracted in Component 2, where qualified procurement staff are employed, highly motivated and satisfied, well remunerated/compensated, and well trained to improve their capacity, there is the tendency for the human resource to function very well to help the entity achieve its objectives.

The physical resources on the other hand refers to the tools or objects required by an organisation to deliver its products or services (Guests, 2019). Such resources may include tangible items that are necessary and available for a business to function. In the view of Cutrina (2020), physical resources are all the tangible resources owned and used by a company such as land, manufacturing equipment, office equipment, information technology and its attendant equipment, and the likes. Procurement entities need some physical resources to be able to function effectively and efficiently (Manu et al., 2019; Yevu and Yu, 2019). The variables that fell under physical resources in Component 2 include physical and logistical resources that support procurement (e.g., means of transport, office space etc.) and computing and ICT facilities. In a typical procurement entity, the onus always lies with management to identify the appropriate physical resources needed to achieve their objectives. In this case, the entity must have a physical resource plan that identifies how to obtain the

needed resources, maintain those resources, and acquire new resources when the need arises.

The component '*financial resources and management*' extracted six variables: procurement rules and procedures that incorporate lifecycle approach to analysis and costing; capacity to self-finance projects (e.g. internally generated funds or public/private partnerships); integration of procurement with internal financial management and budgeting systems; capacity to meet project payment obligations on time; capacity for long term planning and allocation of funds for procurement; and existence of policies aimed at promoting social or environmentally responsible procurement. These collectively explain 5.071% of organisational procurement capacity.

Financial resource refers to the money or capital used to fund an organisation's activities. In the broad sense, this resource may include the money that is generated by sales, loans, grants or donations (Guests, 2019). Finance plays a key role in procurement so it is important to understand the value it offers. Procurement activities consume monetary resources of an organisation which has to be budgeted in advance to prepare realistic cost estimations. This notwithstanding, Changelima et al. (2020) report that in practical sense there are procurement undertakings conducted without appropriate budgeting. Since unrealistic budgets affect the conduct of procurement activities (Agwot, 2016), procurement entities must ensure that what has been budget for truly reflect the estimated cost of procuring the items from the market. This will in the long-term help in achieving value for money (VfM). VfM is the balance between performance and price that offers the highest total benefit for a selection criterion (Asare and Prempeh, 2016). The use of the VfM principle in the procurement process therefore ensures the selection of the tender that gives the best set of factors comprising life-cycle cost, service, quality, and other factors in order to meet the required needs. However, accepting the lowest price tender can have negative ramifications with implications for the achievement of social objectives. Very low tender prices are likely to push the successful tenderer to cut costs, by taking shortcuts that can affect the quality of the product. From the findings of this study, it is evident that implementing procurement rules and procedures that incorporate lifecycle approach to analysis and costing, entities building their capacity to self-finance projects, integrating procurement with internal financial management and budgeting systems, meeting project payment obligations on time, long term planning and allocation of funds for procurement, putting in place policies aimed at promoting social or environmentally responsible procurement are all ways that can help improve and manage an entity's financial resources.

From the foregoing, it is not surprising from the results of the MLR that component 1 (i.e. *management of the procurement process*) has the greatest impact on the attainment of seven out of the 10 procurement objectives. In countries where the principle of equity, fairness and transparency has been the key political concern, the use of a regulatory framework to manage public procurement has been the status quo

(Fourie and Malan, 2020). This arrangement echoes a conventional attitude to public procurement by depending on regulation as the fundamental way of checking management process and implementation of policy. The effect of management of the procurement process on accountability is also consistent with the findings of the Economic Commission for Africa (2003), which observes an improved public administration which stresses on openness and accountability to the needs of customers is considered a good governance practice. This is the reason why steps taken to guarantee accountability are important in decentralized governance systems (Taamneh et al., 2020). The strong effect of the procurement management process on compliance is also consistent with studies which argue that compliance can be achieved through clearer rules, more supplier awareness and effective enforcement of procurement rules (Asare and Prempeh, 2016; Rahmani et al., 2017; Loader, 2018; Larbi et al., 2019).

