

INTERPRETATION OF CONSTRUCTION EQUIPMENT MANAGEMENT USED IN CONSTRUCTION PROJECTS FOR IMPROVING PRODUCTIVITY

¹ D. Sherlyne Neomi Sulochana , ² Dr.L.Ramajeyam

¹ PG Scholar, ² Dean (Head of the Department)

¹ Construction Engineering and Management ,

Meenakshi Sundararajan Engineering College, Chennai, India

Abstract: Construction Equipment is that the important factor to run the project in a successful manner. This paper manages on the benefits of the total Productivity to be implemented .While purchasing, leasing or renting the equipment, and guide in optimizing the profitability. Maintenance and it'll also helps to specialize in calculating the general equipment effectiveness. Current practices and observations made in Indian housing industry. The effectiveness of construction machineries may be a major factor that differentiates construction companies in terms of heavy construction and lightweight construction. The time and price of project is most vital constraint for the success of project. Data was acquired from equipment rental companies, construction companies and multiple construction projects. Hypotheses on some expected results were tested. Finally, the findings of this study were compared with findings of questionnaire conducted for locating significant commonalities and differences in equipment management practices. The maximum effectiveness of a production system is about 81.5%, the target of the work is to reinforce the equipment effectiveness at a construction company. Different factors of machinery management are revealed with the help of this research work. Factors causing cost within the development projects were ranked on the thought of Relative Importance Index (RII). Top five significant factors identified were frequent equipment breakdowns, maintenance of kit ,insufficient number of kit , performance and efficiency of kit and inadequate modern equipment systems

IndexTerms - Productivity. Purchasing, Leasing or renting the equipment, Equipment effectiveness ,Cost overrun, Relative Importance Index (RII).

I. INTRODUCTION

The construction industry is that the massive industry throughout many countries within the world. Since the start of the new century there has been an exponential growth pattern in most of the economically strong nations within the world. Germany is an example of a rustic that has experienced extremely high infrastructure growth rates within the last 10 or 15 years. Effective management of kit is crucial for the success of construction firms. Inadequate manual processes of kit management and therefore the subjective decisions of kit managers usually end in major losses in construction firms, hence, the economy. Equipment manager's main task is to scale back downtime, achieve optimum equipment utilisation and increase production at minimum cost. The cost of kit during a Large scale (eg- massive infrastructure) project varies from 10-30% of the entire cost of project, depending upon the extent of mechanisation. Proper planning, selection, procurement, installation, operation, maintenance and equipment replacement policy plays a crucial role in equipment management for successful completion of project.

Traditionally, the equipment purchase process was complete when the contractor selected a selected make and model of machine from a dealer. Today's building construction projects are highly mechanized. With the growing industrialization of construction and therefore the gradual shift to offsite prefabrication of structural and finishing elements that are then assembled (rather than produced) on site, production equipment is increasingly making room for transportation equipment. Thus, material handling and lifting equipment dominates construction sites as an important resource, constituting a serious part of the Project's construction cost. the standard concrete-construction vacant lot will employ several or all of the subsequent equipment types: (1) cranes, (2) material handlers, (3) concrete pumps, (4) hoists and lifts, and (5) forming systems.

II. METHODOLOGY

2.1 INTRODUCTION

A detailed literature review was administered to gather the knowledge about the objectives of this study by considering construction practitioners in various locations. Through the literature review helped to establish the research topic in detail and general. The construction equipments considered for this research includes seven categories machineries includes concreting equipments, concrete handling equipment, screening equipment, compaction equipment, handling equipment, bar bending equipment, earth compactor. This chapter deals with the methodology followed to identify and analysis the equipment.

2.2 RESEARCH METHODOLOGY

There are two types of data collection namely secondary and primary data to ensure the values to some extent. From the collected data relevant information's are framed for analysis of data and final suggestive measures are framed from the collected information.

2.3 SECONDARY DATA SOURCE

A detailed literature review was administered to collect general information about the objectives of this study considered by construction practitioners in various countries. Conducting literature review helped to acknowledge the research topic intimately and general. Moreover, extra sources also as essential knowledge required regarding this study were obtained through literature review. The resources employed during literature review of this study are international and native conference papers, documents, internet, magazines, journal articles, books, and etc. Secondary data sources were went to identify specially the financial factors affecting on construction equipment acquiring method.

2.4 PRIMARY DATA SOURCE

The primary data source of this study was interview. Initially interview was conducted through communicating with the key personnel of contractor companies. This interview was done through asking open ended questions. The results from this stage then used mainly to urge some ideas and establish the objectives through finding the problems . The interview was used specially for identifying non-financial factors affecting on construction equipment acquisition methods.

