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A QUALITATIVE APPROACH TO INVESTIGATE GREEN INFRASTRUCTURE PROCUREMENT IN THE CONSTRUCTION INDUSTRY

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ABSTRACT

The procurement phase is pertinent to the infrastructure project lifecycle. Green Procurement (GP) through Green Infrastructure (GI) may enhance the sustainability of construction projects. Hence, GP is utilised in an effort to achieve Sustainable Development Goals (SDGs) related to sustainable infrastructure through the tendering or contractor selection process. There is a paucity of studies concerning Green Infrastructure Procurement (GIP) in Nigeria's construction industry. Thus, this research investigated the level and perceived hindrances facing the implementation and identified measures to improve GIP applications in Nigeria's tendering process. The study employed a qualitative approach via virtual interviews to accomplish the study's objectives. Twenty-six interviewees were engaged via a convenient sampling technique and achieved saturation at the 23rd interviewee. The study utilised a thematic method to analyse the collected data. Results show that GIP practice is low in the Nigerian construction industry. Possible barriers were identified. Developing an institutional framework to set standard guidelines for Nigerian GIP, encouraging incentive mechanisms in government procurement to enhance GIP performance, and periodic monitoring of progress achieved to improve GIP were measures suggested to improve GIP implementation. The research will provide insight into GIP and stir relevant stakeholders, especially government authorities towards enacting policies and programmes that will improve achieving SDGs via promoting GIP at the early contract administration stage.

Introduction

Physical infrastructure are facilities that meet the need for water and food, energy, jobs, well-being, and other human services. Infrastructure is a component of contemporary society (Organisation for Economic Cooperation and Development, 2015). It is the backbone of several economic accomplishments. Dithebe *et al*. (2019) and Manu *et al*. (2021) affirmed that governments are the major client of physical infrastructure development. Thus, basic infrastructure project delivery is germane to economic growth, especially in developing countries. This includes power, roads, dams, hospitals, schools, railways, and telecommunication (Ebekozien *et al.*, 2022a). Asiedu *et al*. (2021) asserted that infrastructure projects are critical drivers toward accomplishing the United Nations Sustainable Development Goals linked with infrastructure. The United Nations Economic and Social Council (2016)

stated that infrastructure provision yields global results. By 2015, construction output worldwide may increase by 70% (Global Construction Perspectives and Oxford Economics, 2013). This is to bridge the infrastructure gap and improve achieving the SDGs. Public infrastructure procurement is pertinent in the delivery of public infrastructure. United Nations Office for Project Services (2010) described public procurement as activities comprising preparation, requests highlights, obtaining and solicitation of bids, assessment of bids, analysis and contracts award, contracting, and all stages of administration until delivery of the goods or services, contract's end, or the useful life of an asset.

This public infrastructure consumes a high amount of energy during construction, operation, and demolition, thus heightening the risk of air pollution, flooding, land degradation, and other harmful environmental problems (Ebekozien *et al.*, 2022a). Energy used during a buildings' life-cycle accounts for up to 40% of the world's greenhouse gas (GHG) emissions (United Nations Environmental Programme, 2009; Energy Information Administration, 2014). Yeatts *et al.* (2017) opined that buildings consume higher energy globally. This includes developing and developed countries. They reported that 42% of the energy consumption is from structures and 35% emits GHG emissions in Europe. The European Commission (2007) and Cellura *et al*. (2014) reported that 50% of the electricity consumed and 36% of the country's GHG emissions are linked with structures in the United States of America. Building energy consumption is above 50% in Malaysia and Nigeria (Hassan *et al.*, 2014; Energy Commission of Nigeria, 2014). Masson-Delmotte *et al*. (2018) discovered that between 2030 and 2052, world temperatures might increase by 1.5°C. If not mitigated, climate change could worsen and threaten sustainable development. For better sustainable development, construction practitioners should consider environmentally friendly components during the procurement process (green procurement). This is the study's core issue.

Besides the authors' preliminary findings presented at a conference in mid-2023, Alqadami *et al.* (2020) studied barriers facing GIP implementation in building projects in Malaysia, and researchers in Africa, for example, Ghana and Nigeria, have studied infrastructure procurement and green infrastructure, but not regarding green infrastructure procurement. Several studies (Yeatts *et al*., 2017; Opoku *et al.*, 2019; Agyekum *et al.*, 2020) focused on hindrances faced by green infrastructure projects. Besides Alqadami *et al*. (2020), they employed a quantitative method with insufficient in-depth measures to proffer solutions to the challenges. Mahamadu *et al*. (2018) and Ebekozien (2019) found a need for more quality and quantity of basic physical infrastructure. They affirmed that the procurement approach by the personnel contributed to the deficit in the quality and quantity of basic physical infrastructure. Their findings are corroborated by the World Bank (2013), which identified inadequate skills in the public procuring entities as a key barrier to infrastructure procurement. Asiedu *et al.* (2021) recommended eight infrastructure procurement skills to boost efficiency and competencies in Sub-Saharan Africa.

In Nigeria, scholars (Onuoha *et al.*, 2017; Oyewole *et al.* 2019; Ahmad *et al.*, 2020; Ebekozien, 2020a) worked on green infrastructure procurement. Oyewole *et al*. (2019) examined developers' readiness to invest in green infrastructure in Abuja. Ahmad *et al*. (2020) and Ercin and Yahuza (2020) identified various hindrances and user needs in green infrastructure in Nigeria. Wang (2022) affirmed that various governments had planned to promote Green Infrastructure Development (GID) as part of efforts to achieve the Sustainable Development Goals. Achieving the SDGs linked to infrastructure development, especially in developing countries, may be threatened if caution is not taken to embrace green infrastructure procurement to promote infrastructure greening. To ensure environment-friendly infrastructure, sustainable infrastructure has been embraced along with sustainable development. The Environmental Protection

Agency (2014) described green infrastructure as "*...the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest, and reuse, or landscaping to store, infiltrate, or evapotranspiration stormwater and reduce flows to sewer systems or to surface water...*" Pauleit *et al.* (2019) opined that green infrastructure comprises multifunctional, networked, and natural structures that accrue numerous advantages to the environment and society. Green infrastructure assists in proffering solutions to urban encumbrances. These solutions include embracing the transition to a green economy, biodiversity conservation, climate change adaptation, promoting social cohesion, and improving the city's sustainable development.