From the MLR, the need for financial resources towards the attainment of procurement objectives cannot be overemphasised, especially as component 3 (i.e. *financial resources and management*) is the next strongest contributor to four out of the 12 objectives analysed. For instance, the need for financial resources and management is a fundamental requirement in seeking private sector participation in the provision of public infrastructure towards achievement of VfM. Private sector participation offers the possibility of offering the services required by the public in a manner that can provide VfM (Walker and Brammer, 2009). This is because private sector participation can offer scope for innovation in how services are delivered, and better management of project and the resulting asset. Given the significance of public procurement, there should be adequate financial resources and their management to realise the triple constraint of economic (cost effectiveness), environmental and social success. At the tendering stage, the interest of public authorities should lie with stimulating suppliers' offers, while seeking to select the lowest evaluated responsive tender that meets social and environmental considerations (Rahmani et al., 2017).

From the regression analysis, component 2 (i.e. *human and physical resources*) was also identified to contribute to attaining all the procurement objectives. In recent times, the worlds of human resources and procurement have increasingly become entwined. The traditional procurement organisation has now evolved into a sourcing and procurement services organisation with more strategic function of procurement closely working with the human resource management. There is therefore the need to enhance the human resource of procurement teams to unlock their ability to achieve procurement objectives. The human resource capacity boosters for procurement personnel can be in the form of highly motivating the staff, remunerating, and compensating them well, training them well to progress in their careers, among other things. Basically, physical resources are in the form of material resource and infrastructure. According to Li (2014), logistics and communication are two of such physical resources which often impact procurement activities. Within the context of this study, component 2 revealed that the physical resources which when put in place has the ability to affect achievement of procurement objectives are in the form of logistics (i.e. means of transport, office space, etc.), and computing and ICT facilities. These facilities, especially, the computing and ICT have the potential to improve the capacity of the human resource to help achieve the procurement objectives of a given organisation. Though component 2 contributes to the attainment of all the procurement objectives, the MLR shows that it is the greatest contributor to the achievement of value

for money (VfM). Well qualified and highly motivated procurement personnel within any public organisation is therefore needed to identify and remove waste in the procurement process, and, above all, enhance VfM.

Conclusions

The research investigated the effect of procurement capacity on the attainment of procurement objectives. The study has empirically demonstrated that the attainment of infrastructure procurement objectives is inextricably connected to the adequacy of organisational procurement capacity of public procurement entities. The findings from the study suggest that the organisational procurement capacity comprises of three components: *management of the procurement process*; *human and physical resources*; and *financial resources and management*. The findings further showed the impact of various components of the organisational procurement capacity on the attainment of procurement objectives. In this regard, '*management of the procurement process*', which encapsulates procurement capacity items, such as conformance to policy and legal frameworks for procurement and anti-corruption, has the greatest contribution to the attainment of procurement objectives in the procurement of infrastructure. Significant investments and commitments are therefore needed to strengthen the management of the procurement process in the procurement of infrastructure.

Overall, the outcome of the above study has provided robust and unique insights on how specific procurement objectives are affected by organisational procurement capacity. The implications of the findings are evident for the procurement agencies within the two countries of study as well as other developing countries with procurement settings like those studied in this paper. The implications are in two-folds, i.e. to policy makers and to public procurement agencies. The findings could inform policy makers at various levels of public institutions to formulate, resource, and implement capacity-building development plans that have appropriate development priorities based on the relative contributions of procurement capacity components to the attainment of the desired procurement objectives. Aligned to this, multilateral organisations that fund infrastructure and procurement reforms in various countries could consider prioritising investment into the development of specific capacity components that contribute the most to the attainment of desired procurement objectives. Also, to public agencies involved in infrastructure procurement, this study provides a strong justification for investment into developing their procurement capacity. This finding provides an important justification for the need for continued investment in building the capacity of such agencies to ensure and enhance sustained attainment of procurement objectives.

While the findings of this study provide some useful inferences, key limitations are acknowledged. The study adopted a quantitative survey of procurement personnel from various public institutions. The underlying explanations regarding the effects of the observed procurement capacity on the attainment of procurement objectives could, therefore, not be explored deeper. In view of this, further studies could be conducted using qualitative approaches to unearth further empirical realities.