2.5 ESTABLISHING OBJECTIVES

The design of questionnaire meant for surveying with contractors and engineers are literally achieved through various literatures. The primary data that are obtained from the sources of contractors and engineers with open ended questions. This survey is used for identification of factors affecting on construction equipments acquisition methods.

III. DATA COLLECTION

The study used both primary and secondary data. Here there are two basic sources of knowledge sources namely, primarily and secondary source, during this study both primary and secondary sources of knowledge was utilized through questionnaires, interview and literature review, observation check list & flows conference guide, etc. The contribution of every of the factors to overall delays was examined and therefore the before the ranking of the attributes in terms of their criticality as perceived by the respondents was done by use of Relative Importance Index (RII) and the results of the analysis are presented.

$$RII = \sum W / A * N \quad (0 \leq RII \leq 1)$$

Where: W – is that the weight given to every factor by the respondents and ranges from 1 to five , (where “1” is “strongly disagree” and “5” is “strongly agree”);

A – is that the highest weight (i.e. 5 during this case) and;

N – is that the total number of respondents.

The purchase data includes its down payment, interest rate, tax deductions, loan length and annual payment, salvage value, etc. The rental data includes equipment rental rate, rental inflation rate and twelve monthly use. The lease data found parallel to rental data replacing the terms as lease purchase having additional data about its lease length.

IV. SPSS RESULTS

4.1 RANKING CASES

S. NO	FACTOR	RANK CASE	RR
1.	Will the equipment maintenance affect by improper cash flow ?	1	0.77
2	Have the improper bearing affect equipment ?	2	0.72
3	Does the preventive maintenance reduce equipment loss?	2	0.72
4	Does the regular inspection avoid cost overrun ?	3	0.68
5	Will you affect by unplanned budget ?	3	0.68
6	If delay analysis are important?	3	0.68
7	If the higher resale value decrease economic loss ?	3	0.68
8	Is there any problem with poor supervision?	3	0.68
9	How does equipment affect by unroutine maintenance?	3	0.68
10	Will saving cost has the problem with construction equipment ?	4	0.67
11	Does the construction equipment increase	4	0.67

12	Are you affect by improper site condition?	4	0.67
13	If the depreciation method reduce?	4	0.67
14	Have they maintain activities by computer?	4	0.67
15	Does equipment breakdown affect productivity?	5	0.65
16	Have they taking activities by digital equipment bearing ?	5	0.65
17	Have lack of equipment affect by high cost?	5	0.65
18	If availability of spare parts affects productivity?	5	0.65
19	Do you reduce completion time of project by construction equipment?	5	0.65
20	Does the quality improve by construction equipment?	5	0.65
21	Do you affect by labor maintenance?	5	0.65
22	Have the construction equipment accurate ?	5	0.65
23	Have do you choose replacement alternative by equipment cost ?	7	0.63
24	Is it construction equipment perform multiple task?	8	0.61
25	Is there correct material quality enhance equipment performance?	8	0.61
26	Have the past experience increase equipment availability?	9	0.60
27	Have you aware the use of software equipment ?	10	0.58
28	Have you choose software equipment based on well resources ?	10	0.58

29	How the equipment performance based on vehicle capacity ?	11	0.57
30	Have the site condition are important for machine performance ?	11	0.57
31	Have the regular lubrication maintain heavy construction equipment ?	11	0.57
32	Is the automated monitoring system better ?	12	0.56
33	Enhance project usage modern equipment	12	0.56
34	Is there, operating facility will be important?	13	0.55
35	If the conventional monitoring system needed?	13	0.55
36	How the performance of skilled labour in equipment maintenance ?	14	0.53
37	Do you have an operation/maintenance organization chart?	15	0.52
38	Do any maintenance record report for equipment ?	16	0.51
39	Constructing equipment increase speed	17	0.49
40	Equipment usage increase cost	17	0.49
41	Use external holding equipment	18	0.44

Fig 4.1 Ranking Results

4.2 FREQUENCY ANALYSIS

N	Valid	15	15	15	15
	Missing	0	0	0	0
	Mean	2.2000	2.5333	2.8000	2.4667
	Median	2.0000	3.0000	3.0000	3.0000
	Mode	3.00	1.00	1.00	1.00 ^a
	Std. Deviation	1.01419	1.35576	1.56753	1.30201
	Maximum	4.00	5.00	5.00	5.00