Therefore, green procurement may enhance construction project sustainability. The concept is understood as utilising environmental criteria in goods and services selection and assessment (Smith & Terman, 2016). Greening infrastructure procurement will support the infrastructure development capacity to accomplish the SDGs associated with infrastructure. How far this mechanism is employed during infrastructure procurement and how much hindrances GIP implementation faces are yet to be explored in developing countries. Thus, the study asks the subsequent question: What are the hindrances facing GIP initiatives in Nigeria's construction projects? Preceding studies did not use a qualitative approach and it was not addressed in developing countries' context as discovered in the reviewed literature. Besides filling the methodological gap, this study will enlighten and improve the theoretical background to the body of knowledge. Thus, green procurement may be a mechanism to promote SDGs linked with sustainable infrastructure provision via formulating environmental policies and programmes in the tendering process or contractor selection. The study investigates the perceived hindrances facing the implementation and recommends feasible measures to promote GIP applications in the Nigerian tendering process via the following objectives:

(i) To identify the relevance of GIP in the construction industry.

(ii) To investigate the factors that could hinder GIP implementation in the construction industry.

(iii) To identify feasible measures to promote GIP applications in the construction industry.

Green Infrastructure Procurement

Green Infrastructure (GI) has become one pertinent strategy for achieving sustainable development. GI is also known as Sustainable Infrastructure (SI). It is a term that became common after the International Federation of Consulting Engineers (FIDIC) released the 'State of the World: FIDIC Infrastructure Report' in 2009 to raise awareness of the issues faced by the infrastructure sector. FIDIC (2012) identified that increasingly complex disasters, waste management, climate change, water scarcity, non-renewable resource depletion, urbanisation, and economic crisis as the issues that threaten the resilience of critical infrastructure and services. GI can effectively coordinate economic, social, and environmental development (De Valck *et al.*, 2019; Ying *et al*., 2022). The concept of green infrastructure is a vital knob in investigating the "*harmonious coexistence between humans and nature*" (Benedict & McMahon, 2002). Green infrastructure is a balance between nature protection and human construction, and artificial facilities (Ying *et al.*, 2022). Besides, adapting to climate change (Geneletti & Zardo, 2016), improving stormwater management capacity (Raei *et al*., 2019), and alleviating heat island impact (Livesley *et al*., 2016), the concept advocates rebuilding green network via active maintenance (Ying *et al*., 2022).

The complexity of modern infrastructure design and construction, coupled with the need for sustainable construction, redirects the procurement mechanism from the traditional to a sustainable procurement system. Chan *et al*. (2021) emphasised that sustainable construction ensures minimal negative environmental impact

and enhances optimum economic, social, and environmental benefits. Zainordin and Tan (2015) described sustainable construction as construction practices regarding material choice, environmentally friendly construction, and approaches and designs to advance performance and mitigate project load on the environment and wastage. Khan *et al*. (2018) opined that green procurement is also known as sustainable procurement. They affirmed that globally, governments are promoting sustainable procurement principles to improve efforts to meet SDGs associated with GIP delivery (Alqadmi *et al*., 2020).

There is an increase in embracing green procurement in the built environment. This is because the mechanism is a good tool for waste management and increasing product and service quality with consideration to environmental impact throughout the life cycle (Oyedokun & Garba, 2022). The procurement system, including green infrastructure procurement, faces malpractices and challenges. This includes an increased procurement cycle, supplier payment delay, contract inflation, and a high incidence of vested interest (Alqadmi *et al*., 2020). Green procurement is conducted to work on the environmental concept of an inventory base with the help of green procurement drivers (Arisa & Muturi, 2016). They identified benefits with green procurement: Asset and operational efficiency, improved staff health and safety, worker engagement, advancement, green market support, reduced risks, improved public image, and increased profitability. These benefits encounter challenges, as Kimira *et al*. (2018) identified. They are high priced, there might be a deficit in knowledge to achieve them, absence of corporate commitment, accessibility issues, no acceptance of alternatives, buying habits, and low investment. Inadequate enforcement, insufficient knowledge, high cost, passive culture, lack of guidance and tools, and weak corporate commitments were identified by Khan *et al*. (2018) as the barriers confronting green procurement in the built environment industry.

Several scholars identified hindrances to green construction practices and initiatives, but there is a paucity of literature regarding GIP in developing countries, including Nigeria. Opoku *et al.* (2015) found a lack of incentives, training building and design teams, high investment costs, a lack of construction regulations and codes, higher costs, and risk-adverse attitudes of stakeholders as barriers to green construction in the United Kingdom. Zuniga-Teran *et al.* (2020) identified innovation, financeability, socioeconomic considerations, regulatory pathways, and design standards as the key barriers facing GI implementation. In developing countries, Nigeria included, few studies have worked on barriers facing green construction implementation and practices. This includes Chan *et al.* (2018), Aghimien *et al.* (2018), Opoku *et al.* (2019), Oyewole *et al*. (2019), and Ercin and Yahuza (2020). In Chan *et al*. (2018), five clusters emerged from the 26 identified barriers.

This includes cost and risk-related, knowledge and information-related, market-related, government-related and human-related barriers. Oyewole *et al*. (2019) identified absence of government support, lack of integrated green building codes and regulations, lack of expertise, poor demand, and inadequate technology are barriers to green construction practices. Ahmad *et al*. (2020) identified the absence of key materials, lack of experts, absence of incentives and programmes from governments, and lax government policies as key barriers facing green construction practices. Hence, a comprehensive analysis of hindrances to GIP implementation in Nigeria's construction industry using a qualitative research design method of enquiry and joining the views of experts are well-intentioned. Table 1 summarises the potential barriers to GIP implementation.

