ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com

International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 4, Special Issue 11, March 2017

STUDY ON FACTORS AFFECTING EQUIPMENT MANAGEMENT AND ITS EFFECT ON PRODUCTIVITY IN COMMERCIAL BUILDING CONSTRUCTION

T.Niswana1
Sona college of technology, Salem, 636005&Tamilnadu
Email:niswananis88@gmail.com

Abstract **-** The equipment efficiency and process control have direct relationship with high productivity performance. , Together with labour and materials, Construction equipment is one of the three major inputs of the building construction process. In the execution of many construction projects, equipment selection is a critical factor. Acquisitions, maintenance, repairs, rebuild, replacements, and retirements are included in the decisions. Improper management of equipment cause 36- 40% overrun of construction cost. In construction, good project management must vigorously pursue the efficient utilization of labor, material and equipment. Construction technologies has made possible wholesale changes by the use of new equipment and innovative methods . Different factors of equipment management is reveled in this paper . To find out the various factors affecting equipment management which effects the productivity of the construction in various commercial building sites is the main objective of this study .

I. INTRODUCTION

In building construction process, construction equipment is one of the three major inputs , together with labour and materials. Equipment plays a major role for improving contractor's capability in performing their work more effectively and efficiently.

The maintenance purpose is to keep the equipment in service. Options for equipment maintenance are planned preventive or corrective maintenance, unplanned on-site breakdown maintenance or maintenance in workshop, and replacement.

Portable or mobile ranging from small hand tools through tractors, cranes, and trucks are the machinery or equipment items. Today's complex building projects makes it harder to evaluate equipment alternatives and make the right selection from many alternatives. In equipment management, selection of proper equipment, its proper running, maintanence,etc comes under.

Together with labor and materials construction equipment is one of the three major inputs of the building construction process. The construction development and use of equipments is mainly due , to inability to done construction activities beyond the limit of human strength, and maintaining high standards, which is required by present designs and construction technologies . The other one is to making economical construction process. Equipments of construction can be used,

- To increase productivity and reduce costs
- To replace manual operations particularly the heavy tasks such as excavating and concrete production and placing, handling construction material and components,
- To maintain the excavating and budgeted cost and placing and concrete production where labour is expensive or scarce to employ
- To reduce wastage of construction material on assembly and handling

Types of equipment maintenance are:

- **Corrective maintenance:** The defects to be found in the different equipment which are corrected by the set of tasks and that are communicated by users of the same equipment to the maintenance department.
- **Preventive Maintenance:** Maintain a level of certain service on equipment is its mission , In the

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com

International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 4, Special Issue 11, March 2017

interventions of their vulnerabilities. It is used to be a systematic character, that is, even if equipment has not given any symptoms of having a problem it should be inspected. .[9] analyzed microwave waveguides and components such as microwave T junctions , circulators, attenuators and Isolators.

 Predictive Maintenance: By knowing the values of certain variables It pursues constantly report and know the operational capacity and status of the installations , which represent such operational ability and state. It is necessary to identify physical variables (temperature, vibration, power consumption, etc.) for applying this maintenance, in which problems that may be appearing on the equipment is indicative of variation. since it requires advanced technical resources this maintenance is the most technical at times of physical and / or technical knowledge and strong mathematical,.

 Zero Hours Maintenance (Overhaul): The goal of set of tasks is to review the equipment before appearing any failure at scheduled intervals, either when the equipment reliability has decreased considerably so making of forecasts of production capacity become risky . As if the equipment were new, leaving the equipment to zero hours of operation is the review basic, The items subject to wear or repair will be replace by this review. The aim is to ensure, a good working time fixed in advance with high probability,.

Periodic maintenance (Time Based Maintenance TBM): The users made the basic maintenance of equipments. It consists of visual inspections ,data collections, lubrication, cleaning, retightening screws for which no extensive training is necessary, but perhaps only a brief training. This is based on TPM (Total Productive Maintenance) type of maintenance.

2.LITERATURE REVIEW

Anwar Zeb, Dr. Abdul Qudoos(2015) has been carried out to explore the current practices of machinery used in the construction industry of building projects of Pakistan. This research work revealed different factors of machinery management. Factors causing cost overrun in the construction projects were ranked on the basis of Relative Importance Index (RII). Author studied different mechanisms of equipment technology for labor productivity and identified five different factors to describe changes in technology.