Fig 4.2 Frequency Analysis Results

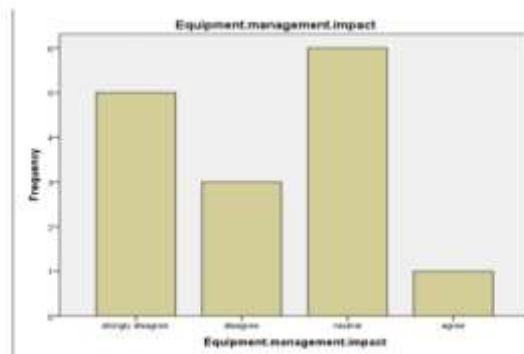


Fig 4.3 Histogram for Equipment Management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	1	6.7	6.7	6.7
	disagree	1	6.7	6.7	13.3
	neutral	3	20.0	20.0	33.3
	agree	6	40.0	40.0	60.0
Total		15	100.0	100.0	

Fig 4.4 Frequency analysis for Improper cash flow

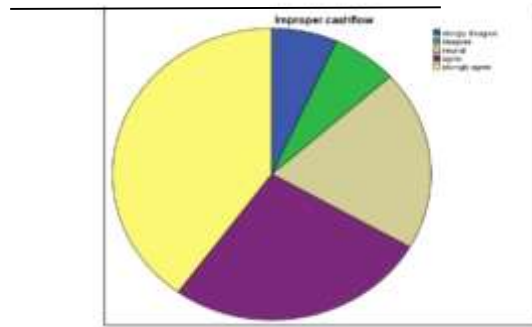


Fig 4.5 Pie chart for Improper cash flow

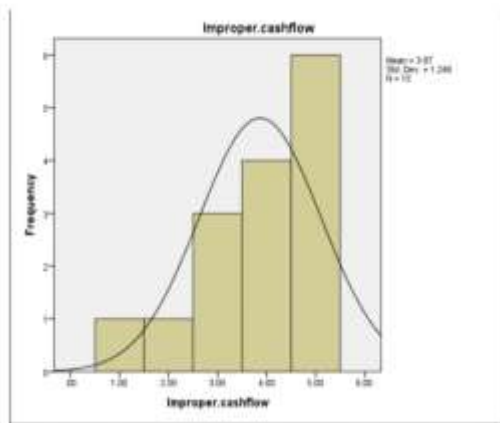


Fig 4.6 Histogram for Improper Cash flow

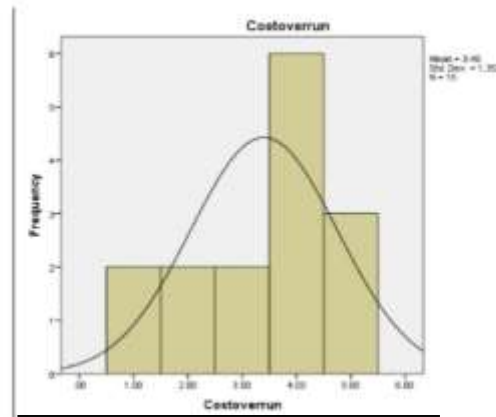


Fig 4.6 Histogram for Cost Overrun

		Freque y	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	5	33.3	33.3	33.3
	neutral	5	33.3	33.3	66.7
	agree	5	33.3	33.3	100.0
	Total	15	100.0	100.0	

Fig 4.7 Frequency analysis for Improper training

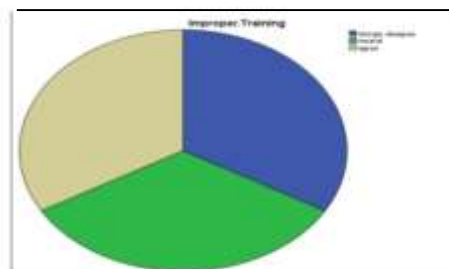


Fig 4.8 Pie chart for Improper training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	1	6.7	6.7	6.7
	disagree	1	6.7	6.7	13.3
	neutral	4	26.7	26.7	40.0
	agree	6	40.0	40.0	80.0
	strongly agree	3	20.0	20.0	100.0
	Total	15	100.0	100.0	

