ISSN 2347 - 3983
Volume 14. No.2, February 2026
International Journal of Emerging Trends in Engineering Research
Available Online at http://www.warse.org/IJETER/static/pdf/file/ijeter0214022026.pdf
https://doi.org/10.30534/ijeter/2026/0214022026

Barriers to Implementation of Sustainable Electronic Procurement for Green Construction Project Development

Gregory Chimere Enyinna[1],Chukwuneke Chetanna Jude[1],Blessing Mmesoma Ogbonnaya[2], Columbus Ikechukwu Anyawu[1]

[1,]Department of Project Management Technology, Federal University of Technology Owerri, Nigeria
[2]Department of Logistic and Supply Chain Management, Federal University of Technology Owerri, Nigeria
pycongregco@gmail.com

Received Date: December 24, 2025 Accepted Date: January 26, 2026 Published Date : February 07, 2026

ABSTRACT

This research seeks to evaluate the barriers to implementation of sustainable E-procurement for green construction projects in Nigeria. Descriptive statistics and Regression analysis were used to analyze the implementation barriers of E-procurement as well as deficiencies of manual procurement, to verify their significant effect on green construction projects. Results show that 73.6% variability with p−value = 0.006 p−value=0.006 at α=0.05α=0.05 showing a hypothetical proof that barriers to implementing of sustainable E-procurement framework have significant impact on green construction projects while deficiencies associated with manual procurement had 60.4% variability with p−value=0.02p−value=0.02at α=0.05α=0.05, showing that deficiencies of manual procurement have significant impact on green construction projects. This study concludes that, barriers to the implementing e-procurement like financial resources, inadequate technological infrastructure for tenderer, internal user resistance to learn multiple procurement systems and procedures, lack of competent employee on e-procurement, and training of contractors should be eliminated for successful e-procurement of green construction projects in Nigeria.

Key words: Barriers, Green Construction, Implementation, Projects, Sustainable Electronic Procurement.

1. INTRODUCTION

Electronic for green construction project is an area of research that can be over emphasized since green construction project development has become very necessary in for climate change mitigation, adaption for climate and environmental conservation.

Green construction project procurement encompasses all methods and processes that guide the acquisition of goods, services and works for its delivery [1]. These procurement processes help green construction companies in planning, sourcing, purchasing and making payment for goods, services and works. Thus, it is important to note that application of best procurement strategies when paying for goods, services and works would help all organizations to conduct procurement planning so as to determine the kind of project deliverables that they can procure and when to procure them [2].

The procurement of green construction project, goods, services and works would require contract award for procurement process to begin. These contracts are actually, awarded to contractors or suppliers by their clients, sponsor, owner or customer, considering the place, price, quality, quantity and time. Furthermore, the procurement transition from the traditional procurement method to E-Procurement method has given room to advancement in procurement processes especially, during emergency lockdown situation when all movements are actually restricted due to introduction of social distancing to avert human contact for prevention of disease contraction and for reducing the rate of increase in mortality and morbidity in our system [2].

This revolutionary way of business transaction that evolved from traditional procurement process has drastically reduced the cost, streamline and simplifies traditional procurement process, increase efficiency as well as increasing the speed of process of procurement. It also allows for transparent purchase process and enhances security. Though the complexity of the process of E-procurement can lead to errors or time overrun in completing the procurement process [3].

Most organizations have not started using E-procurement process in developing countries especially in Nigeria because executives in charge of procurement are not sure if electronic purchases should be used since their organizations were not yet ready to apply the process. There are several potential problems that could arise in the development of a sustainable electronic purchase support framework for road construction projects in Nigeria. Some of these issues could include:

(a) Limited access to technology: Many parts of Nigeria may not have reliable access to the internet or modern technologies, which may make it challenging for businesses to engage in electronic purchase procedures.
(b) Lack of trust: Some companies and individuals may be hesitant to use an online platform for procurement due to concerns about security and the risk of fraud.
(c) Limited understanding of electronic purchase: Some companies and individuals may not be familiar with electronic purchase processes, which could lead to confusion.
(d) Inefficiencies. Limited capacity: Some companies may not have the resources or capacity to participate in electronic purchase processes, which could limit the pool of potential suppliers and contractors.
(e) Regulatory barriers: There may be regulatory barriers or red tape preventing the initiation of an electronic market circle in Nigeria.
The Nigerian government has acknowledged the necessity of swiftly eradicating worldwide perceptions of corrupt practices in public procurement methods by implementing an electronic purchase platform, leveraging online marketplaces, utilizing electronic payment systems, adopting a centralized procurement system, and implementing procurement card programs for road construction projects. These strategies can help to streamline the procurement process, reduce costs, and improve efficiency in road construction projects, which have the capacity to affect great governance and foster trust via the purchasing system [4].
The adoption of electronic means of purchase has presently started in our Nigeria, but there are certain shortcomings that can hinder the initiation and effectiveness of electronic purchase strategies, such as an infrastructural deficit including reliable internet connectivity and sufficient computing resources. It is necessary to have a strong infrastructure in place for electronic purchase to be successful. In some areas of Nigeria, there may be challenges with the infrastructure that can hinder the implementation of electronic purchase strategies These challenges include;
(a) limited vendor participation: electronic purchases rely on vendors participating in the process by electronically submitting bids and proposals. If there are not enough vendors participating in the process, it can limit the competitiveness of the bidding process and impact the quality of the value-added items being procured.
(b) Security concerns: electronic purchases involve the exchange of sensitive financial information, and there is a risk of data breaches or cyber-attacks. Organizations in Nigeria may need to invest in additional security measures to protect against these risks.
(c) Resistance to change: Some organizations and individuals may be resistant to changing established procurement processes in favor of electronic purchase, which can hinder the adoption and effectiveness of electronic purchase strategies.
(d) Limited transparency: Without proper oversight and transparency, there is a risk of corruption or the purchase process being poorly managed. It could be necessary to include accountability and transparency safeguards in electronic purchase initiatives. These strategies can only be sustainable in an electronic procurement space. The purchasing procedure might be simplified with the use of an electronic procurement platform, making it more efficient and lowering the possibility of mistakes and data loss, while facilitating a consistent method of purchasing though, by standardizing the procurement process, it becomes easier to compare bids and select the most sustainable option and encourage the use of environmentally friendly materials.
Electronic procurement process for green construction projects considers encouraging the use of materials that have a lower environmental impact, such as recycled asphalt or concrete. This is an avenue to reduce the impact of climate change through climate adaptation consideration during construction project delivery [1].
A sustainable e-procurement support framework can help reduce procurement cost by streamlining procurement processes and reducing paperwork [5], consider the entire lifecycle of the materials: In addition to the environmental impact of the materials themselves, consider the environmental impact of the transportation and disposal of the materials as well. Promote transparency and accountability: Boost openness and responsibility with the help of your organization's electronic purchase space, for example, by making bids and award decisions publicly available. Engagement with stakeholders, such as local communities and environmental organizations, to ensure that the procurement process takes their concerns into account.
The concept of E-procurement, electronic purchase, cloud purchasing or digital procurement, refers to the use of electronic means to purchase goods or services. This can include the use of online marketplaces, electronic request for quotation (RFQ) systems, and electronic bidding systems. Electronic purchases can help organizations streamline their purchasing processes; reduce costs, and increase transparency and efficiency. The term "electronic purchasing space" is commonly used to refer to online tools that simplify internal business transactions. Buying value-added items electronically is the most important aspect of cloud business function excellence for major organizations [4]. Digital or cloud purchasing is said to be the acquisition of value-added items through the utilization of the internet or an electronic network[6]. The goals of electronic commerce include facilitating monitoring and auditing of processes, meeting the requirements for up-to-date information, and boosting transparency and accountability in the marketplace and among businesses.
Sustainable Electronic Procurement (e-procurement) is a modern approach that leverages digital technologies to enhance procurement processes while simultaneously prioritizing sustainability in the supply chain. Unlike traditional procurement methods, which often rely heavily on paper-based processes and manual workflows, e-procurement integrates technology to reduce waste, streamline transactions, and improve transparency. The concept not only focuses on increasing procurement efficiency but also encourages responsible purchasing decisions by

factoring in environmental, social, and economic sustainability. For example, organizations can choose suppliers who adopt sustainable practices, reduce carbon emissions, and employ eco-friendly materials. By incorporating sustainability into procurement strategies, companies can lower their environmental footprint, optimize resource use, and enhance supply chain resilience. Furthermore, sustainable e-procurement facilitates better decision-making by enabling more transparent access to information, which is crucial for fostering long-term, environmentally-conscious relationships with suppliers. This transformation, powered by digital tools, is driving the future of procurement, aligning business objectives with broader environmental goals [7].

