IMPACT OF SUSTAINABLE PROCUREMENT OF CONSTRUCTION MATERIALS ON PROJECTS DELIVERY IN NIGERIA

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Abstract

The impact of sustainable procurement of construction materials on project delivery in Nigeria. The main objectives: to analyse. The success factors of construction procurement and its impact on project delivery in Nigeria. to examine the constraints/challenges against the attainment of the desired sustainable Procurement of construction materials on project delivery in Nigeria. 180 questionnaires were distributed and 165 returned, 156 were successfully filled and found to be useful, the sample size was gotten using Yaro Yamane Formula. Relative important index and average mean score was also used in ascertaining the result.it was concluded that the success factors of sustainable procurement have positive impact on construction materials procurement for project delivery in Nigeria as factors such as organizational strategy, contract management, user satisfaction, technological parameters and government policy are the most important factors influencing sustainable procurement of construction materials on project delivery which is guided by the rules and regulations of the public procurement Act 2007. Factors like: No formal contract, not doing supplier assessment before procurement, and lack of transparency were ranked very high with relative impact index of 2.09, 2.02and 1.88 respectively. It was suggested that efforts should be made to control the relevant constraints/challenges by all stakeholders involved in the procurement process of a project**.**

Keywords: Procurement, Sustainable, Materials, Construction, Impact, Project, Delivery

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1. Introduction

Decades ago, the procurement practice in the Nigerian construction sector has changed to a degree worth considering. Oshungade et al., [1] opined that this has led procurement entities to use various methods to procure materials required to carry out their various project he posits that the methods used by these procurement entities for carrying out their various projects are mainly the plan and build, construction management, and lastly traditional method of plan and build. Therefore, Procurement can be referred to as handling the various tasks associated in execution of a project, it starts from looking for suitable materials that conforms to the standards for the project and also ascertain the human capital or man power that are required. Thus, this study is determined to examine the impact of procurement of construction materials for project delivery in Nigeria.

Hence, the role these procurement methods play is key in measuring whether the project can be carried out on time or not. According to Hammer [2], the complicacy of the construction project and lack of sustainable procurement leads to implacable outcome, which makes the owner to pay more money.

In addition, some factors is considered when purchasing for services in a project. These factors are grouped into extrinsic and intrinsic factors according to Hammer [3]. According to him the extrinsic

factors Is the economized environment which is usually a market for services concerned with prices. When materials is expensive, the procurement entities choose to look for materials in areas where they are very cheap which might also affect the quality of the procured materials. The Traditional procedure of procurement is painstaking, because the client of the project needs a u –turn on time from the start of the task, he can examine the offers from online and analyze the best favorable prices. Nevertheless, legal challenges are seen as one of the drawbacks of procurement which hinder what the materials and even the type of service to be presented so as to meet the required specifications. Hence, all country has a different guideline that control their procurement activities. Thus, having knowledge about needs of client or the stakeholders helps in choosing the right procurement procedure for a project. On the other hand, he opined that intrinsic factors are manageable which can be handled to fit the needs of the client. The client may prefer a specific procedure over the other according to Ojo et al., [4]. This is witnessed where clients want to reduced cost. Therefore, the meaning of success in a project is diverse between the owner and the procurement entities which are focused on pleasing their various stakeholders. Hammer [5] disagreement arises because the procurement entities fails to meet the specifications desired by their clients.

Anvuur et al., [6], opined that High complicacy, doubt, and time pressure in projects have maximized the desire for togetherness within different project professionals to an extent is due to the procurement methods leading to many challenges at the phases of procurement process. According to him interchanging of procurement method is, however, hindered by owner's behaviour.

1.2: Procurement

It refers to the purchase of items, services, and knowledge needed by organizations, from the appropriate place, the appropriate quality, in the appropriate quantity, at the appropriate price and at the appropriate time to maintain and handle an organizations primary and support activities. According to Mangan et al., [7], procurement refers to the means of disclosing goods and services. According to him, it involves sourcing, buying and includes all series task from looking for suppliers for delivery to the benefactor.

1.21: PROCUREMENT METHODS

Procurements in construction sector has changed. Because of sudden rise for construction in societies, choosing the appropriate method to purchase materials and look for a referral from a professional. Thus, coming up with a strategy to handle projects emphasizes on less performance before beginning of the task.

