

A Comparative Analysis of Methods of Procuring Plant and Equipment in execution of Construction Projects

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Abstract

Contractors encounter a lot of problems in decision making on how to acquire plant and equipment to execute project to attain cost effectiveness to either purchase or to hire. The paper examined the relationship between procurement method preference and some selected variables (value of contract, contract size, contract type and contract period) A total of 75 questionnaires were administered to different indigenous construction companies in Abuja using the random sampling method. The data were analysed using simple spearman correlation, simple percentage and Relative importance index. It was concluded that it is more economical to hire plants that are not frequently put to use (specialized plants). High cost of equipment was the major reason contractors preferred to hire than purchase plant. It was recommended that government should make efforts to reduce hire rate and a national Centre for manufacturing of construction equipment be established partnering with stakeholders in the construction industry.

Keywords: Selection of Plants, Procurement, Plants and Equipments

1.0 introduction

The construction industry is different from most other industries, because it creates a one-off prototype while other industries produce in mass. The construction industry involve in mass production when the prototype occur as a model (Valencia, 2011).

Constructions take off after design. The conversion of a design through construction into a suitable structure is accomplished with the help of men and machines (Ahmad,2012)

Construction work is labour intensive and takes time. This has being the major problem confronting the industry. Efforts have been geared towards reducing time and efforts spent on site. Machines are usually employed to provide solution to that problem (Ahmad,2012)

Mechanical/electrical equipments are machines that augments human energy, increase our level of control and process information. They are vital elements essentially needed for the execution of most construction projects (Construction equipments, 2012)

Construction equipment set up the most important financial outlay in both the Civil Engineering and building actions. It is therefore significant that a great application of equipment is accomplished on construction sites so as to attain a satisfactory profit on capital spent. Presently, cost and time overruns remain popular in Nigerian construction industry and they are being disappointment to project delivery. Hence, the identification of appropriate equipment application problems, the systems of choosing and the methods of procurement of equipment and the records of contemporary maintenance policy of equipment employed by companies on sites will significantly outline the success of project delivery (Gyan, 2003)

Every single piece of construction equipment is expressly designed by the manufacturer to perform a certain mechanical action. The duty of the estimator is to match the accurate machine or combination of machines to the job at hand. A precise and in-depth understanding of the cost that result from equipment ownership and operation gives firms a market advantage that leads to countless profits. The practice of selecting a specific type of machine for use in constructing a project entails the knowledge of the cost concomitant with operating the machine on the site (Construction equipments, 2012)

The evidence of just how we understand the work that needs to be accomplished and select appropriate machines for that purpose is made known by recalling the amount spent on it when the contract is accomplished. Did the firm make a profit or sustained a loss? (Construction equipments, 2012) One of the most significant tasks in the pre-construction planning practice is equipment selection. There are numerous variables to think about when selecting equipment and these factors ought to be considered at the time of selecting construction Equipment: few of these factors are:

The Equipment must be Standard Equipment if possible; be give the paramount service at low cost; unit cost of production should be reasonable; be effortlessly repairable with low shutdown period; be easily disposed off; suit the bulk of the requirements of the job; be capable of doing more than one task; be of reasonable size, as they have less moving parts and have low working cost. Bearing in mind the above factors, one can either Purchase or Hire the Equipment. According to (Amusan, 2006) Plant and equipment procurement matter is one of the most important factors that influence project success. This research covers the Nigerian indigenous construction companies in the works category of the BPP (Bureau of Public Procurement)'s

classification of contractor in and around Abuja. One of the problems encountered by a contractor as he plans to construct a project is the selection of the most suitable equipment to be used.

Most contractors in Nigeria undertake projects which they know little or nothing about talkless of selecting the appropriate equipment. Most contractor secure contract based on the political affiliations and connections and some projects even failed before they are being started. The target of this paper is to identify why contractors prefer a specific procurement type from the available options. It also examined the relationship between procurement preference and some selected variables (such as contract value, contract size contract type and contract period) which will assist the contractor in decision making.

2.0 Selection of Plants and Equipment

For a beginner contractor, he cannot spend all the money for equipment in a particular investment. A contractor cannot afford to own all types and sizes of equipment he needed for a project. A contractor does not have to pay for the construction equipment but equipment must pay for itself by earning for the contractor more money than it costs (Valencia, 2011).