Research Method

The study employed phenomenology, a type of qualitative approach. Creswell and Creswell (2018) says that phenomenology emphasises interviewees' proficiency and experience during

the interview. This study aligns with Elise and Hsu (2018) and Ebekozien *et al*. (2022a, 2022b). Elise and Hsu (2018) adopted the same data collection method to investigate sectors' green infrastructure governance roles. Similarly, Ebekozien *et al*. (2022a) used the same approach to investigate hindrances facing the construction of Nigerian hospitals using green building practices. The researchers employed virtual interviews to accomplish the study's main aim. This is complemented by reviewed academic literature. The research engaged 26 experts from Lagos and Abuja via a convenient sampling method, as presented in Table 2. It is a non-probability sampling method, where units or interviewees are selected for inclusion in the study's sample (Creswell & Creswell, 2018).

The study achieved saturation at the 23rd participant. The participants are experienced in green and sustainable construction. Lagos and Abuja are known for large construction activities (Ebekozien & Aigbavboa, 2021). The participants' locations, number of employees, ranks, and years of experience were stated in Table 2. The researchers concealed the participants' identities for privacy reasons. This aligned with Ibrahim *et al.* (2022) and Jaafar *et al*. (2021). The 26 participants include infrastructure contractors, the design

Table 1: Summarised potential barriers to GIP implementation in Nigeria's construction industry

No.	Barriers	Authors
1	Attitude of experts	Chan *et al*. (2016), Ebekozien *et al*. (2022a)
2	Overall cost of alternate energy sources	Aghimien *et al*. (2018),
3	Cost of green building technologies	Aghimien *et al*. (2018), Chan *et al*. (2016, 2018), Zuniga-Teran *et al*. (2020)
4	Lack of incentives	Aghimien *et al*. (2018), Chan *et al*. (2018), Ahmad *et al*. (2020)
5	Lax financing systems	Parr *et al.* (2016), Aghimien *et al*. (2018), Chan *et al*. (2018), Zuniga-Teran *et al*. (2020)
6	Absence of local green building materials	Shen *et al*. (2017), Chan *et al*. (2018)
7	Absence of local institutes to facilitate R & D of green buildings	Chan *et al*. (2018)
8	Absence of client's awareness regarding benefits	Chan *et al*. (2016), Ebekozien *et al*. (2022a)
9	Absence of expertise and design standards	Chan *et al*. (2016), Parr *et al*. (2016), Ahmad *et al*. (2020), Zuniga-Teran *et al*. (2020)
10	Lack of green building rating systems and labelling programmes	Chan *et al*. (2018)
11	Lack of green housing databases and information	Chan *et al*. (2018)
12	Absence of green building codes and regulations	Chan *et al*. (2018), Lindley *et al*. (2018), Zuniga-Teran *et al*. (2020), Ebekozien *et al*. (2022a)
13	Conflicts of interests among stakeholders'	Love *et al*. (2012)
14	Resistance to change from the use of conventional technologies	Chan *et al*. (2016)
15	Inadequate promotion of green building technology by government	Aghimien *et al*. (2018), Chan *et al*. (2018)
16	Risks and uncertainties involved in adopting new technologies	Chan *et al*. (2016), Lindley *et al*. (2018)

Source: Modified from various sources in Table 1

Table 2: Description of the participants' background

ID	Company	Location	Employees	Years of Experience	Participant Rank
P1	Large Infrastructure Contractors		340	21	Safety Manager
P2			340	19	Management staff
P3			370	23	Operation Director
P4	Medium Infrastructure Contractors		65	28	Project Coordinator
P5			65	17	Director
P6			60	24	CEO
P7	Arch Firm	Abuja	3	24	Partner
P8	Eng Firm		4	20	Partner
P9	QS Firm		3	20	Senior Partner
P10	Public Client			22	Govt agency
P11	Private Client			12	1st generation bank
P12	Govt. Rep			15	Senior staff
P13				18	
P14	Large Infrastructure Contractors		300	24	Management staff
P15			370	23	Operation Director
P16			300	20	Site Manager
P17	Medium Infrastructure Contractors		55	17	Head, Engineering
P18			60	29	Managing Director
P19			60	23	Quality Controller
P20	Arch Firm	Lagos	3	20	Project Designer
P21	Eng Firm		6	34	Director
P22	QS Firm		3	35	MD
P23	Public client			22	Govt agency
P24	Private client			18	Plastic company
P25	Govt. Rep			24	Senior staff
P26				22	

Source: Authors work

team, selected public and private clients, and policymakers from government ministries, departments, or agencies. The study utilised a thematic approach to analyse the data. The virtual interviews lasted 45 minutes on average and were conducted between January 2023 and March 2023. The interviewees were engaged with questions within the stated objectives. The study coded the collated data. Seventy-nine codes emerged from the coding, and three main themes were found from the sub-themes that were divided into 12 clusters.

Findings and Discussions

The section presents findings and discussions to proffer answers to the study's objectives.

Theme 1: Relevance of GIP

Construction projects via GIP can improve environmental, social, and economic development. Despite the significance of GIP in achieving sustainable development, there are few studies concerning its relevance, especially in developing countries such as Nigeria. Thus,

this sub-section presents the interviewees' opinion regarding GIP relevance to the Nigerian construction industry and by extension, to other developing countries that may embrace GIP in the future. Findings agree that the relevance of GIP in the 21st century is driven by technological innovation and the desire for sustainable development to mitigate climate change and other environmental hazards, cannot be over-emphasised. Thirteen benefits of GIP in the construction industry emerged. This includes coordinating between nature protection and human construction, maintaining and rebuilding green networks, promoting climate change adaptation, improving stormwater management capacity, alleviating the heat island effect, providing economic advantages to surrounding areas, and promoting the construction project prosperity and sustainable development (majority). Other benefits are reducing environmental pollution (P3, P12, P23, and P26), offering natural life support system for the environment (P1, P11, P14, P18, and P22), providing an ecological base for sustainable environment (P6, P9, P14, P20, and P25), providing opportunities of getting close to nature (P4, P7, P13, and P22), enhancing landscape aesthetics (P1, P7, P9, P15, P21, P24, and P26), and improving social well-being and human health via an improved environment (P3, P5, P13, P16, P19, and P23).