1.22 Traditional Procurement

Here, the designers are different from contractors. It is significant to take into account that the duties of a designer is short term and concludes after giving an insight of the entire project. selective tendering is used to choose the qualified contractor awarded with any project. Bids are made to the management and the basis for appointment is based on numerous factors such as cost and the estimated time of execution. Traditional procurement method is made up of lump sum procurement, measurement procurement and cost reimbursement. Under lump sum, the contractor concurs to carry out a task within amount depending with the features of the task. The client is not allowed to make any changes.

In addition, the contractor does not have a right to ask for more resources irrespective the project costed him more money. The cost may vary due to the instability of price. The Government is usually known for this kind of procurement method, where the contractor Is required to execute the task at within an amount. The task cannot be exactly determined thus; the qualifications are made to examine the precise cost. The advantages of the method are proper transparency of funds on the side of

contractor. The team that is assigned with the duty of selecting the appropriate contractors accurately evaluate all the tenets required for good performance hence, resolves the right one. Another benefits of this method Is equity. According to park et al [8] qualification process is being carried out in a tendentious manner which enhances the chances of quality the owner benefits from this method since they have an array of choice to resolve on. According to him A favorable chance is giving to the management to coordinate themselves and combine enough money to carry out the whole project. As said earlier, the designer and the management have a direct effect of the quality of task delivered. They can be able to note the faults and provide a means to correct the it. This method takes longer to come to agreement because, it begins from the qualification process where different contractors present their proposals for qualification. They are sometimes not involved in the initial stage and hence can interrupt the connection between the various professionals involved. According to Hammer [9], the old method of procurement is suitable in most cases. These are requisite which holds permanently for this procedure to be recognized. This must be when the architect and the contractor are assigned differently. It was recommended for the management to select the two professionals at diverse stages. The contractor makes sure the planned work is executed. If the project manager has enough time to wait for the long protocols, then this method is suggested to be used. duration comes into play since the necessary people and bodies should be engaged according to Hammer [10].

1.23: Design-Build Procurement Method

This is a procurement set up which crops the construction sector. The organization that plans the task is normally company that executes. Thus, a specific contractor is allowed to execute the whole project. The company uses all fields of construction. Its features are that plan is not always ready when the job starts. Because the designer of the project is the same who executes. It implies that nobody works on the plan while the job is in progress by executing it in different procedure. Naoum et al., [11] added that the main fountainhead of lack of efficiency when construction is going on is from lack of communication between procurement entities and their various suppliers which in turn increases the chances of mistakes due to the services that are provided by the suppliers. Serious changes could get involved when all task is done by one person. The professional who has tabled the design is supposed to inspect every activity at the construction site. And is in opposition to when another group is present to deliver the plan services appears to depend on the specification of the client. He's able to make change when the contractor grasps the plan of the work. Hammer [12] opined that the procurement methods helps the management to accede services for a particular contract without searching for more contractors. It minimizes expenses and time.

Regardless the benefits mentioned earlier, disagreement comes in if the project is being executed. This happens from not conforming to all the specifications of the owner. Inadequate procedures at the beginning phases of the task increases the rate of conflict. Bacon [13] affirmed that it is included to decrease inspection on the side of the client and the contractor is assigned with the obligation to inspect the whole work. Lower inspection is put in place at risk of low standard. According to him effective standard is required to put in place each stage made by the foremen and relevant deliberations is grasped when choosing this method of procurement. The client has little control over the whole work. The contractor is authorized to inspect and handle each task that occurs at the construction site. Hence, completion of the project is trusted by the contractor. Also the have power to manage the rate at which work is done and show appraised time to tidy up each task. It's a disadvantage on the part of the owner. Park et al., [14] opined that the zeal to create the picture of their organizations helps the organizations to provide quality services and act efficiently to dated time hurdles. Sureness of price is lofty and changes of specification by the client may affect the plan of the contractor badly. According to Bacon [15] this procedure maybe be used when less complex project are executed instead of a complicated one.

1.24: Management procurement

Hammer [16] said that Management contracting comprises the client choosing a virtuoso in construction sector each consultant is engaged in preconception stage and during the execution of the project. The responsibility of contractors is to inspect each activity. They make available short minutes to the client, specifying all expenses of the job carried out and amount to be given to the various parties. Special attention is laid on knowing the class of contractor to get involved in the project. Management construction comprises the process of choosing a person from a list of presented quotations. The procedure of choosing is carried out for some period and the eligible individual is given the project. He agrees to work below a stable rate instead of agreement basis. Contractor is usually a representative and will not estimate the precise duration for project closing. The representative is not responsible to mishap that happens which is expensive to the owner. Planning and management is normally referred to contract management. The contractor is settled with some part of money and anticipated to provide for both planning and execution. Benefit of using this procedure; the owner works with a specific contractor.

