

Systematic Construction Equipment Handling in Construction Industry for Cost Efficiency & Proper Management

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Abstract - The construction team plays an important role in the construction sector, it costs up to 36% of the total cost of the construction project, however, the maintenance of the equipment has not received adequate attention and this contributes to about 40% of the total cost of the construction project. The goal of this research is to ensure that construction professionals implement and adhere to the appropriate equipment maintenance strategy as an effective aspect of the profitability of the construction project. To assess the factors, some questionnaires were prepared using this information and distributed among construction professionals. The purpose of this document is to reduce downtime, obtain optimal use of the equipment and increase production at a minimal cost.

Key Words: Equipment Management, Construction Industry, Cost Management

1. INTRODUCTION

The selection of construction equipment plays a crucial role in the actual completion of any civil project. Therefore, equipment selection and planning are essential for use with minimal cost. It is the responsibility of the engineer to instruct a team to complete a task based on the site conditions. Since a large amount of equipment is available on the market, it becomes difficult to select equipment based on productivity and other responsible factors.

Many of the construction companies are unaware of the new construction equipment available on the market. To complete the project within a set deadline, the use of equipment becomes a priority. Therefore, teams need to be well classified to reduce selection times. The aim of this document is to address the classification, selection, and use of all construction equipment to facilitate the selection method and the timely completion of the project.

The cost of the equipment in a project varies from 10-30% of the total cost of the project, depending on the degree of mechanization. The appropriate planning, selection, acquisition, installation, operation, maintenance and replacement of equipment policy plays an important role in managing the equipment for the success of the project. Traditionally, the equipment purchase process was completed when the contractor selected a specific brand and machine model from a distributor.

Considering the various aspects of the usefulness of a equipment, the contractor must economically justify whether to buy or rent the equipment. A good construction manager must identify these factors and when evaluating them, decisions can be made

Another factor that can influence real construction wages is technology. In recent decades, there have been many technological changes in construction equipment and materials technology. Construction equipment has become more powerful, automated, more precise, safer and more functional, allowing workers to be more productive in construction activities.

1.1 Requirement of Equipment Management

Cost analysis and the desire to adopt the appropriate techniques for the situation are the basic factors for success and, therefore, rational planning, adequate selection and reasonable deployment of equipment concerning the optimal conditions of use. It is a common fact to find a wide range of construction machinery on every construction site, which makes construction work easy, safe and fast.

Cash purchase, loan financing, rental, and leasing are the four most common ways to buy construction equipment (CEA). Having the best results in terms of profits for the construction industry, choosing the best alternative for obtaining equipment is one of the most important issues.

There is a shortage of skilled workers in the construction sector. Advancement in construction equipment and materials automation, along with extensible components and estimation and schedule strategies have made up for the shortage of skilled labor.

1.2 Importance of this Study

The company's goal is to minimize operating, maintenance and repair costs while achieving a high use of construction equipment. The main objectives of the study are:

- ❖ Offer suggestions for the effective use of the equipment and its management in the construction sector.
- ❖ In providing a detailed report for the selection of equipment suitable for the projects.

- ❖ Identify the factor that influences the selection and effective use of the equipment.
- ❖ Analyse the various tasks involved and the difficulties encountered by respondents in construction projects.

Table -1: Frequency Percentage of Designation of the respondents

Designate on of the respondent to	Frequency	Percent	Valid Percent	Cumulative Percent
Engineer	7	35.0	35.0	35.0
Contractor	6	30.0	30.0	65.0
Supervisor	5	25.0	25.0	90.0
Equipment t operator	2	10.0	10.0	100.0
Total	20	100.0	100.0	

2. Proper selection of Equipment

- ❖ Work size: larger work volumes require greater capacity or machines of smaller and smaller capacity.
- ❖ Time limits of the activity: the lack of time for, for example, excavation can force contractors to increase the size or quantity of equipment for the activities related to the excavation.
- ❖ Availability of the equipment: the productivity of the excavation activities will decrease if the equipment used to perform them is available but not the most appropriate.
- ❖ Cost of transporting equipment: this cost depends on the size of the work, the distance of transport and the means of transport.
- ❖ Type of excavation: The main types of excavation in construction projects are cutting and / or filling, massive excavation and excavation for foundation elements. The most suitable equipment to carry out one of these activities is not the most suitable to carry out the other.
- ❖ Soil characteristics: the type and conditions of the soil are important in choosing the most suitable equipment, since each piece of equipment has different exits for different terrains. Furthermore, an excavation well may have different soils in different layers.
- ❖ Geometric characteristics of the elements to be excavated: the functional characteristics of the

different types of equipment make these considerations necessary.