Regarding coordinating between nature protection and human construction, Participant P26 says, "*...GIP significance, if fully implemented in developing countries such as Nigeria that is behind in green construction practices, will reawaken the need to protect nature for today and the future, irrespective of the proposed projects…*" Findings agree with Zhai (2012) and Ying *et al*. (2022). They identified coordination between nature protection, human construction, and artificial facilities as a key benefit of green infrastructure. Infrastructure naturally supporting the environment should be encouraged to achieve sustainable development (P14, P21, and P25). Ying *et al.* (2022) affirmed that American and European countries are leading in green infrastructure. They agreed that a relationship exists between human health, the ecosystem, and green infrastructure. Similarly, the findings agree with Sun *et al*. (2019) and Wolf *et al*. (2020). They opined that besides green infrastructure improving social well-being and human health, it enhances the environmental quality and promotes prosperity and sustainable development. Participant P4 says, "*...GIP can improve the Nigerian construction industry via opportunities to get close to nature and protect the future environment for the next generation…*" Findings agree with Raei *et al*. (2019). They found that green infrastructure mitigates environmental pollution and improves stormwater management capacity. This is pertinent because of the rapid development of urbanisation and the need to control large volumes of rainwater runoff. The urban rainwater pipe system can assist in achieving this task better than the traditional stormwater pipe network. Zhang and Chui (2019) asserted that the green infrastructure stormwater pipe network is multifunctional. This is germane to improving sustainable development.

Theme 2: Perceived Factors

There needs to be more literature regarding GIP in the built environment, especially in developing countries like Nigeria. Findings show that despite the benefits of GIP such as biodiversity conservation, climate change adaptation, promotion of social cohesion, and improvement in achieving sustainable development of the city, the level of GIP adoption is low with diverse barriers. Hence, this sub-section lists the barriers influencing GIP applications in the built environment as identified by the research participants. Twelve perceived factors hindering GIP implementation in the built environment emerged. This includes high initial cost, client attitude towards green infrastructure, deficiency in knowledge, absence of corporate commitment, accessibility issues, and no acceptable alternatives. Other factors include buying habits, low investment, passive culture, insufficient guidance, lack of tools, and regulatory compliance issues. From the twelve identified barriers, high initial cost, deficiency in

knowledge, absence of corporate commitment, low investment, and regulatory compliance issues were the most frequently mentioned among the participants. These findings agree with Zuniga-Teran *et al*. (2020). They found that innovation, finance ability, socioeconomic considerations, regulatory pathways, and design standards as the key barriers to GI implementation. The absence of an all-inclusive sustainability policy in the Nigerian built environment has not helped matters (majority). Participant P4 says, "*...I doubt if there is a functional and enforceable policy regarding GIP in Nigeria. The Public Procurement Act emphasises cost-effectiveness, quality, and time but is silent regarding sustainable construction…*"

Participant P6 says, "*...are we ready for GIP? How many staffers in the procurement department of ministries/departments/agencies understand the basic concept of green practices? Do we have the capacity to formulate product specifications and environmental policy tools for efficiency and green practice innovation? Besides the multinational construction companies, how many indigenous companies like ours have green experts? The same question goes to the procuring entities, how many entities have procuring managers with skills to formulate product/service specifications? These and many more questions deserve answers…*" Findings agree with Zuniga-Teran *et al*. (2020), who discovered that GI contributions to urban resilience would be appreciated better if mainstream stakeholders understood the industry and design professions. They identified design standards as one of the key barriers to effective GI implementation in the industry. Alqadami *et al*. (2020) agree that among the barriers to GI implementation are the higher initial cost of eco-products and services, including implementing sustainable procurement, lax legislation to implement sustainable procurement mechanisms, and lax green procurement internal management structures, especially for medium and small-scale contracting firms. They found that the higher the cost of eco-products and services, higher sustainable procurement costs, the gap between policy formulation and infrastructure project delivery, lax legislation, funding support, insufficient capacity to innovate green solutions, and lack of client demand as top barriers that may hinder green procurement adoption in infrastructure projects. Findings show that key stakeholders' roles and commitment will mitigate most of these barriers. For example, inclusive integration and enhancing policy formulation and actual infrastructure project delivery will improve GIP awareness and increase usage in the Nigerian construction industry.

Theme 3: Identified Measures

The sub-section presents measures to improve GIP applications in the Nigerian construction industry. GIP implementation cannot be successful without key stakeholders, especially the government taking the lead role, followed by the construction companies via integrated policy. This is pertinent to sustainable development, especially in developing countries like Nigeria. Ten measures to promote GIP implementation in the built environment emerged. This includes more financial capacity for alternative materials, public awareness regarding environment conservation, acquiring organisational assistance via innovation, encouraging GIP via incentives and collaboration, and self-evaluation (benchmarking, monitoring, and reviewing). Other measures include fostering an implementation system, test-run green procurement programmes, deliberate audits to evaluate sustainment with appropriate technologies, upskilling and reskilling personnel, and developing an institutional framework regarding their regulations and rules of operations. From the 10 measures, more financial capacity for alternative friendly materials, public awareness regarding environment conservation, encouraging GIP via incentives, upskilling and reskilling of personnel, and developing an institutional framework were most frequently raised among the participants as measures to promote GIP implementation usage in the Nigerian construction industry. An institutional framework with a functional legislative sustainable procurement policy driven

by competent procurement managers managing public entities cannot be overemphasised to achieve a fruitful GIP implementation in the construction industry.

Participant P1 says, "*...we are far behind compared to some developing countries such as Malaysia that have recorded success in green construction. We have a lot to put in place, including locally based rating tools and green certification of infrastructure awareness…. Many construction practitioners know nothing about green infrastructure and cannot tender based on green procurement…*" The findings agree with Ebekozien *et al*. (2022a). They found that awareness among industry players about the green certification of buildings is low and suggested inclusive awareness and sensitisation of green building features and certification. Regarding practitioners' awareness of the need for stakeholders to conserve the environment for the future, irrespective of the infrastructure development and more funding for friendly alternative materials, these findings agree with Oyedokun and Garba (2022).