Green Construction Project Development embodies the practice of designing, constructing, and operating buildings that are environmentally responsible, resource-efficient, and promote occupant well-being. Unlike conventional construction, which often leads to significant waste and high energy consumption, green construction focuses on minimizing environmental impacts through the use of sustainable materials, energy-efficient technologies, and low-impact construction methods. This includes incorporating features such as renewable energy systems, water-efficient plumbing, and environmentally friendly building materials that reduce the carbon footprint of the building and its operations. Green construction also emphasizes waste reduction, with strategies in place for recycling construction materials and reducing landfill contributions. The ultimate aim is to create spaces that are not only energy-efficient and cost-effective over their lifespan but also healthier for their occupants. Increasingly, certifications like LEED (Leadership in Energy and Environmental Design) serve as standards for projects that aspire to meet high environmental performance criteria. This approach to construction development not only aligns with global sustainability efforts but also helps mitigate climate change by reducing the ecological impact of the built environment [7].

The use of E-procurement involves facilitating purchasing process in public sector construction projects. This involves the use of cloud platforms to advertise procurement opportunities, receive and evaluate bids or proposals, and award contracts. The goal of public digital purchasing is to make the procurement process more efficient, open, and competitive and to limit the possibilities for bribery and other forms of misconduct in public sector construction project. Researchers and scholars have studied various aspects of public electronic purchase, including its implementation, effectiveness, and challenges [8].
[9] specified that strong legal frameworks, effective stakeholder engagement, and the need for adequate training and support to ensure a smooth transition of electronic purchase systems when working for the government are all important aspects that will affect efficiency in E-procurement process.

The process of E-Procurement in green construction project management follows a digital protocol that makes use of internet technology in centralizing green construction project procurement management workflows as well as guiding all associated transactions that include, purchasing goods and services for green construction project procurement so as to drastically reduce cost as well as improve procurement processes. This process allows application of Software for E-Procurement of green construction projects. This has taken over paper-based methods through automation of traditional procurement method. [10], identified that E-procurement ignites good spend analysis for strategic cost reduction and operations between procurement and procurement funding. This E-Procurement software incorporates spend analysis, E-Sourcing, E-auctions, procure-to-pay (P2P), marketplaces, and contract management. Thus, using this centralized system improves efficiency and creates reduction in overall cost of procurement process.

In E-procurement, we have five digital procedures that correspond to different levels of traditional procurement process. They include; definition of requirement, sourcing, soliciting, evaluating, contracting, as well as contract administration.

Figure 1 below displays pictorial representation of E-procurement process for construction project management.

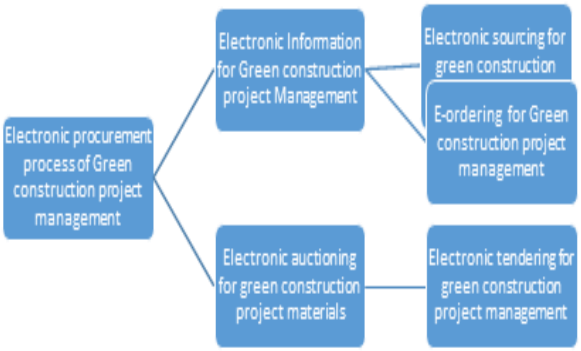

Figure 1: E-procurement process for green construction project management

This is an intersection between all digital procurement steps and traditional procurement circle. E-informing operates a two-way exchange of confidential data. It involves a process of communication between internal and external stakeholders of any green construction project development partners that could help the construction industry to upgrade its E-procurement processes[9].

E-sourcing is the first stage of E-procurement process, for green construction project development that includes finding, evaluation and engagement of potential suppliers based on certain criteria for cost reduction and achievement of best value for money. It

involves narrowing down needs of the procurement agency to different vendors through pre-qualifying potential suppliers for the assessment stage[11].

E-tendering process involves soliciting and assessing green construction project development tender. It involves getting information, seeking proposals, as well as quotations from potential shortlisted suppliers for green construction projects. This helps in analyzing and evaluating green construction project vendors in the procurement organization's analysis. In this case, the procurement entity makes use technologies for the purpose of transparency in the course of green construction project supplier's selection process [3].