1.25: Critical success factors for sustainable Procurement Project

This work reviews the significant factors that affect the projects to ensure success. The project's acquisition process is essential to achieve project success, owing to delay of materials required and equipment delivered with wrong specifications. Thus, ensuring acceptable instrumentality as to each schedule, ensures success in the execution of the project. The concept of considerations therefore, proof that essential factors affect the acquisition method within the project to achieve success. The influencing factors is to be given continual attention to ensure that they help in the success of projects.

Table below, provides a summary of literature concerning the success factors for procurement projects

Table 1: Identifies the Success Factors

Organizational strategy	**Contract management**	**User satisfaction**	**Technological parameters**	**Governmental policies**
Top management support	Negotiation	Relationship with supplier	Technological standard	Political support
System training and documentation	Competitive procurement process	security	Project technical feasibility	Government involvement by providing guarantees
System integration	Supplier process and time	risk	Technology transfer	Economic policies
Change management	Price	Social support		
Performance measurement	Available financial market	Partner selection		
Good governance	Shared authority between public and private sectors	experience		
Team building	Transparency n procurement process			

	Cost of fuel, electricity and water etc.			

1.25: Benefits of a sustainable procurement

There are several benefits of a sustainable procurement process which are as follows:

- A good procurement process minimizes time and also makes sure that the right solution to meet the required project objectives.
- A good procurement process helps to determine the suitable cost of materials for a project.
- It helps to overlook the vital steps that may come back to haunt the project objectives;
- It helps the supplier is to be familiarized with a particular approach used by a procurement entity.
- Finally, a good and sustainable procurement helps to resolve the issue of transparent bookkeeping and also avoids fraud.

1.26: The Impact of sustainable Procurement of Construction Materials on Project Delivery in Nigeria

At a recent summit which was held by the Nigerian Institute of Building (NIOB), tagged: "Appropriate procurement methods: Ensuring effective building production," the organization said high rise in inflation index on resources in the construction industry has caused a decrease in business activities in the sector with inflation affecting negatively on corporate body's purchasing power; and by extension decreasing the desire for new projects. The Vice Chairman, NIOB Lagos Chapter, Sunday Wusu, said that the sustainable procurement of construction materials would successfully help in completion of projects in Nigeria, and at the right cost to the various stakeholders without reversion to arbitration and litigation. He also called on professionals to see suitable procurement methods in its true light and to differentiate between diverse procurement procedures for different project; that would help in arriving at the best alternative for each project.

Wusu mentioned that: "sustainable procurement of construction materials when systematically analyzed and examined at the beginning and put to use would definitely help in decreasing, if not remove cost overrun that culminate from the elongation of time due to unexpected mistakes from the different stakeholders on such projects."

1.27: Theoretical Perspectives of the Problems of Construction Procurement.

(a) Economist view of the Problems of Procurement:

Some economic analysis of procurement concur that the problem of procurement is data incommensurability at the beginning of the negotiation. This shows data predicted in manufacturing cost. The opined that different group in the negotiation will benefit by having some important information concerning each fields of the output whether in price, material accessibility, government rules etc. This notion is supported by the use of negotiation price theory, game theory and principal

agent theory to different sections of procurement. The features of construction procurement are that they are one-time commodity that are very diverse and unmatched from any. it makes costs similarities to be cumbersome as each task is unmatched.

(b) Traditional Engineering and Construction Managements Opinions

In opposition to the statement above, Bajaris et al., [17] opined that there is no proof that a group engaged in a construction activity have the right to a particular data which is not easily provided to the groups involved in the procurement procedures. The originators debated that the higher problem is in condition of doubts associated with construction in accordance of the planning and construction procedures. Most times alterations are affected by the stakeholders because of unavoidable situations, because of environmental disasters, weather condition and violence. This stance are held in position by Chartered institute of building [18] which claims that the factors that differentiate construction procurement from other sectors as the complicacy of projects.

2: Materials and Methods

The materials used for this research includes the collection of data from various sources. The data were gotten through questionnaires, interviews and discussions with professionals that have been involved in various procurement projects. The secondary data were gotten from journals of key professional agencies, like the Nigerian Institute of Building, architects, quantity surveyors and Nigerian Society of Engineers, textbooks, and seminar and so on.