Fig 4.9 Frequency analysis for Preventive maintenance

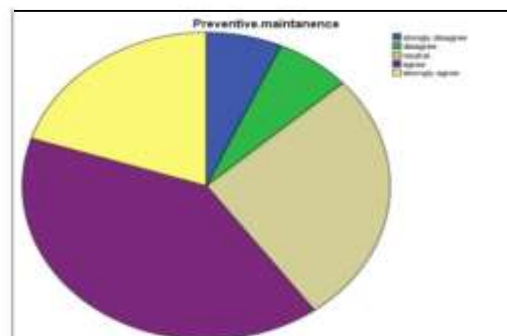


Fig 4.10 Pie Chart for Preventive Maintenance

4.3 TOTAL VARIANCE EXPLAINED

Component	Initial Eigen values			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.886	28.860	28.860	2.886	28.860	28.860
2	1.858	18.579	47.439	1.858	18.579	47.439
3	1.518	15.182	62.621	1.518	15.182	62.621
4	1.130	11.300	73.921	1.130	11.300	73.921
5	.849	8.495	82.416			
6	.767	7.665	90.082			
7	.425	4.253	94.335			
8	.319	3.185	97.520			
9	.189	1.886	99.406			

Fig 4.11 Initial Eigen values

	Component			
	1	2	3	4
Improper cash flow	.612	.065	.684	-.022
Improper Training	-.594	.554	-.074	-.077
Preventive maintenance	.650	.064	.140	.001
Cost overrun	-.455	-.438	.668	.151

Unplanned budget	.855	.108	-.228	.089
Delay analysis	-.133	-.694	-.264	.403
Resale value	-.703	-.266	-.250	-.146
Poor supervision	.419	-.352	-.421	.452
Unroutine maintenance	-.314	.292	.381	.755
Owning cost	-.112	.760	-.269	.368

Fig 4.12 Component Matrix

V. CONCLUSION

The result indicated that idle time, down time, poor equipment maintenance practices, improper determination of economic life and timing of replacement, poor training of equipment operators, equipment breakdown, over maintenance of equipment, huge capital investment during acquisition, balance of interdependent equipment, misunderstanding the scope of work carried out, unit cost of production and equipment suitability for job condition were found to be the major problems that affect construction equipment planning and management. The overall productivity of construction is affected by various reasons. To improve productivity it is essential to improve the performance of the construction systems. The desired production output is achieved through high equipment availability, which is influenced by equipment reliability and maintainability

REFERENCES

- [1] Prajeesh. V. P, Mr. N. Sakthivel, (2016) 'Management of Equipment & Machinery in Construction' -International Journal of Innovative Science, Engineering & Technology, 6(3), 2016, pp.113-118.
- [2] D. B. Phadatare and S. B. Charhate, Impact of Construction Equipment's On Building Site Productivity. International Journal of Civil Engineering and Technology, 7(4), 2016, pp.513-520.
- [3] Saurabh Rajendra Kadam, 2Prof. Dhananjay S Patil (2015) 'Construction Equipment Fleet Management: Case Study of Highway Construction Project' -International Journal of Science and Research 4(6) pp. 2558-2564.
- [4] Jade, N. Markiz, and N. Albelwi, (2012) 'An Economical Operation Analysis Optimization Model for Heavy Equipment Selection - World Academy of Science, Engineering and Technology Vol:6(1), 2012 pp. 146-151.
- [5] Mithilesh V.V.S, Nagavinothini R (2016) 'A Critical Study on Latest Heavy Equipment and Latest Technologies Used In Road Works and Recommending the Types of Equipment and Its Effectiveness for Indian Roads Equipment Recommendation for Indian Roads - A Critical Study' - International Journal of Innovative Research in Science, Engineering and Technology. Volume 5(2), pp 2408-2412.

- [6].Prof. Desai D. B, Dr. Gupta A. K, Mr.Jadhav Ashish B. (2017) 'A study on construction equipment management and it's effect on project cost'- international multidisciplinary e-journal, Vol5(5), pp 8-11.
- [7].Kartik Sharad Thete, Dhiraj Rajendra Baviskar, (2016) 'Construction Equipment Management' - International Journal of Science, Engineering and Technology Research , Vol5(11), pp3262-3264.
- [8].Mali Pritam A., M.R.Apte, (2015) 'Effect of Construction Equipment on Production in Building Construction project' International Journal of Engineering Sciences & Research Technology, pritam 4.(6), pp 681-689.
- [9].Mr. Nilesh Ayane, Mr. Mangesh Gudadhe (2015) 'Review Study on Improvement of Overall Equipment Effectiveness in Construction Equipments'- International Journal of Engineering Development and Research Vol 3(2), pp457-490.
- [10].Prasannasangeetha.A, Alan.S, (2015) 'Equipment Management In Construction Secto'- International Journal of Science and Engineering Research, Vol 3(6), pp 3221-5687.