This study advocates for conserving the infrastructure environment via green infrastructure procurement. Participant P22 says, "*...green procurement is practically driven, and involving a green acquisition programme implies changing procedures and methodologies. It is a cycle with explicit needs and targets individuals…*" For self-assessment, test-run green procurement, and evaluation sustainment, these findings agree with Ramakrishnan *et al*. (2022). They emphasised that a pilot programme is germane to give sensible inclusion with purchasing green items and firms and complemented with green norms. Participant P26 says, "*...stakeholders should not underrate the need for upskilling and reskilling of the personnel because several findings show that inadequate skills hinder infrastructure procurement…*" Results aligned with Asiedu *et al*. (2021). They discovered that infrastructure procurement staffers have low skills and suggested eight main skills to enhance their job. Findings show that incentives to construction practitioners to embrace GIP and integrated institutional framework are key measures to promote GIP implementation. Findings agree with Sanchez *et al*. (2014) and Zuniga-Teran *et al.* (2020). They suggested incentives to reduce greenhouse gas emissions in road construction contracts. Also, findings suggest bridging the gap between policy formulation and infrastructure project delivery. This is key to mitigating the client's attitudes towards green infrastructure and promoting green implementation.

Implication and Benefit

Findings reveal that developing countries, a case study of Nigeria, need to learn from countries that have positively impacted green infrastructure and GIP. The benefits of GIP to the construction industry cannot be overemphasised, especially its role in mitigating environmental challenges and improving urban sustainable development. GIP also reveals promise in improving urban resilience via ecosystem services quality and reduced energy consumption in construction projects. This, by extension, will improve the well-being of urban GI users and develop more resilient communities (Liu *et al*., 2016). This is because GIP can be seen as the innovative combination of artificial and natural structures envisioned to achieve explicit resilience goals with a supported procurement system driven by the principle of digitalisation (Staddon *et al.*, 2017). These goals include public health, flood/drought management, facilitating new regulations, promoting politics of climate change, and sustainable development via holistic mechanisms. Findings intend to motivate stakeholders, especially GI policymakers, to re-evaluate the political commitment to invest in GI. This can become an enabler in mitigating financial challenges and supporting innovation to benefit the wider society in the 21st century. The study also identifies measures to improve GIP applications in the construction industry.

Regarding the practical implications, the proposed policies will improve GIP applications in developing countries' construction industries, using Nigeria as a case study. Besides the

environmental, social, and economic benefits of GIP in the construction industry, harmonising nature protection and human construction, advocating active maintenance and rebuilding of green networks, promoting climate change adaptation, improving stormwater management capacity, alleviating heat island effect, stimulating the local economy, promoting prosperity and sustainable development of the construction project, and improving social well-being and human health via enhancing environmental quality, this study is among a few to conduct an in-depth analysis of the supposed challenges affecting GIP implementation in Nigeria's construction industry. Also, scholarly literature on the challenges of GIP has been lacking, especially in developing countries' context. This study will fill the theoretical gap.

Findings intend to support and offer a rich insight into GI. This is because of the relationship between GI and sustainable development. Promoting GI via GIP can assist in improving Nigeria's Leadership in Energy and Environmental Design (LEED) and green institutionalisation to address compliance issues and standards, including regulations and capacity building. The identified recommendations are useful to the GI policymakers and construction contractors or housing developers. It would enhance their decision-making regarding GI and improve accomplishing GIP implementation during the early stage of the pre-contract. This is a component of the study's implications. Regarding the study's relevance to sustainable development, it intends to promote GI usage via GIP as one mechanism to reduce the negative impact of climate change. This can be achieved through proactive and pragmatic government policies to embrace GI and include GIP in the tender document. The use of GI via GIP in the construction industry can improve the well-being of the users and sustainable infrastructure projects, save construction and maintenance costs, and mitigate environmental dilapidation. The study was conducted within the context of "GIP in Nigeria's construction industry". However, the results and emerging suggestions will be insightful to GI policymakers and other stakeholders in other developing countries with similar GIP challenges.

Study's limitations and Areas for Future Studies

The study's main limitations are the methodological approach and its limited coverage to two commercial hubs in Nigeria. These limitations do not negatively influence the findings because of the robust reviewed literature, and the covered locations were top-ranked construction hubs in Nigeria. In the future, besides expanding the methodological approach and geographical scope, GIP studies should focus on the economic, social, and ecological impacts of GIP projects on urbanisation and how the concept will improve well-being and enhance urban resilience.

Conclusions and Recommendations

This research investigated the perceived factors hindering GIP implementation and recommended measures to promote GIP usage in the built environment industry. The researchers collected data via virtual interviews and supplemented it with reviewed literature. The perceived factors that could hinder GIP were identified. Unless significant all-inclusive policy and integrated institutional changes are enhanced, these factors may continue challenging GIP implementation, especially in many developing countries. Regarding the implications, the study's findings contribute to the paucity of GIP literature, especially in developing countries such as Nigeria, and would stir policymakers and other stakeholders to engage more in sustainable construction because it ensures minimal negative environmental impact and enhances optimum economic, social, and environmental benefits. GIP enhances environmentally friendly construction, approaches, and designs to advance performance and mitigate a project's impact on the environment. The study recommends the following measures to promote GIP applications in the Nigerian built environment industry:

(i) Stakeholders, especially the government, should develop standardised international institutional framework procedures and best practices for green infrastructure procurement in Nigeria with key parties' collaboration. This should include researchers, construction contractors, design teams, and clients. An integrated sustainability policy should be included in the Nigerian built environment. This is paramount and indicates a commitment statement from top management to conserving the environment while providing infrastructure.

(ii) Innovation and stakeholders' integrated participation are key to GIP implementation, especially in developing countries such as Nigeria. Potential innovations driven by technologies would enhance the multifunctional performance of GI and can assist in expanding networks and empower other stakeholders to embrace GI. The outcome would lead to improving urban resilience and strengthening communities.

(iii) The study recommends training and workshops on green infrastructure procurement for key public sector staffers via upskilling and reskilling to enhance the firm's performance. It will enhance their competencies and capabilities to communicate clients' environmental concerns during the prequalification process and ensure there is evidence of previous compliance or compliance's ability during the contractor's prequalification process.

(i) The government should encourage GIP via incentives incorporated into the contracts and allow for milestone benchmarking, monitoring and reviewing. This can be addressed in the contract clauses emphasising sustainable construction.

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Conflict of Interest Statement

The authors declare that they have no conflict of interest.

References

Aghimien, D., Aigbavboa, C., Oke, A., & Musenga, C. (2018). Barriers to sustainable construction practices in the Zambian construction industry. In *Proceedings of the International Conference on Industrial Engineering and Operations Management*, Paris, France, July 26-27.

