

## Comparative Assessment of Construction Plant Procurement Methods in Minna and Jos Metropolis

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### Abstract

This paper focused on comparative assessment of hiring and purchasing construction plants with regards to their cost and benefits and it also carried out an overview of the selection criteria for construction equipment with a view to identifying the method that is more appropriate and better for plant management approach. A review of relevant literature was made in conjunction with questionnaire and oral interviews with plant supervisors, site managers, construction consultants, professionals in the construction industry and stake holders in equipment hiring/leasing firms. In the study, Lack of capital outlay for equipment purchase, lack of well organized hiring firms, high cost of spare parts, lack of proper planning vis a vis equipment record keeping were identified to be the major problems facing the construction industry. Furthermore, results also showed that it is more economical to own than to hire equipment, depending on the frequency of utilization of equipment.

**Keywords:** Construction Equipment, Procurement Method, Plant, Construction Industry, Cost

### Introduction:

Construction is the ultimate objective of a design and machines make accomplishment of that objective possible. Equipment is an economic investment and contractors must be able to apply the approximate time value analytical formulae to the decision process of machine purchase and utilization. The proof of how well the planner understands the work and coordinates the use of the company's equipment is the bottom line when the contract is completed at a profit or loss! (Peurifoy and Schexnayder, 2002).

Nigeria as a nation has been confronted with enormous set backs in terms of housing delivery; this is due largely to economic depression allied with low income growth rate increased debt repayment burden, rapidly increasing population, urbanization and most importantly, the cost of equipment, labour and materials. Plant plays an increasingly important role in building civil construction operations. Both time and money can be saved through the efficient use of mechanical plant(s). Full advantages on the use of mechanical plant can only be attained if the plant is well managed both on and off site; achieving this requires a thorough understanding of the economics of plant use and management aspect (Calvert, 1971).

Calvert (1971) further stated that mechanization of construction works is largely influenced by design.

The equipment costs only pay off through greater utilization of equipment. This can only be achieved through greater standardization and repetition works. For example, a crane will become expensive if the design does not allow a fairly continuous program of work while it is on the site. Despite the current economic challenges, an immense task lies before the building industry for many years to come, if it has to establish a balance between the dwindling national resources and high cost of labour. Consequently, new method must be evolved by which greater and more efficient use can be made of mechanical plant.

### Types of Equipment Used In Construction Industry

According to Butler (1985), the range of plant to be found in the industry is wide and varied, as can be seen from the following list of items: Pile-driving plant, demolition plant, tower cranes, concrete mixer, excavators, pumps, scaffold, hoist, dumper, bulldozers, compressors, and power hand tools. These are just a few a builder would use in the course of normal construction work.

### Factors Affecting Selection of Plants for Construction Projects

Peurifoy and Ledbetter (1985) stated that a constructor can never afford to own all types or sizes of equipment that might be used for the kind of work the company does. Contractors are frequently confronted with the problem of selection/ acquisition of the most suitable equipment and for this reason they have to cultivate the habit of ensuring that, the money invested on plant as an investment must be recoverable with a profit during the useful life of the equipment. A contractor does not pay for construction equipment: the equipment must pay for itself by earning for the contractor more money than it consumes. Unless it can be established in advance that a unit of equipment will earn more than the cost, it should not be purchased. (Richard and David, 1970).

Achuenu (1991) concisely described the factors affecting the selection of construction equipment to be specification requirement, specific job or operation to be done, mobility required of the equipment, weather's influence on equipment performance, time scheduled for doing the job, balancing of interdependent equipment, versatility and adaptability of the equipment, maintainability of the equipment, the efficiency of the operation with the equipment, how often parts are replaced and the cost of the equipment. Harris (1981) stated that, selecting the correct plan for the job ideally forms part of the construction planning process and should be chosen for a particular task only after analysis of many interrelated factors, which are: the function to be carried out, the capacity of the machine, the method of operation, the limitation of the method.

### Plant/Equipment Procurement Methods

Once plant has been selected, the next is method of acquisition. Contractors and other users of construction equipment are concerned with a decision as whether to purchase, hire or lease (rent) equipment. Under certain conditions, it is financially advantageous to purchase, whereas under other conditions, it is more economical and satisfactory to rent, hire

or use other method of plant acquisition (Peurifoy and Ledbetter, 1985).