- ❖ Spatial limitations: the performance of the equipment is influenced by the spatial limitations for the movement of the excavators.
- ❖ Drive unit characteristics: the size of an excavator will depend on the drive units if there is a restriction on the size and / or number of these units.
- ❖ Location of the unloading areas: the distance between the construction site and the unloading areas could be relevant not only for selecting the type and number of conveyors, but also the type of excavators.
- ❖ Climate and temperature: rain, snow and harsh temperature conditions affect the productivity of work and equipment in the workplace.

3. METHODOLOGY

The general methodology of this study is largely based on the survey questionnaire that will be collected by local building contractors of different sizes by post or by staff meeting. A thorough

The bibliographic survey was initially conducted to identify the management of risk-free equipment.

Table -2: Type of Machines

Types of Machine used	Mean	SD	F value	P value
Excavator	24.43	2.573	13.012	.001*
Excavator cum loader	17.50	1.414		
Tractor loader	17.00	3.000		
Trenching machine	23.50	4.950		
Total	20.45	4.174		

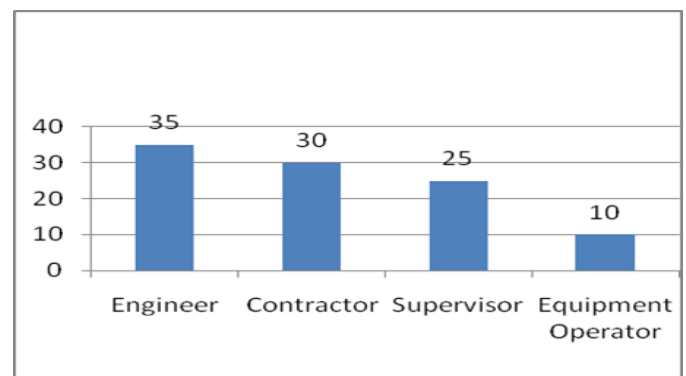


Chart -1: Percentage of Respondents

From the above table it could be inferred that Engineer constitute 35% of the total respondents followed by contractor of 30%, supervisor constituting 25% and Equipment operator to 10% of the total respondents

Table -3: Frequency percentage of type of equipment used

Location of the project	Frequency	Percent	Valid Percent	Cumulative Percent
Rural	5	25.0	25.0	25.0
Urban	6	30.0	30.0	55.0
Semi urban	8	40.0	40.0	95.0
Hilly area	1	5.0	5.0	100.0
Total	20	100.0	100.0	

As for the construction site it could be he noted that most of the buildings are built in semi-urban areas that make up 40% of respondents, followed by buildings tested in 30% urban areas and rural areas that make up 25% of total respondents.

Table -4: Analysis of variance between cost factor and type of machine used

Experience of the respondents	Frequency	Percent	Valid Percent	Cumulative Percent
Below 5 years	2	10.0	10.0	10.0
5-10 years	9	45.0	45.0	55.0
10-15 years	6	30.0	30.0	85.0
Above 15 years	3	15.0	15.0	100.0
Total	20	100.0	100.0	

Analysis of the variance between cost factor and type of machine used in construction Industry. From the previous table it can be deduced that the value of p is less than 0.05 therefore, the null hypothesis is rejected with a significance level of 5%. Therefore, we can conclude that there is a significant difference between the cost factor and the types of machines used. These are the types of machines used in the construction sector that have a great impact on the aspects of determining costs. Apart from this, by comparing the average of the various types of machines used with the cost factor, the excavator influences more the cost factors with the highest average score of 24.43 and the variable that least influences the cost factor is the tractor loader with 17.00 as an average score.

The equipment can be available with companies or it can also be outsourced. Therefore, to outsource the equipment, we need to analyze the supplier for any information he provides. As if we were hiring a computer from a provider and if it breaks down on a site, the provider must have provisions for another backup equipment. To avoid delays in

an activity. The equipment is also available in a company, but when the situation arises where we need the same machine for more than one location, we need a subcontracting agency. A company must have a good database of these suppliers. Depending on factors such as

Time period for equipment to rent, rental cost, original cost, manufacturer's name, team capacity, space limits, equipment productivity, maintenance cost, equipment labor cost, the company / contractor can decide whether to buy the equipment or rent it or rent it.

3. CONCLUSION

The study reveals that the types of machines used in the construction sector have a significant influence on the construction sector. Since the cost of equipment plays an important role, the construction industry based on the size of the projects (i.e. small, medium or large projects) uses the types of equipment according to their needs. However, optimism among construction machinery distributors remains high. The growth of the rental fleet is expected to play an increasingly important role in the business model of distributors who cannot afford to own equipment.

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