The respondents were to individually ascertain the success factors of the sustainable procurement and the constraints militating against the attainment of the desired sustainable procurement of construction materials on project delivery in Nigeria. The respondents in this research are professional advocate of technocracy directly engaged in the execution of capital projects as well as their staff in their different companies. The professionals stated above are directors of departments involved in either inspection of project execution and determining value for money on the different capital projects completed in their various field.

A total of 180 questionnaires were distributed to the participants in this research and 156 were successfully filled up and needful for the research. The 156 questionnaires comprise of 91% success rate. Based on the aver mention in Ewa [19] that the data gotten from a survey can be said to be tendentious and of a less value if the return rate was not up to 31-42% thus, with the returned rate at 91%, this is eligible for analysis. Yaro Yamen formular was used to examine the sample size as follows:

$Q = q/1+(e)^2$

1= constant

q = population size = coefficient of confidence (0.05)

Q= sample size

Cumulative population size =156

$Q=156/1+(0.05)^2$

156/2.7 = 57.777

This research is aimed at determining the following objectives which is as follows:

1) The respondent's opinion on the critical success factors of sustainable procurement.

2) The respondent's opinion on the problems/challenges of procurement. Four point Likert scale was used as adopted by Ewa [19] with the following points as represented below on the scale:

Relative important index (RII) = $(4Q_4+3Q_3+2Q_2+Q_1)/4Q$

Where: Q_4 = most likely; Q_3 = likely; Q_2 = not likely; Q_1 = most not likely; Q = Number of respondents. Average mean score was used to evaluate the respondent's opinions on the constraints/challenges against the attainment of the desired success factors that helps in attaining a sustainable procurement of construction materials on project delivery in Nigeria. A four point Likert scale was used which is suitable with what Familoye et al., [20] used in evaluating the effect of the problems facing the effective operations of the Nigerian public procurement Act 2007. This was indicated with points as Follows:

Strongly agreed = Q_4

Agreed = Q_3

Not agreed or disagreed = Q_2

Disagreed = Q_1

3: Results and Discussion

A thorough analysis of the success factors used in procurement project of various categories was useful in highlighting success factors. The established factors were further sub-divided categorically based on the perception of the respondents.

Table 2. Relative Importance Index Score for Organizational Strategy

The success factor for organizational strategy	Q_1	Q_2	Q_3	Q_4	RII	Ranking
Top management support	2	9	19	70	2.41	1st
System training and documentation	2	10	25	40	1.73	7th
System integration	5	15	60	20	1.99	5th
Change management	12	13	55	20	1.87	6th
Performance measurement	12	3	60	25	2.01	4th
Good governance	5	36	11	48	2.03	3rd
Team building and training	7	5	30	58	2.23	2nd

The results presented in table 1 shows that the most important factor for Organizational strategy is top management support with a RII of 2.41 and ranked first. While the results indicate that engaging in system training and documentation has the least RII of 1.73 and ranked seventh. Ensuring that there is team building and training and good governance are the next in the list of the highest ranked factors.

Table 3. Relative Importance Index Score for contract management

The Success factors for contract management	Q_1	Q_2	Q_3	Q_4	RII	Ranking
Negotiation	16	25	40	18	1.74	7th

Competitive procurement process	14	25	35	26	1.82	6th
Supplier process and time	6	51	25	18	1.72	8th
Price	7	25	57	11	1.84	5th
Available financial market	2	15	30	53	2.25	2nd
Shared authority between public and private sectors	9	8	31	52	2.20	3rd
Transparency in the procurement process	6	9	21	64	2.34	1st
Cost of electricity, fuel and water	4	5	32	49	2.06	4th

The results presented in table 2 shows that the most important factor for contract management is transparency in procurement process as a pre-condition for a successful project delivery with a RII of 2.34 and ranked first. While the results indicate that getting the supplier process and time has the least RII of 1.72 and ranked eight. Available financial market and shared authority between public and private sectors are the next in the list of the highest ranked factor.

Table 4. Relative Importance Index Score for user satisfaction

The Success factors for user satisfaction	**Q_1**	**Q_2**	**Q_3**	**Q_4**	**RII**	**Ranking**
Relationship with supplier	2	10	28	60	2.34	1st
Security	8	13	18	55	2.08	6th
Risk	1	15	40	44	2.21	3rd
Social support	3	18	25	49	2.09	5th
Partner selection	3	9	11	71	2.28	2nd
Experience	7	8	55	31	2.11	4th

The results presented in table 3 indicates that the most important factor for user satisfaction is the relationship with supplier with a RII of 2.34 and ranked first. While the results show that security has the least RII of 2.08 and ranked sixth. Partner selection and risk are the next in the list of the highest ranked factors.