As rightly put by Stone (1976) and supported by Peurifoy and Ledbetter (1985), construction equipment can be acquired in one of the following ways: hire purchase, leasing through third party, rent with an option to purchase it at a later date; hiring, and outright purchase.

### To Hire or Buy

Butler, (1982) put it succinctly that, because of the structure of the industry with its many small units, there has developed the plant hire organization, whose role has been to provide a service for the 'little man' who requires and wants to use items of plant but, due to circumstances, cannot afford to buy, and the larger concerns who at times require specialized plant for limited periods. These hire firms have proved to be most successful and are recognized in the same manner as any other form of sub-contractor. The big advantage in using a plant hire firm is that as specialists and experts in using a particular field, a good range of up-to-date, efficient working plant should be obtainable at very short notice. Why then, should a builder buy if such a good service is at hand? The main reason is, of course, cost. If a builder owns his own plant, that is constantly employed, the cost will be less than that of a plant hire firm. The choice of buying or hiring is generally one of policy. A few of the more general considerations to make before purchasing plant are: (a) Will there be sufficient work for the item, not only now but over its working life? (b) What will the machine do? (c) What is not only the initial outlay, but also the costs incurred in repairs, replacements and maintenance? (d) Will transportation be required to carry items from site to site? (e) Will skilled operators have to be employed or trained? (f) What is the working life of the item? (g) Power source (electrical, petrol, diesel).

### Research Methodology

In the cause of this research, the necessary information needed was obtained through the

use of questionnaires and oral interview with the contractors, the professionals in Construction equipment hiring and leasing companies in Jos, Plateau state and Minna, Niger state.

Two hundred and nine questionnaires were administered to the respondents and the study reported in this work was carried out on eight types of construction plant. The eight equipment that the study were carried on are CAT D8K Bulldozer, Poker vibrator, P&H mixer, Concrete mixer, CAT 12G Grader,

CAT 612B scraper, CAT 955L excavator and Dumper (winget). The purchase prices, ownership cost per day and hire rate per day were collected from the contractors and the equipment hiring companies.

Table 1 shows the values for the purchase, cost of ownership per day and hiring rate per day of this equipment while Table 2 describes the strength of the respondents on hire, outright purchase, leasing of the equipments in question and the Bar and Pie chart below supported this inference.

Table 1: Values for the purchase, cost of ownership and hiring rate per day of equipment

| S/N | Case Study              | Purchase price (#) | Ownership Cost Per day (#) | Hire Rate per day (#) |
|-----|-------------------------|--------------------|----------------------------|-----------------------|
| 1   | CAT D8K (Bulldozer)     | 30,000,000         | 22,000                     | 111,000               |
| 2   | CAT 12G (Grader)        | 25,000,000         | 21,000                     | 96,000                |
| 3   | CAT 621B(Scraper)       | 20,000,000         | 21,000                     | 91,000                |
| 4   | CAT 955L (Excavator)    | 12,000,000         | 21,000                     | 91,000                |
| 5   | Concrete Mixer (Winget) | 5,500,000          | 5,750                      | 24,400                |
| 6   | Dumper(Winget)          | 1,000,000          | 6,250                      | 25,000                |
| 7   | Poker Vibrator          | 150,000            | 3,500                      | 12,000                |
| 8   | P&H Mixer               | 10,000,000         | 18,000                     | 68,000                |

Source: Author's Field work (2008).