Agyekum, K., Adinyira, E., & Ampratwum, G. (2020). Factors driving the adoption of green certification of buildings in Ghana. *Smart and Sustainable Built Environment*, *9*(4), 595-613. https://doi.org/10.1108/SASBE-02-2019-0017

Ahmad, M. S., Yahuza, S. M., Nathan, F. P., Danjuma, F., Tadesse, H. F., & Tamur, H. Z. (2020). Drivers and barriers of sustainable green buildings in Kano State, Nigeria. *International Journal of Advanced Science and Technology*, *29*(11), 634-640.

Alqadami, A., Zawawi, N. A., Rahmawati, Y., & Alaloul, W. (2020). Challenges of implementing green procurement in public construction projects in Malaysia. *IOP Conference Series: Materials Science and Engineering*, *49*(1), 012047.

Arisa, E., & Muturi, W. (2016). Constraints influencing the implementation of green procurement - A survey of public institution in Kisii, Kenya. *International Journal of Social Sciences and Information Technology*, *2*(3), 155-177.

Asiedu, R. O., Manu, P., Mahamadu, A.-M., Booth, C. A., Olomolaiye, P., Agyekum, K., & Abadi, M. (2021). Critical skills for

infrastructure procurement: Insights from developing country contexts. *Journal of Engineering, Design and Technology*, *21*(6), 1948-1974. https://doi.org/10.1108/JEDT-08-2021-0437

Benedict, M. A., & McMahon, E. T. (2002). Green infrastructure: Smart conservation for the 21st century. *Renewable Resources Journal*, *20*(3), 12-17.

Cellura, M., Guarino, F., Longo, S., Mistretta, M., & Orioli, A. (2013). The role of the building sector for reducing energy consumption and greenhouse gases. *Renewable Energy*, *60*, 586-597.

Chan, A. P. C., Darko, A., Ameyaw, E. E., & Owusu-Manu, D. G. (2016). Barriers affecting the adoption of green building technologies. *Journal of Management in Engineering*, *33*(3), 1-10. https://doi.org/10.1061/(ASCE)ME.1943-5479.0000507

Chan, A. P. C., Darko, A., Olanipekun, A. O., & Ameyaw, E. E. (2018). Critical barriers to green building technologies adoption in developing countries: The case of Ghana. *Journal of Cleaner Production*, *172*, 1067-1079. https://doi.org/10.1016/j.jclepro.2017.10.235

Chan, M., Masrom, M. A. N., & Bahrin, A. S. S. (2021). Government green procurement in sustainable infrastructure development. *International Journal of Real Estate Studies*, *15*(S1), 7-17.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

De Valck, J., Beames, A., Liekens, I., Bettens, M., Seuntjens, P., & Broekx, S. (2019). Valuing urban ecosystem services in sustainable brownfield redevelopment. *Ecosystem Services*, *35*, 139-149. https://doi.org/10.1016/j.ecoser.2018.12.006

Dithebe, K., Aigbavboa, C. O., Thwala, W. D., & Oke, A. E. (2019). Analysis on the perceived occurrence of challenges delaying the delivery of water infrastructure assets in South Africa. *Journal of Engineering, Design and Technology*, *17*(3), 564-571.

Ebekozien, A. (2019). Unethical practices in procurement performance of Nigerian public building projects: Mixed methods approach. *Theoretical and Empirical Research in Urban Management*, *14*(4), 1-21.

Ebekozien, A. (2020a). Maintenance practices in Nigeria's public health-care buildings: A systematic review of issues and feasible solutions. *Journal of Facilities Management*, *19*(1), 32-52. https://doi.org/10.1108/JFM-08-2020-0052

Ebekozien, A., & Aigbavboa, C. (2021). COVID-19 recovery for the Nigerian construction sites: The role of the fourth industrial revolution technologies. *Sustainable Cities and Society*, *69*, 102803. https://doi.org/10.1016/j.scs.2021.102803

Ebekozien, A., Ayo-Odifiri, O. S., Nwaole, C. N. A., Ibeabuchi, L. A., & Uwadia, E. F. (2022a). Barriers in Nigeria's public hospital green buildings implementation initiatives. *Journal of Facilities Management*, *20*(4), 586-605. https://doi.org/10.1108/JFM-01-2021-0009

Ebekozien, A., Ikuabe, M., Awo-Osagie, I. A., Aigbavboa, C., & Ayo-Odifiri, O. S. (2022b). Model for promoting green certification of buildings in developing nations: A case study of Nigeria. *Property Management*, *40*(1), 118-136. https://doi.org/10.1108/PM-05-2021-0033

Elise, H., & Hsu, D. (2018). Roles for government and other sectors in the governance of green infrastructure in the U.S. *Environmental Science & Policy*, *88*, 104-115. https://doi.org/10.1016/j.envsci.2018.06.003

Energy Commission of Nigeria. (2014). *National energy masterplan*. Retrieved from http://www.energy.gov.ng/index.php

European Commission. (2007). *A lead market initiative for Europe: Action plan for sustainable construction*.

Geneletti, D., & Zardo, L. (2016). Ecosystem-based adaptation in cities: An analysis of European urban climate adaptation plans. *Land Use Policy*, *50*, 38-47. https://doi.org/10.1016/j.landusepol.2015.09.003

Global Construction Perspectives and Oxford Economics. (2013). *Global construction 2025: A global forecast for the construction industry to 2025*.

Hassan, J. S., Mohamad Zin, R., Majid Abd, M. Z., & Hainin, R. M. (2014). Building energy consumption in Malaysia: An overview. *Jurnal Teknologi*, *70*(7), 18-37. https://doi.org/10.11113/jt.v70.3574

Ibrahim, F. S., Ebekozien, A., Khan, P. A M., Aigbedion, M., Ogbaini, I. F., & Amadi, G. C. (2022). Appraising fourth industrial revolution technologies' role in the construction sector: How prepared is the construction consultants? *Facilities*, *40*(7-8), 515-532. https://doi.org/10.1108/F-09-2021-0086

International Federation of Consulting Engineers. (2012). *State of the world report 2012: Sustainable infrastructure*.