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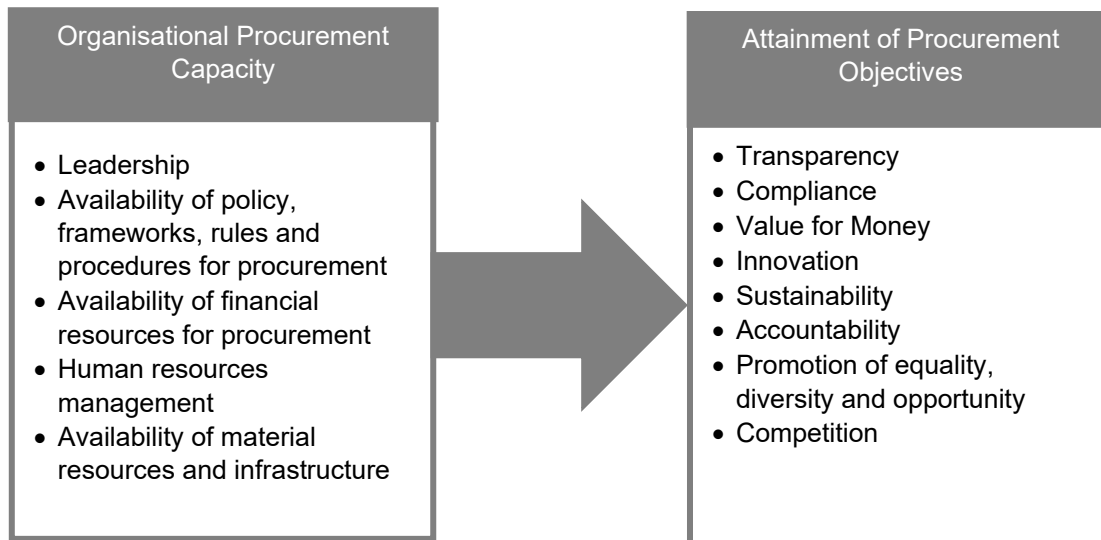


Figure 1: Conceptual framework of the relationship between organisational procurement capacity and attainment of procurement objectives

Table 1: Core Areas of Organisational Procurement Capacity (UNDP, 2006)

Core Areas	Description
Leadership	Strategic direction, improved understanding and relationships, and greater collective effectiveness in procurement
Policy framework	Provision of framework, adherence to rules and practices within which competition is maximized
Mutual accountability mechanisms	Practices that enhance efficient, responsive, transparent and accountable public administration
Public engagement	Engaging the private sector, individuals, civil society organisations, and media in public procurement
Human resources	Exercising capacity is made up of proportionate resource endowment and human capacity development
Financial resource	Financial efficiency and capacity to manage public procurement is within budget and fiscal constraints
Physical resources	Availability of material resources and infrastructure
Environmental resources	Application of environmentally sustainable and socially inclusive principles

Table 2: Response Rate

Country	Locations	Questionnaire administered	Useable questionnaire received	Response rate
Ghana	Ashanti, Eastern and Greater Accra Region	480	302	62.92%
Nigeria	Oyo State and Kaduna State	373	288	77.21%
Combined		853	590	69.17%

Table 3: Demographic Information of the Respondents

Item	Frequency	Percent
<i>Professional role</i>		
Procurement officer/personnel	139	23.6
Engineer	146	24.7
Quantity surveyor	63	10.7
Purchasing officer/personnel	35	5.9
Architect	32	5.4
Land surveyor	8	1.4
Administrator	56	9.5
Urban/Town planner	23	3.9
Estate surveyor	25	4.2
Builder	24	4.1
Other role	39	6.6
<i>Highest Education</i>		
Pre-bachelor's degree education (secondary/diploma/HND)	187	31.7
Bachelor's degree	242	41.0
Postgraduate diploma	58	9.8
Masters/PhD degree	95	16.1
Other	6	1.0
Non-response	2	0.3
<i>Experience in professional role (years)</i>		
0-5	248	42.0
6-10	133	22.5
11-15	77	13.1
16-20	59	10.0
Over 20	46	7.8
Non-response	27	4.6
Mean = 9.12; Standard deviation = 7.29		
<i>Experience in infrastructure procurement (years)</i>		
0-5	281	47.6
6-10	128	21.7
11-15	39	6.6
Over 15	40	6.8
Non-response	102	17.3
Mean = 6.62; Standard deviation = 5.70		