\* # = Naira

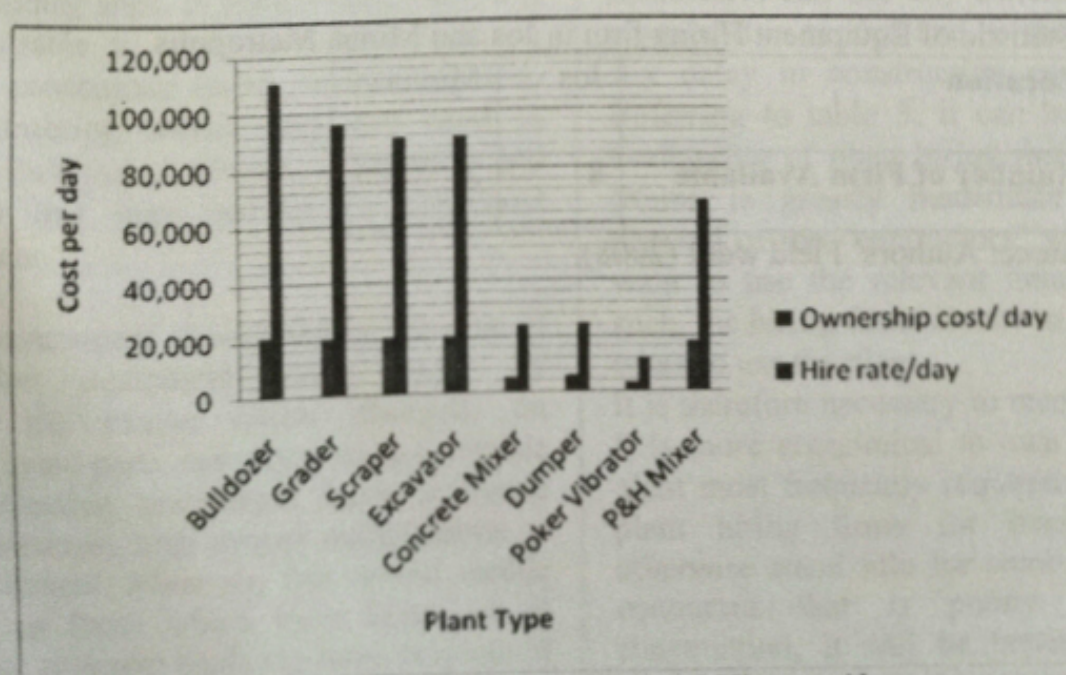


Figure 1: Differential between Ownership cost/day and Hire rate/day

| Equipment procurement Method | Response | Percentage |
|------------------------------|----------|------------|
| Purchase                     | 106      | 51         |
| Leasing                      | 37       | 17         |
| Hiring                       | 66       | 32         |
| Total                        | 209      | 100        |

Source: Authors' Field Work (2008)