Amir azizi (2015) did a analysis on Overall Equipment Effectiveness (OEE) measures how effective the machine used for manufacturing in practically as opposed to in theory. Availability, performance rate, and quality rate are the three important parameters which form the product of OEE. The six big losses such as breakdowns, setup and adjustments, small stops, reduced speed, start-up rejects and the production rejects are the main contributions that affect the performance the machines AM is implemented in glazing line presents the seven steps in conducting AM workshop before implementation of AM in glazing line.

 Cleaning and inspection - remove all the dirt and dust from the machine to expose and highlight the hidden problems related with the machine.

 Countermeasures to sources of contamination - implement why-why analysis to identify the root causes of source of the contamination.

 Cleaning and lubrication standards - standardize a method of cleaning including relevant tools for cleaning and the frequency of cleaning.

 Train for Overall inspection –aware operator about the need of the standard inspection.

Conduct autonomous inspections - perform maintenance task on machines to improve the standard.

Tsado, Theophilus Yisa,et al.2014) Construction firms are often faced with problems related to high rate of equipment failure or breakdown and accident resulting from unskilled operator's abuse. Poor training of equipment operators is often claimed as a major cause of equipment related accidents (John and Herman, 2009; Schenayder et al., 2002) Five different critical, but closely related identified integral strategies of effective construction equipment management were Leadership and Management, Preventive Maintenance, Reliability Improvement, Personnel Training, and Equipment Parts Administration.

Hamid Aadal,2014)conducted on the sites of Iran, five items have been identified as the most important issues in the construction management regarding the use if plants namely: The effect of spare parts availability to decrease downtime, the effect of employing expert mechanics to increase the repair quality, impact of gasoline and petrol availability to decrease wasting the time, impact of periodic control and serviceability of plants and equipment to increase productivity, impact of training persons who are involved plants and equipment to increase productivity.

A. Jrade, N. Markiz,et.al 2012, The first factor to consider would be matching the right equipment to the proper type of activity. Another factor would be the availability of the right equipment with proper service, maintenance, and repair reserves. Besides previous factors, proposed two factors that can be

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com

International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 4, Special Issue 11, March 2017

distance to be traveled; and desired productivity, which is a critical factor that affects equipment selection, cost effectiveness ; which involves considering the size of equipments besides the proper type; versatility which involves selecting equipments that can perform multiple tasks at the site work.

3.AIM AND OBJECTIVE

The objective of this study focuses on views from the construction industry about various factors affecting equipment management, analyzes factors affecting the equipment management impact, and suggests appropriate measures that can be taken to improve equipment productivity. The aim is supported by the objective stated below.

Aim:

Study on factors affecting equipment management and its effect on productivity in construction.

Objectives:

- Study and discuss various factors affecting equipment management in construction industry .
- Study and discuss how the equipments are maintained in construction site.

4.RESEARCH METHODOLOGY

A questionnaire survey was done for date collection. The questionnaire was described as a self-administered tool with selected questions, with an appropriate response.

Survey Planning

For the research study, survey questionnaire was distributed to various construction companies. Collecting general information on various factors affecting equipment management in building construction all over tamilnadu and kerala was the basic aim of the survey. The purpose and approach used in the survey was fully explained to the respondents.

Considerations for the Survey

The main consideration for a survey was that it should be easy for respondents. Too complicated questions results possibility of high drop-out rate was studied. Care was taken so that the initial questions did not negatively influence the results of subsequent questions. Study was done to find any serious loopholes and if questions were truly answerable.

Questionnaire

The questionnaire design practice advanced on a communicating basis. It was categorized into profile of the respondent and various factors construction. Questions in the section 1 were created to collect personal information such as job position, experience, name of the company and years of experience. The next set of questions was targeting the factors affecting equipment management in the three different groups. ManagementFactors,workforce characteristics, equipment characteristics.

5.RESULT AND ANALYSIS

The population targeted was professional working on construction projects. With an experience of more than 4 years. The respondents were approached over the internet and personal meetings depending upon the availability and location of the projects. The questionnaire is distributed to around 25 companies and the data is collected. The respondents are mainly from private sector and having satisfactory working experience. Among them major of the engineers are having a bachelor degree in engineering. Some of the respondents also have additional post graduate qualification.

Ranking

To assess the likelihood of each identified factor in the construction projects five point likert-scale of 1-5 was used, where scale of 1= very low, 2= low, 3 =moderate 4= high and 5 = very high. All the respondents were asked to rank each factor as per degree of importance. The identified factors were then ranked on the basis of Relative Importance Index (RII). The equation used for RII is

$$RII = \frac{\sum W}{AN}$$

W is the weight given to each factor by the respondents and ranges from 1 to 5.