Table 4: Exploratory factor analysis results

Organisational procurement capacity items	Communalities after extraction	Components of organisational procurement capacity		
		1	2	3
Internal mechanisms that ensure conformance to national policy and legal frameworks for procurement	0.631	0.724		
Internal anti-corruption mechanisms	0.618	0.697		
Vision and strategic planning for procurement	0.660	0.690		
Effective procurement auditing procedures	0.657	0.688		
Dialogue with civil society and stakeholders	0.658	0.685		
Application of sanctions for non-compliance	0.663	0.678		
Leadership and top management support for procurement	0.647	0.654		
Inclusion and participation of civil society organisations and media in the public procurement process	0.628	0.644		
Inclusion and participation of private sector institutions in procurement process	0.540	0.548		
Highly motivated and satisfied procurement staff	0.725		0.763	
Physical and logistical resources that support procurement (e.g. means of transport, office space etc.)	0.679		0.707	
Well remunerated /compensated procurement staff	0.679		0.694	
Training and effective procurement personnel capacity development	0.680		0.691	
Computing and ICT facilities	0.651		0.657	
Effective human resource management of procurement staff	0.602		0.594	
Number of qualified procurement personnel	0.555		0.545	
Application of sustainability principles in procurement (e.g. in specifications, tender selection criteria etc.)	0.559			
Procurement rules and procedures that incorporate lifecycle approach to analysis and costing	0.642			0.705
Capacity to self-finance projects (e.g. internally generated funds or public/private partnerships)	0.636			0.683
Integration of procurement with internal financial management and budgeting systems	0.638			0.681
Capacity to meet project payment obligations on time	0.652			0.659
Capacity for long term planning and allocation of funds for procurement	0.643			0.644
Existence of policies aimed at promoting social or environmentally responsible procurement	0.606			0.577
Eigen value		11.817	1.669	1.166
Variance explained		51.377	7.255	5.071
Cronbach alpha		0.913	0.913	0.892

Notes:

Extraction method and rotation method are principal component analysis and varimax rotation, respectively.

KMO = 0.953. The variance explained by the three factors = 63.70%.

Bartlett's Test of Sphericity: Chi-Square = 9373.783 (df =253), p < 0.001.

The factor loadings less than 0.5 have been suppressed.

Table 5: Regression Results for the Relationship between Organisational Procurement Capacity and the Procurement Objectives

Procurement objective (dependent variable)	Predictor variable co-efficient				Model statistics & ANOVA						
	Constant	Management of the procurement process	Human and physical resources	Financial resources and management	R	R ²	Adjusted R ²	R ² Change	F Change	Durbin- Watson test	ANOVA F
Transparency	3.636*	0.330*	0.285*	0.237*	0.533	0.284	0.280	0.065	51.521*	1.899	75.223*
Compliance	3.629*	0.329*	0.259*	0.212*	0.546	0.298	0.294	0.061	49.166*	1.864	80.296*
Value-for-money	3.725*	0.290*	0.307*	0.238*	0.525	0.276	0.272	0.067	52.518*	1.745	72.265*
Promotion of equality, diversity and opportunity (e.g. for SMEs, marginalised groups in society etc.)	3.482*	0.342*	0.288*	0.282*	0.552	0.305	0.302	0.087	71.499*	1.717	83.336*
Private sector participation	3.386*	0.330*	0.206*	0.346*	0.508	0.258	0.254	0.040	30.974*	1.826	65.951*
Innovation	3.501*	0.324*	0.275*	0.313*	0.559	0.312	0.309	0.085	70.342*	1.723	85.951*
Sustainability	3.580*	0.308*	0.298*	0.356*	0.599	0.359	0.356	0.103	91.155*	1.741	105.949*
Accountability	3.759*	0.313*	0.291*	0.306*	0.563	0.317	0.314	0.097	80.775*	1.797	88.001*
Standardisation of procurement procedures	3.708*	0.344*	0.236*	0.301*	0.564	0.319	0.315	0.067	55.902*	1.829	88.519*
Competition in procurement process	3.589*	0.399*	0.231*	0.374*	0.584	0.341	0.337	0.052	44.531*	1.735	98.017*
Cost effectiveness	3.664*	0.260*	0.268*	0.323*	0.537	0.288	0.284	0.080	64.173*	1.864	76.744*
Professionalism	3.833*	0.237*	0.308*	0.314*	0.557	0.310	0.307	0.070	57.712*	1.869	85.312*

Notes: * $p < 0.001$