Jaafar, M., Ebekozien, A., & Mohamad, D. (2021). Community participation in environmental sustainability: A case study of proposed penang hill biosphere reserve, Malaysia. *Journal of Facilities Management*, *19*(4), 527-549. https://doi.org/10.1108/JFM-03-2021-0033

Khan, M. W. A., Ting, N. H., Kuang, L. C., Darun, M. R., Mehfooz, U., & Khamidi, M. F. (2018). Green procurement in construction industry: A theoretical perspective of enablers and barriers. *MATEC Web of Conferences*, *203*, Article 02012. https://doi.org/10.1051/matecconf/201820302012

Kimira C. W., Getuno P., & Kiare, D. (2018). Effect of green procurement practices on competitiveness of manufacturing firms in Kenya: A case of Unilever Kenya Limited. *Journal of Agricultural Research*, *2*(5), 9-23.

Livesley, S. J., McPherson, G. M., & Calfapietra, C. (2016). The urban forest and ecosystem services: Impacts on urban water, heat, and pollution cycles at the tree, street, and city scale. *Journal of Environmental Quality*, *45*(1), 119-124. https://doi.org/10.2134/jeq2015.11.0567

Lindley, S., Pauleit, S., Yeshitela, K., Cilliers, S., & Shackleton, C. (2018). Rethinking urban green infrastructure and ecosystem services from the perspective of sub-Saharan African cities. *Landscape and Urban Planning*, *180*, 328-338. https://doi.org/10.1016/j.landurbplan.2018.08.016

Liu, Y., Theller, L. O., Pijanowski, B. C., & Engel, B. A. (2016). Optimal selection and placement of green infrastructure to reduce impacts of land use change and climate change on hydrology and water quality: An application to the Trail Creek Watershed, Indiana. *Science of the Total Environment*, *553*, 149-163. https://doi.org/10.1016/j.scitotenv.2016.02.116

Love, P. E. D., Niedzweicki, M., Bullen, P. A., & Edwards, D. J. (2012). Achieving the green building council of Australia's world leadership rating in an office building in Perth. *Journal of Construction Engineering and Management*, *138*(5), 652-660.

Manu, P., Asiedu, R. O., Mahamadu, A. M., Olomolaiye, P., Booth, C., Manu, E., Ajayi, S., & Agyekum, K. (2021). Contribution of procurement capacity of public agencies to attainment of procurement objectives in infrastructure procurement. *Engineering, Construction and Architectural Management*, *28*(10), 3322-3345. https://doi.org/10.1108/ECAM-05-2020-0375

Masson-Delmotte, V., Zhai, P., Pörtner, H.-O., Roberts, D., Skea, J., Shukla, P. R., Pirani, A., Moufouma-Okia, W., Péan, C., Pidcock, R., Connors, S., Matthews, J. B. R., Chen, Y., Zhou, X., Gomis, M. I., Lonnoy, E., Maycock, T., Tignor, M., & Waterfield, T. (2018). *Summary for policymakers*. In *Global warming of 1.5°C: An IPCC special*

report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways. Intergovernmental Panel on Climate Change. https://www.ipcc.ch/sr15/

Onuoha, J. I., Kamarudin, N., Aliagha, U. G., Okeahialam, A. S., Atilola, I. M., & Atamamen, O.F. (2017). Developing policies and programmes for green buildings: What can Nigeria learn from Malaysia's experience? *International Journal of Real Estate Studies*, *11*(2), 49-58.

Opoku, A., Cruickshank, H., & Ahmed, V. (2015). Organisational leadership role in the delivery of sustainable construction projects in UK. *Built Environment Project and Asset Management*, *5*(2), 154-169. https://doi.org/10.1108/BEPAM-12-2013-0074

Opoku, D-G. J., Ayarkwa, J., & Agyekum, K. (2019). Barriers to environmental sustainability of construction projects. *Smart and Sustainable Built Environment*, *8*(4), 292-306. https://doi.org/10.1108/SASBE-08-2018-0040

Oyewole, O. A., Ojutalayo, A. A., & Araloyin, M. F. (2019). Developers' willingness to invest in green features in Abuja, Nigeria. *Smart and Sustainable Built Environment*, *8*(3), 206-219. https://doi.org/10.1108/SASBE-06-2018-0031

Organisation for Economic Co-operation and Development. (2015). *Towards a framework for the governance of infrastructure*.

Oyedokun, G. E., & Garba, M. A. (2022). Impacts of firm internationalization, green procurement and organizational performance of University College Hospital, Ibadan, Nigeria. *International Journal of Finance Research*, *3*(4), 275-293.

Pauleit, S., Ambrose-Oji, B., Andersson, E., Anton, B., Buijs, A., Haase, D., Elands, B., Hansen, R., Kowarik, I., Kronenberg, J., Mattijssen, T, Olafsson, A. S., Rall, E., van der Jagt, A. Pn N., & van den Bosch, C. K. (2019). Advancing urban green infrastructure in Europe: Outcomes and reflections from the GREEN SURGE project. *Urban Forestry and Urban Greening*, *40*, 4-16. https://doi.org/10.1016/j.ufug. 2018.10.006

Parr, T. B., Smucker, N. J., Bentsen, N. C., & Neale, W. M. (2016). Potential roles of past, present, and future urbanisation characteristics in producing varied stream responses. *Freshwater Science*, *35*(1), 436-443. https://doi.org/10.1086/685030

Raei, E., Reza Alizadeh, M., Reza Nikoo, M., & Adamowski, J. (2019). Multi-objective decision-making for green infrastructure planning (LID-BMPs) in urban storm water management under uncertainty. *Journal of Hydrology*, *579*, 124091. https://doi.org/10.1016/j.jhydrol.2019.124091

Ramakrishnan, J., Liu, T., Yu, R., Seshadri, K., & Gou, Z. (2022). Towards greener airports: Development of an assessment framework by leveraging sustainability reports and rating tools. *Environmental Impact Assessment Review*, *93*, 106740. https://dx.doi.org/10.1016/j.eiar.2022.106740

Sanchez, A. X., Lehtiranta, L., Hampson, K. D., & Kenley, R. (2014). Evaluation framework for green procurement in road construction. *Smart and Sustainable Built Environment*, *3*(2), 153-169. https://doi.org/10.1108/SASBE-05-2013-0028

Shen, L., Zhang, Z., & Long, Z. (2017). Significant barriers to green procurement in real estate development. *Resources, Conservation and Recycling*, *116*, 160-168.