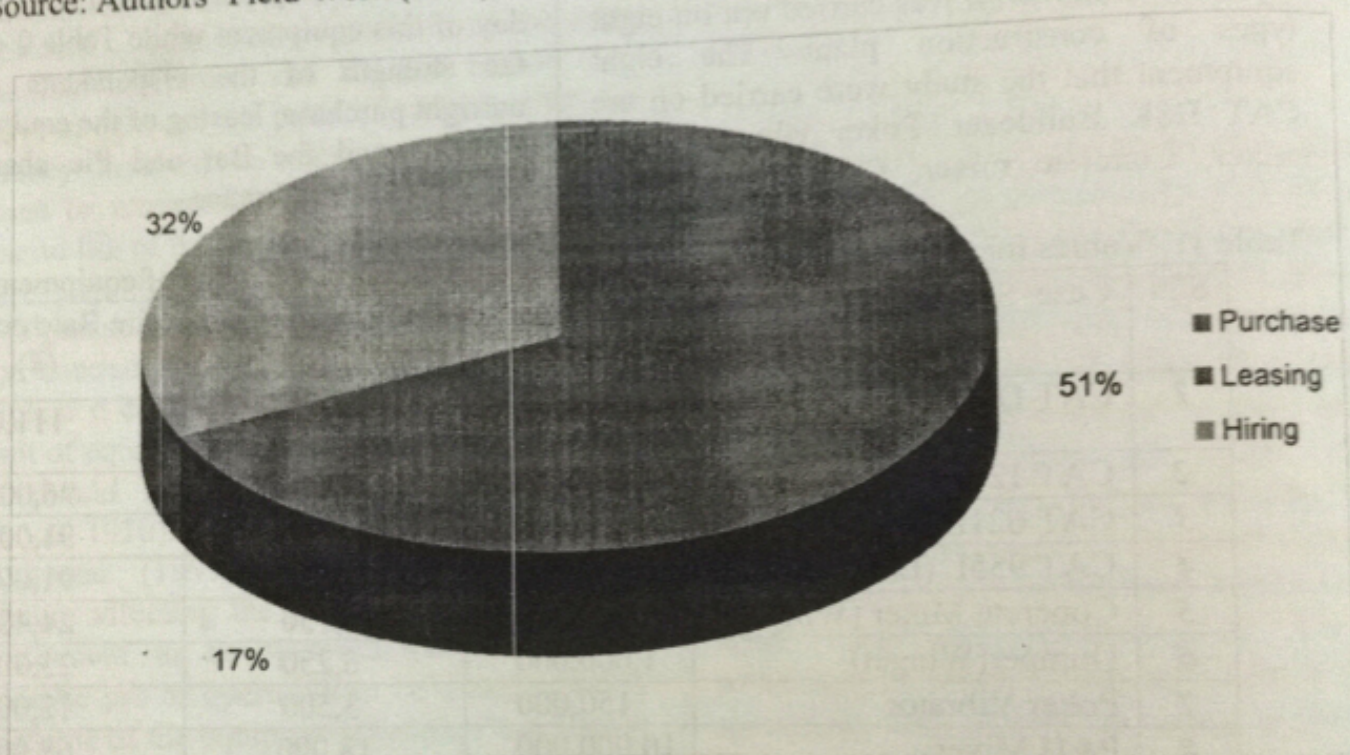


Figure 2: Relative Percentage of the various procurement Methods

Table 3: Statistic of Equipment Hiring firm in Jos and Minna Metropolis

| Location                 | Jos | Minna |
|--------------------------|-----|-------|
| Number of Firm Available | 8   | 2     |

Source: Authors' Field work (2008).

### Results and Discussion

From the analysis of the case studies in Table 1, most of the results favoured equipment ownership, it was found that the cost of owning D8k bulldozer per day is #22,000.00 while the cost of hiring the same equipment is #111,000.00 per day, meaning a contractor owning this equipment will be saving #99,000.00 everyday. The result of individual equipment also shows that it is better to own the equipment than hiring, (all things being equal).

68% (51% + 17% from table 2) of the respondents agree that equipment hiring is not efficient in this part of the world, because, there is little or no major construction project done and that because of high maintenance cost, most hiring firms in this part of the world have packed up, making the few available ones tend to fix high rate for rentage of their machines, making it uneconomical for the contractors to rent or hire.

From Table 2, 32% of the respondents agree that plant hiring is efficient, but further stated that spare parts should be readily available at cheaper rate so as to reduce the cost of hiring. Some plant items such as concrete mixer, dumper and poker vibrator require constant use on building sites, in such a condition; it is more advisable to own such equipment. A firm that concentrate more on building than civil engineering works may not need to acquire Bulldozer, Grader, Scraper and Excavator that may not be in consistent employment.

Federal government should reduce the cost of construction equipment spare parts, by reducing the excise duties charged, on imported spare parts and plant, so as to enable the construction companies have available plant department with proper maintenance of such equipment. More so, this would enable most hiring firms which have been out of business to resurrect back. On large projects of long duration, it is advisable to purchase standard plant for a specific job and resale at

answer to obsolescence. Effective plant hiring division should be established in the federal and state ministries of works and housing at a moderate hire rate to help the small contractors. Small construction companies should come together to form partnership or joint stock companies so as to raise more money to purchase or hire plant when needed. This can also help them to attract bank loans and other prospective investors/financiers.

### Conclusion and Recommendation

From the results obtained on purchasing and hiring of construction equipment, most of the plant surveyed supported equipment ownership. It will not be enough to have a generalized rule that the result should be adhered strictly to. Below are the conclusions made:

Individual equipment survey showed that, it is more economical to own most plants than to hire them. However inflation is a major problem confronting the construction industry in Nigeria with the devaluation of the Naira. As inflation becomes more pronounced, prices of construction equipment are increasing everyday; this makes it impossible for a small scale firm to procure them. There are a lot of benefits derived from equipment ownership, contractors can use any owned item of plant anytime it is needed and so there wouldn't be any delay in construction completion time. Referring to table 3, it can be said that the availability of plant hiring facility in Jos and Minna is grossly inadequate to meet the demand of the "contractors" who require and want to use the relevant items of plant. As such, the hiring firms dictate to the contractors when to use the plant.

It is therefore necessary to recommended that: It is more economical to own those types of plant most frequently required and to look to plant hiring firms for items that would otherwise stand idle for some periods. For a contractor that is purely into building construction, it will be better to own such equipment as concrete mixer, dumper and vibrator because the benefits in the long run will be higher when owned, compared to

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