E-reverse auctioning, is connected to green construction project contract and evaluating method. This involves negotiation of price and conditions of contract between engaged stakeholders. When agreement is reached, the procurement entity procures the green construction project materials from the vendor. In this case of green construction project, multiple buyers involve in competition so as to contract with a provider through proposing higher green construction project material prices. Furthermore, so many providers can as well, go into competition for a contract with one customer via under bidding [10].

E-ordering for green construction project takes place same time with contracting and management of contract. This involves creating and authorization requisition, ordering, and receiving the materials placed on hold. Completed contracts for green construction are indexed in digital catalog. Such catalogs can be visited by employees any moment and place an order. Managing suppliers and catalogs. Thus, e-procurement operations in green construction project will integrate purchase orders, e-invoicing, and e-payment for its process to be complete. Note that, all the above E-procurement process was adopted from [10].

2. METHODOLOGY

Electronic procurement system for green building construction project became very necessary due to deficiencies associated with the traditional or manual procurement system. This section will apply the method of descriptive statistics to explore and analyze the deficiencies associated with the manual-based procurement system for green construction projects and barriers of implementation of e-procurement for green construction projects in Imo State, Nigeria. Excel spread sheet and SPSS will be used to analyze the Hypothesesusing regression analysis where**:**H0:states that the deficiencies associated with manual-based procurement system have no significant impact to green construction projects in Imo State and H_0 is the implementation barriers of e-procurement system have no significant effect on green construction projects in Imo State.

3. RESULTS AND DISCUSSION

Table 1 above, shows the analysis of data obtained to determine the deficiencies associated with the manual-based procurement system for green construction projects in Imo State. Lack of transparency (M=3.28, SD=1.00) remained more pronounced, following poor legal framework and corruption (M=3.06, SD=1.01), political interference by the executives (M=3.17, SD=0.95), complexity of procurement regulations (M=3.14, SD=1.03), inadequate institutional and human resource capacity (M=3.24, SD=0.95), procurement entities repulsive attitude (M=2.73, SD=1.04), and incompetency of the procurement practitioners (M=3.16, SD=0.94), as deficiencies associate with manual-based procurement system for green construction projects in Imo State.

Result from Hypotheses: H0: ***H0***:in table 2 and 3 below show the model summary and ANOVA on deficiencies associated with manual-based procurement system have no significant impact to green construction projects in Imo State.

Table 1: Deficiencies associated with manual-based procurement system for green construction projects

S/N	Item	SA	A	D	SD	$\overline{x}$	$\bar{x}$	ss
1	Poor legal framework and corruption	43	36	11	13	3.06		1.01
2	Lack of transparency	61	19	14	9	3.28		1.00
3	Political interference by the executives	47	35	12	9	3.17		0.95
4	Complexity of procurement regulations	51	27	13	12	3.14		1.03
5	Inadequate institutional and human resource capacity	54	28	13	8	3.24		0.95
6	Procurement entities repulsive attitude	27	39	19	18	2.73		1.04
7	Incompetency of the procurement practitioners	46	36	12	9	3.16		0.94
8	Shortage of experienced procurement practitioners	19	24	16	44	2.17		1.17
9	Absence of open and competitive tendering	15	15	46	27	2.17		0.98
10	Faulty implementation of procurement system	18	13	25	47	2.02		1.13

The analysis presented in Table 1 highlights several critical deficiencies associated with manual-based procurement systems in green construction projects. The most significant issues, as indicated by high mean scores ($\bar{x}$), include lack of transparency, inadequate human resource capacity, political interference, and poor legal frameworks—all of which hinder efficiency and accountability. Conversely, challenges like faulty implementation and absence of competitive tendering received lower mean scores, suggesting they are perceived as less critical by respondents. Overall, the findings underscore the systemic weaknesses that impede sustainable procurement practices and stress the need for more transparent, professionalized, and digitized systems to support green construction initiatives.

Table 2: Model Summary for deficiencies of manual-based procurement

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.812[a]	.604	.517	.30218

a. Predictors: (Constant), x2, x5, x3, x7, x4, x1, x6

Table 2 presents the model summary showing a strong correlation (R = 0.812) between the identified variables and the deficiencies of manual-based procurement systems, with approximately 60.4% of the variation in procurement deficiencies explained by the model (R^2 = 0.604). The adjusted R^2 of 0.517 indicates a good model fit, suggesting that the selected predictors significantly contribute to understanding the shortcomings in manual procurement processes.