Smith, C., & Terman, J. (2016). Overcoming the barriers to green procurement in the county: Interest groups and administrative professionalism. *Journal of Public Procurement*, *16*(3), 259-285. https://doi.org/10.1108/JOPP-16-03-2016-B001

Staddon, C., Ward, S., Vito, L. D., Zuniga-Teran, A., Gerlak, A. K., Schoeman, Y., Hart, A., & Booth, G. (2017). Contributions of green infrastructure to enhancing urban resilience. *Environment Systems and Decisions*, *38*,

330-338. https://doi.org/10.1007/s10669-018-9702-9

Sun, F., Xiang, J., Tao, Y., Tong, C., & Che, Y. (2019). Mapping the social values for ecosystem services in urban green spaces: Integrating a visitor-employed photography method into SolVES. *Urban Forestry and Urban Greening*, 38, 105-113. https://doi.org/10.1016/j.ufug.2018.11.012

United Nations Economic and Social Council. (2016). *Progress towards the sustainable development goals - report of the secretary-general*. https://unstats.un.org/sdgs/files/report/2016/secretary-general-sdg-report-2016EN.pdf

United Nations Environmental Programme. (2009). *Building and climate change: Summary for decision-makers (United Nations Environmental Programme Sustainable buildings and climate initiatives)*.

United Nations Office for Project Services. (2010). *Annual statistical report on the procurement activities of the United Nations system*.

U.S. Energy Information Administration. (2014, August). Energy information administration, Table 2.1 and Table 7.6. *Monthly Energy Review*. https://www.eia.gov/totalenergy/data/monthly/

U.S. Environmental Protection Agency. (2014). *Greening CSO plans: Planning and modeling green infrastructure combined sewer overflow (CSO) control* (Publication No. 832-R-14-001).

Wang, R. (2022). Fuzzy-based multicriteria analysis of the driving factors and solution strategies for green infrastructure development in China. *Sustainable Cities and Society*, *82*. https://doi.org/10.1016/j.scs.2022.103898

Wolf, K. L., Lam, S. T., McKeen, J. K., Richardson, G. R. A., van den Bosch, M., & Bardekjian, A. C. (2020). Urban trees and human health: A scoping review. *International Journal of Environmental Research and Public Health*, *17*(12), 4371. https://doi.org/10.3390/ijerph17124371

Yahuza, S. M., & Erçin, C. (2020). Determination of user's need and comfort in designing and purchasing green buildings in Kano State, Nigeria. *European Journal of Sustainable Development*, *9*(3), 127-144. 10.14207/ejsd.2020.v9n3p127

Yeatts, E. D., Auden, D., Cooksey, C., & Chen, C-F. (2017). A systematic review of strategies for overcoming the barriers to energy-efficient technologies in buildings. *Energy Research & Social Science*, *32*, 76-85. https://doi.org/10.1016/j.erss.2017.03.010

Ying, J., Zhang, X., Zhang, Y., & Bilan. S. (2022). Green infrastructure: Systematic literature review. *Economic Research-Ekonomska Istraživanja*, *35*(1), 343-366. https://doi.org/10.1080/1331677X.2021.1893202

Zainordin, N., & Tan, C. Y. M. (2015). An insight of sustainable development – A study among construction professional in Malaysia. *International Journal of Current Research and Academic Review*, *Special Issue 2*, 56-64.

Zhai, J. (2012). Coordinative symbiosis: From grey municipal infrastructure and green infrastructure to integrate landscaping infrastructure. *Planners*, 28, 71-74.

Zhang, K., & Chui, T. F. M. (2019). Linking hydrological and bioecological benefits of green infrastructures across spatial scales - A literature review. *Science of the Total Environment*, *646*, 1219-1231. https://doi.org/10.1016/j.scitotenv.2018.07.355

Zuniga-Teran, A. A., Staddon, C., de Vito, L., Gerlak, K. A., Ward, S., Schoeman, Y., Hart, A., & Booth, G. (2020). Challenges of mainstreaming green infrastructure in built environment professions. *Journal of Environmental Planning and Management*, *63*(4), 710-732. https://doi.org/10.1080/09640568.2019.1605890

Appendix 1: Virtual Interview Questions

Dear Participant,

Request for Virtual Interview

The procurement phase is pertinent to the infrastructure project lifecycle. Green Procurement (GP) through Green Infrastructure (GI) may enhance the sustainable development of construction projects. Hence, GP is utilised to improve achieving Sustainable Development Goals (SDGs) related to sustainable infrastructure through the tendering or contractor selection process. There is a paucity of studies concerning Green Infrastructure Procurement (GIP) in Nigeria's construction industry. Therefore, the paper's title is **A Qualitative Approach to Investigate Green Infrastructure Procurement in the Construction Industry.** Specifically, the researchers will achieve the stated aim through the following:

i. To identify the relevance of GIP in the construction industry.

ii. To investigate the factors that could hinder GIP implementation in the construction industry.

iii. To identify feasible measures to promote GIP applications in the construction industry.

Kindly note that the interview questions will be within the stated objectives. Responses provided by you will be collated and analysed together with that of other interviewees. It will make up the value and contribution to achieving the success of this work. Information provided will be treated with the greatest secrecy.

Hence, your valuable time and other answers to the questions will be highly cherished.

With regards.

Yours faithfully,

(Research Coordinator)

BASIC QUESTIONS FOR THE PARTICIPANTS

1. Please, for record purposes, what is your organisation's name and state located?
2. Please, what is your position in the organisation?
3. Can you tell us your years of work experience?
4. Please, are you knowledgeable regarding GI and GIP?
5. If yes to question 4, how can you describe the relevance of GIP in the construction industry?
6. As a stakeholder in the construction industry, how can you evaluate the current GI and GIP practice?
7. Do you think there are perceived barriers facing GIP implementation in the construction industry?
8. If yes to question 7, what are the possible barriers?
9. If no to Question 7, why do you think so?
10. Please, what feasible measures can be used to promote GIP applications in the construction industry?