Procurement of plant and equipment issue is one factors of utmost importance that has impacts on the success of the project (Amusan, 2006). If the Equipment is to be used frequently and for a long duration of time on the Project, it is more economical to Purchase the Equipment. On the other hand, if the Equipment is to be occasionally used and for a short period of time on the Project, it is more economical to hire it (Construction Equipment, 2007)

Some of the methods through which plant and equipment procurement could be achieved are as follows; Purchase (outright Purchase, Hire Purchase), Hiring (Leasing, Renting). (Amusan, 2006)

Equipment Purchase refers to a contractor or construction organisation attempting to acquiring plant and equipment to accomplish the goals of executing a project. According to Purchasing (2013) Purchasing is of two types, and these are: outright and hire purchase.

O outright purchase is a situation whereby the person willing to sell a plant or equipment is ready to offer it for sale at a particular time frame and marked price. It involves articulating the term and condition of sale and payment in an article of agreement. The ownership of the plant remains that of the buyer after purchase. Liability shift from the seller to buyer. (Amusan, 2006). Hire purchase is a kind of instalment credit in which the hirer (hire purchaser) come to an agreement to take the properties on hire at a specified rental, which is all-encompassing the payment of principal as well as interest, with an opportunity to purchase. In this business deal, the hire purchaser obtains the equipment instantaneously on signing the hire purchase contract nonetheless the title or ownership of the same is reassigned only when the last payment is paid. (Rani, 2011)

According to Renting (2013), Hiring is an arrangement where money is paid for the short-term use of a plant or equipment possessed by someone else. Ownership of the asset remains exclusively that of the hirer throughout the period of the equipment life cycle unless otherwise transfer. It entails specifying the hiring period and terms. Maintenance cost of the plant while in use is often borne by the hirer once the charge has been billed into the hiring cost. Most equipment requires manufacturers' attendance while such equipment is under hire. (Amusan, 2006) while

Leasing is a long duration hire of plant and equipment (for times extended beyond 365 days). Leasing is usually used for high-value capital equipment. A leasing contracts that handovers majority of the threats and rewards of proprietorship, commonly for the existence of the asset, is identified as a finance lease. The other leasing contract which is not a finance lease is known as an operating leases (Renting, 2013). This is considered an alternative option to purchase. Capital intensiveness of the plant and equipment acquisition often necessitates leasing as an alternative. It makes an expensive plants and equipment available to contractors. It also involves documentation of term and agreement, interest rate, extent of concerned party's liability. (Amusan, 2006)

3.0 Research Methodology

The research adopted both descriptive and inferential method of analysis. The research population is the Nigerian construction industry. The construction companies in Nigeria. The contractors involved in various types of construction and the various types of construction equipment used. The sampling frame for this study was generated by a random selection of construction companies in and around Abuja.

A sample size of 75 indigenous construction companies were served questionnaires from the targeted sample frame in order to achieve the desired result. The simple random sampling technique was employed.

The data for this research were collected by administered questionnaires, and personal interview to gather first-hand information as a primary source.

Statistical tools employed in analysing data including simple spearman correlation, simple percentage and RII Ranking of responses of construction firms.

Simple Spearman Correlation method was used in this research to analyse the correlation between procurement method and other project variables while simple percentage ranking

method was used to analyse the procurement preference of the respondents in the execution of construction projects.

The Relative Importance Index method was used in this research to analyse the reasons why responding firms prefer to use the procurement method preferred by them.

4.0 Findings and Discussion

48% of the respondents engaged in the building and civil engineering projects while 27% of the respondents worked exclusively on civil engineering works. 21% of the respondents worked on building construction works only.

Crane is the most commonly hired plant of the firms surveyed followed by the tractor trailer, while concrete mixer is the most commonly owned (bought plant) by most of the firms surveyed followed by the trucks. Bulldozer and vibratory compactors are also preferably owned.

36% of the entire sample were companies that handled jobs worth between 100 million and 500 million naira, of these percentage, 20% and 13% preferred hiring and leasing respectively.

Table 1: Procurement Preference and Contract Value Cross tabulation

Procurement preference	Contract value				Total
	Less than ₦100 million	₦100-500 million	₦500 million-1 billion	More than ₦1 billion	
Outright purchase	2.7%	2.7%	.0%	2.7%	8.0%
Hire	10.7%	20.0%	9.3%	13.3%	53.3%
Leasing	6.7%	13.3%	12.0%	6.7%	38.7%
Total	20.0%	36.0%	21.3%	22.7%	100.0%

In testing the correlation between the contract value and the preferred procurement preference, The R^2 value of 0.12% meant only less than 1% of variation in procurement preference were associated with variations in contract value of jobs.