Table 3: ANOVA[s] for deficiencies of manual-based procurement

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	198.748	7	31.029	213.467	.0021[b]
	Residual	42.363	273	.155		
	Total	241.111	279			

a. Dependent Variable: y

b. Predictors: (Constant), x2, x5, x3, x7, x4, x1, x6

Table 3 presents the ANOVA results, indicating that the regression model is statistically significant (F = 213.467, p = 0.0021), meaning the predictors collectively have a meaningful impact on the deficiencies of manual-based procurement. The low p-value confirms that the relationship between the independent variables and the dependent variable is not due to chance, validating the model's explanatory strength.

Table 4: Barriers to implementing e-procurement a sustainable e-procurement framework

S/N	Item	SA	A	D	SD	$\bar{x}$	$\bar{x}$	ss
1	Inadequate financial resources and backing	46	26	18	13	3.02		1.06
2	Inadequate technological infrastructure of tenderer	38	47	5	13	3.07		0.96
3	Internal user resistance to learn multiple procurement systems and procedures	66	17	11	9	3.36		0.98
4	Lack of competent employee on e-procurement	52	30	13	8	3.22		0.94
5	Training of contractors	46	34	13	10	3.13		0.97
6	Inadequate technological infrastructure to implement the process	13	8	29	53	1.82		1.03
7	Inadequate technological infrastructure of tenderer	12	13	35	43	1.94		1.00
8	Internal user resistance to learn multiple procurement systems and procedures.	31	24	25	23	2.61		1.14
9	Insufficient training on procurement and other indirect costs.	18	20	25	40	2.16		1.12
10	Lack of change management, top management support	14	30	22	37	2.20		1.07

Table 4 shows the barriers to the implementation of a sustainable e-procurement framework. The responses indicate that inadequate financial resources and backing (M=3.02, SD=1.06), inadequate technological infrastructure of tenderer (M=3.07, SD=0.96), internal user resistance to learn multiple procurement systems and procedures (M=3.36, SD=0.98), lack of competent employee on e-procurement (M=3.22, SD=0.94), training of contractors (M=3.13, SD=0.97), and internal user resistance to learn multiple procurement systems and procedures (M=2.61, SD=1.14) were perceived by the construction professionals as barriers to implementing a sustainable e-procurement framework for road construction projects in Imo State.
It is apparent from the result that six items were largely picked as barriers to implementing e-procurement system for road construction professionals.

Table 5: Model Summary; barriers to implementation of Electronic Procurement

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.751[a]	.736	.503	.16220

a. Predictors: (Constant), x27,x24,x23,x26,x22,x25,x21

Table 5 shows that the model explains a substantial portion of the variation in barriers to implementing electronic procurement, with an R value of 0.751 and an R Square of 0.736. This suggests that approximately 73.6% of the variation in the dependent variable can be attributed to the selected predictors, while the adjusted R Square of 0.503 indicates a moderately strong model fit after accounting for the number of predictors.

Table 6: ANOVA[s] ; barriers to implementation of Electronic Procurement

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.237	7	2.540	3.069	.006[b]
	Residual	225.873	273	.827		
	Total	241.111	279			

a. Dependent Variable: y

b. Predictors: (Constant), x27,x24,x23,x26,x22,x25,x21

Table 6 presents the ANOVA results, indicating that the model is statistically significant (F = 3.069, p = 0.006), meaning the selected variables meaningfully contribute to explaining the barriers to electronic procurement implementation. Although the F-value is modest, the low p-value confirms that the predictors have a significant combined effect on the dependent variable.

5. CONCLUSION

Results from table 1 above shows that seven items were classified by the respondents as deficiencies associated with manual-based procurement system for green construction projects in Imo State. These deviancies stand as the trigger factors for adoption and implementation of E=procurement process for green construction project Delivery [11].