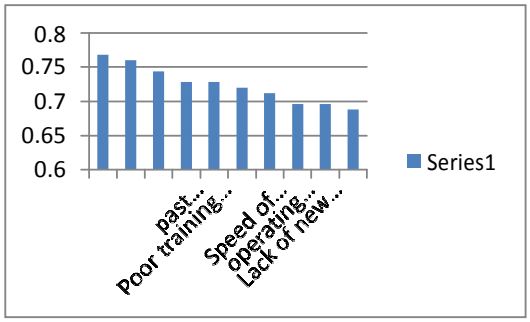
A is the highest weight = 5.

N is the total number of responses collected for the ordinal scale.

The top 10 factors which effect the equipment management in construction sites through this study are : Equipment efficiency , Giving training to the operators , Age of equipment , past experience of worker, Poor training of equipments to operator, Capacity of equipment , Speed of equipment, operating life of equipment, Lack of new technology, Operators efficiency in handling equipment.

The graph below shows the bardigram of the top 10 factors which affect equipment management at sites.

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 4, Special Issue 11, March 2017



The ranking of the 30 factors which is studied are as follows:

Equipment efficiency	.768
Giving training to operators	.76
Age of equipment	.744
past experience of worker	.728
Poor training of equipments to operator	.728
Capacity of equipment	.72
Speed of equipment	.712
operating life of equipment	.696
Lack of new technology	.696
Operators efficiency in handling equipment	.688
Availability of skilled operators	.672
Late inspection of equipment	.664
Frequent change of labors	.664
Size of equipment	.648
condition of sites	.64
type of soil at sites	.64
work Scheduling of equipment	.64
Availability of spare parts	.64
Lack of financial motivation to the workers	.64
High cost of spares	.616
Routine checking	.608
morality of workers	.6
possibility of easy repair of spares	.6
easily availability of Servicing parts	.592
frequent Changing old lubricants at regular time intervals	.592

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com

International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 4, Special Issue 11, March 2017

References:

1.Anwar Zeba, Dr. Abdul Qudoosb, Hashim Hanif,2015,Identification and Analysis of Factors Affecting Machinery in the Construction Industry of Pakistan,International Journal of Sciences: Basic and Applied Research, Volume 19, No 1, pp 269-278.

2. Amir Azizi,2015,Evaluation Improvement of Production Productivity Performance using Statistical Process Control, Overall Equipment Efficiency, and Autonomous Maintenance, ScienceDirect, Procedia Manufacturing 2, 186 – 190.

3. Hamid Aadal, Ali Bagheri Fard, Kiyanoosh Golchin Rad,2014,Impact of Plants and Equipment Management in Construction Industry of Iran, Research Journal of Applied Sciences, Engineering and Technology 7(11) : 2371-2375.

4. Jariwala Siddharth, Jayeshkumar Pitroda,2014,A critical literature review on factors Affecting in selection of construction Equipment, International Journal of Advanced Technology in Engineering and Science,Volume No.02, Issue No. 12,pg no:559-567

5. Jariwala siddharth,Prof. Chetna m. Vyas,jayeshkumar pitroda ,2015,A critical literature review on comparitive analysis of construction equipments –rent and buy, Journal of international academic research for multidisciplinary,Volume 2, Issue 12.

6.Jrade, N. Markiz, and N. Albelwi,2013,An Economical Operation Analysis Optimization Model for Heavy Equipment Selection, International Journal of 39 Social, Behavioral, Educational, Economic, Business and Industrial Engineering Vol:6, No:1, 2012.

7.Major virender singh phogat, ajit pratap singh,2013,Selection of Equipment for Construction of a Hilly Road using Multi Criteria Approach, ScienceDirect, 104 (2013) 282 – 291.

8. Nilesh D. Chinchore *, Prof. Pranay R. Khare,2014. Planning and Selection of Part 1), pp.29-31

9. , Christo Ananth, "A Detailed Study Of Microwave Passive Components [RF & Microwave Engineering Book 3]", Kindle Edition, USA, ASIN: B06XRXJ6MK, ISBN: 978-15-208-926-1-0, Volume 10, March 2017, pp:75-128.

10.Prajeesh. V. P, Mr. N. Sakthivel,2016, Management of Equipment & Machinery in Construction,International Journal of Innovative Science, Engineering & Technology, Vol. 3 Issue 5,pg no:113-118.