Table 5 Relative Importance Index Score for Technology parameters

The Success factors for technology parameters	**Q_1**	**Q_2**	**Q_3**	**Q_4**	**RII**	**Ranking**
Technology standard	4	13	38	45	2.19	2nd

Project technical feasibility	5	16	20	58	2.22	1st
Technology transfer	12	9	29	48	2.19	3rd

The findings presented in table 4 indicates that the most important factor for technological parameter is project technical feasibility with a RII of 2.22 and ranked first. While the results show that technology transfer has the least RII of and ranked 3rd.While technology standard is the next in the list of the highest ranked factors.

Table 6. Relative Importance Index Score for Government policies

The success factors for government polies	**Q_1**	**Q_2**	**Q_3**	**Q_4**	**RII**	**Ranking**
Political support	4	21	28	44	2.07	2nd
Government involvement by providing guarantees	4	11	15	70	2.37	1st
Economic policies	10	21	25	44	2.04	3rd

The findings presented in table 5 indicates that the most important factor for Government policies is the government involvement by providing guarantees with a RII of 2.37 and ranked first. While the results show that economic policies has the least RII of 2.04 and ranked 3rd.Political support is the next in the list of the highest ranked factor.

Table 7. The constraints/ challenges of a sustainable procurement

s/no	**Constraints/Challenges of sustainable procurement**	**Q_1**	**Q_2**	**Q_3**	**Q_4**	**RII**	**Ranking**
1	Poor Quality for Lower Costs	1	5	30	50	1.30	9th
2	Providing wrong Specifications & Requirements	10	33	46	48	1.75	6th
3	Lack of Supplier Assessment Before procurement	10	53	51	50	2.02	2nd
4	Lack of Understanding of the Supplier Capabilities	8	18	42	33	1.30	9th
5	Transparency issues	5	15	56	58	1.88	3rd
6	Trust issues	15	42	30	60	1.85	5th
7	No Formal Contract	18	12	42	80	2.09	1st
8	Accidental Orders	18	50	70	10	1.59	8th
9	inaccurate data	10	33	46	48	1.86	4th
10	More attention on Cost Reduction	3	5	27	49	1.25	12th
11	Complications on Which Supplier to Which to substitute	5	3	45	62	1.70	7th
12	Ignoring the Costs of Time	2	8	35	45	1.31	11th

Table 7: the findings presented on the problems /challenges of sustainable procurement of construction materials.

From the respondent's rankings, it shows that no formal contract came first with 4.13. Not doing supplier assessment before procurement came next on the list with 3.85, this means that if successful project delivery must be witnessed to an extent, all imprecision and complicacies must be done away with. In addition, the respondents of each company must see this as a barrier against the success of project performance. While the least factors which was identified by the various respondents of these organizations are: allowing poor quality for lower cost; ignoring the costs of time and continue focus on cost reduction with 3.41,3.27 and 3.10 respectively.

4: Conclusion and Recommendation

This research work examined the impact of sustainable procurement of construction materials on project delivery in Nigeria. The result showed that organizational strategy, contract management, user satisfaction, technological parameters and government policy are the most important factors influencing sustainable procurement construction materials on project delivery Nigeria, which is guided by the rules and regulations of the public procurement Act 2007. Despite the impact of the success factors that aid in carrying out a sustainable procurement of construction materials, there are still some constraints/challenges militating against the attainment of the desired impact of sustainable procurement of construction materials on project delivery in Nigeria as revealed as follows: No formal contract, not doing supplier assessment before procurement, lack of transparency, lack of accurate data, lack of trust, providing unclear specifications and requirements. This paper, therefore recommends that more effort should be made to control the most relevant constraints/challenges of procurement. The federal government of Nigeria should immediately create the National Council on Public Procurement and for the Executive Council of the Federation and other related bodies. The federal Government officials does not need any special responsibility in the procurement process not provided for in the procurement Act. Finally, the Bureau for public procurement should work together with the procurement entities of organizations to develop a clear time table for solving the problems of lack of technical capacity for sustainable procurement of construction materials for project delivery in Nigeria.

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