Since Table 2 and 3 above displayed that the independent variables considered, about 60.4% of the variability in the dependent variable. The p−val=0.02p−val=0.02at α=0.05α=0.05 the decision is to reject the null hypothesis and conclude that, the identified deficiencies associated with manual-based procurement system have a statistically significant impact on green construction projects in Imo State. While the Alternate Hypothesis shows that, the independent variables considered about 73.6% of the variability in the dependent variable. However, p−val=0.006p−val=0.006atα=0.05α=0.05. the decision is to accept the alternate hypothesis and conclude that the barriers to implementing a sustainable E-procurement framework have a significant impact on green construction projects in Nigeria [12].

This research therefore recommends the use sustainable electronic procurement systems for green construction project development.

Therefore, this study contributes scientifically by providing empirical evidence on how barriers to implementing sustainable e-procurement significantly impact the success of green construction projects in Nigeria. By quantifying the influence of both manual procurement deficiencies and electronic procurement barriers using regression analysis, the research advances understanding of procurement-related inefficiencies in sustainable construction. The findings offer a data-driven foundation for policymakers and stakeholders to transition from manual to digital procurement frameworks, fostering transparency, efficiency, and environmental compliance. Ultimately, this study strengthens the theoretical and practical knowledge base for integrating e-procurement into green construction strategies in developing economies.

.

6. RECOMMENDATION

1.To facilitate the successful implementation of sustainable e-procurement for green construction projects, the Nigerian government and industry stakeholders should invest in robust technological infrastructure. This includes ensuring that tenderers and contractors have access to modern digital platforms and tools that can handle the complexities of green construction procurement.

2.Given the critical role of e-procurement systems, it is essential to invest in comprehensive training programs for procurement professionals, contractors, and internal users. By equipping stakeholders with the necessary skills and knowledge on using digital procurement tools effectively, Nigeria can reduce resistance to change and improve the competence of key players in the procurement process.

3.To overcome financial constraints that hinder the adoption of e-procurement systems, public-private partnerships (PPPs) should be explored as a viable solution. Through such collaborations, the private sector can contribute financial resources and expertise in the development and maintenance of e-procurement platforms.

REFERENCES

1. Enyinna, G. C., Oguzie, J. O. C., Ogbonnaya, B. O., Okereke, G., & Okpala, C. A. (2023). Application of Monte Carlo simulation in evaluation of cost associated with green building projects in Nigeria. *Journal of Management Information and Decision Science*, 26(Special Issue 6), 2023.
2. Enyinna, G. C., Okwara, I. D., &Ikeazota, W. (2021). Impact of sustainable procurement of construction materials on project delivery in Nigeria. *International Journal of Scientific and Engineering Research (IJSER)*, 12(9), 2229-5518.

3. Tomas, H., Ivan, M., & Niksa, J. (2020). Challenges of the electronic industry: A review. *Economies*, 8(1), 13.
4. Llyas, M., Ganis, D. A., Adhi, N., & Dia, P. R. (2021). Impact of e-procurement adoption on company performance: Evidence from Indonesian manufacturing industry. *Logistics*, MDPI.
5. Enyinna, G. C., Okwara, I. D., & Oghenetega, S. A. (2021). Impact of virtual project management on project delivery during the Covid-19 pandemic. *International Journal of Scientific and Engineering Research (IJSER)*, 12(9), 2229-5518.
6. Simon, S. M. Y., & Calvin, C. (2023). Sustainable e-procurement adoption and practices in the pandemic era. *International Journal of Economics and Business Administration*, 11(2).
7. Yonghan, A., Hyunkyu, S., Myunghwa, J., &Chanwoo, J. (2017). Construction process framework for green building projects. *International Journal of Sustainable Building Technology and Urban Development*, 349-364.
8. Refikullah, D., Chen, W., Jeffrey, B., Heng, L., & Faizul, A. M. (2019). Developing internet online procurement frameworks for construction firms
9. World Bank Group Governance Global Practice. (2023). Introducing e-procurement in Bangladesh: The promise of efficiency and openness. *Working Research Paper*.
10. Bo, X., & Ayokunle, O. O. (2023). Building a body of knowledge in construction project delivery, procurement, and contracting. pp. 88-106
11. Simon, S. M. Y., & Calvin, C. (2023). Sustainable e-procurement adoption and practices in the pandemic era. *International Journal of Economics and Business Administration*, 11(2).
12. Yonghan, A., Hyunkyu, S., Myunghwa, J., &Chanwoo, J. (2017). Construction process framework for green building projects. *International Journal of Sustainable Building Technology and Urban Development*, 349-364