In testing the correlation between variation in building size and procurement preference shows the R^2 value of 0.029% meant only less 1% of variation in procurement preference were associated with variations in size of the building jobs.

The correlation result confirms that R^2 value of 4.93% means that about 5% of variations in procurement preference were associated with variation in size of the civil jobs.

The correlation result also shows that the R^2 value of about 0.69% meant that only less than 1% variation in procurement preference were associated with variation in contract types.

This correlation table confirm that the R^2 value of 0.66% means that less than 1% variation in procurement preference were associated with variation in contract period.

Table 2: Correlation result for procurement preference and Contract value

Exp No	Mean Values		Spearman Correlation (R)	R^2 -values (%)	P-value	Strength of Relationship	Remark
	X	Y					
1	Contact value	Procurement preference	0.035	0.12	0.763	Very weak	NS
2	project size (building)	Procurement preference	-0.017	0,029%	0.904	Very weak	NS
3	Contract type	Procurement preference	-0.083	0.689%	0.477	Very weak	NS
4	Contract period	Procurement preference	-0.081	0.656%	0.492	Very weak	NS

Key: SS: statistically significant. NS: Not significant

In ranking the reason why firms prefer hiring/ leasing to buying construction plants. The following findings were obtained on a 5-point likert scale. The top three reasons given were (1) high cost of equipment (0.91), (2) High Maintenance cost (0.83), (3) Jobs that requires specialised plants (0.83) while The three least important reason for not purchasing plant out rightly were (1) Domination of industry by large foreign firms (0.74), (2) Lack of qualified expertise (0.56), (3) Effect of government policies (0.56)

Table 3: Ranking of Reason for Procurement Preference

Reasons	RII	Rank
Cost of equipment is high	0.91	1
Maintenance cost is high	0.83	2
Job requirements (specialized plant required)	0.80	3
Non availability of capital for sinking	0.79	4
Weak indigenous manufacturing industry	0.79	4
Unsteady cash flow (to take care of regular payment)	0.78	6
Scarcity of spare parts	0.78	6
Domination of industry by large foreign firms	0.74	8
Lack of qualified expertise	0.56	9
Effect of government policies	0.56	9

5.0 Conclusion

The study has concluded that hiring plant is the most preferred method of procurement.

The study has also concluded that certain project variables were not significantly associated with the different routes taken to procure plants (outright purchase, hiring and leasing). The research revealed that (i) value of projects, (ii) size of building projects, (iii) size of civil engineering projects, (iv) Contract types and (v) Contract duration each exerted very little influence on the decision of either to hire or purchase plant. Generally the level of influence was below 5%.

High costs of equipment was the predominant reason why respondents preferred to hire rather than purchase plant while high maintenance costs and job requirements that call for specialised plants were other important reasons.

In Nigeria daily hire rates for Concrete mixers do not exceed ₦20, 000; for Trucks, Tractor trailers, and Tippers, hire rates are not more than ₦100, 000; Vibratory compactors, Backhoe, Wheel loaders, Dozers, Cranes, Concrete batching plant, Rollers and Road pavers cost no more than ₦200, 000 to hire; hire rates however exceeded 200,000 naira per day for Asphalt concrete plant, Dragline and Power shovel. These values were based on a sample of 75 firms within the study area.

6.0 Recommendations

In the light of the above conclusions reached in this study, the following recommendations were put forward as a way of improving the procurement of plants and equipment in the Nigerian construction industry.

1. The importance of the market for hiring cannot be over emphasized to the subsector of the national economy. Therefore, there is need to improve the efficiency of transactions within this market. The costs of hiring and leasing are ultimately borne by the taxpayer most especially in the case of public projects. Therefore effort should be on to reduce hire rates since it has great impact on overall construction costs.
2. Costs of equipment and plants (whether for hiring or purchasing) are generally high. To reduce construction costs, it would be necessary to develop the local construction equipment manufacturing sector.
3. This study recommends that a variant of what was done for the scientific equipment sector should be done for the construction industry. A national Centre for manufacturing of construction equipment could be established as a joint effort between government and other stakeholders in the construction industry.

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