International Journal of Modern Trends in Engineering and Research
www.ijmter.com
e-ISSN No.:2349-9745, Date: 2-4 July, 2015

Analysis of Labour Productivity in Residential Construction Projects

Ms. Mate Pratibha B.[1],Dr. P.G. Gaikwad[2]
[1] *Department of Civil Engineering, N.D.M.V.P's K.B.T.C.O.E. Nashik, matepratibha11@yahoo.com*
[2] *Department of Civil Engineering, N.D.M.V.P's K.B.T.C.O.E. Nashik, pggiitr@gmail.com*

Abstract-Construction is the second largest industry after agriculture in India. It has big share in India's total employment. Most of the construction activities here are labour intensive till today. Labour productivity is an important factor that affects the performance of a project in construction industry. Poor productivity of construction labour is a main cause of time and cost overruns. There are many factors that affecting the productivity of labour. It is therefore necessary to study those factors which improve the labour productivity by taking a necessary action over them. In this study various factors affect labour productivity are classified under: material factors, labour factors, supervision factors, design factors, equipment factors, financial factors, working time factors, owner/consultant factors, external factors, project factors, health and safety factors. The factors are given ranking by calculating the importance index for each. The factors that mostly affect the labour productivity are equipment factors, labour factors, material factors and financial factors.

Keywords-Labour productivity, importance index, construction, performance, India, Nashik, overrun, factor.

I. INTRODUCTION

Construction is considered to be world's largest industry. It forms a major portion of any country's economic output. Improvement and development of new construction techniques is crucial for construction industry to get its economic output. Since Indian construction industry is labour dominant, productivity is major concern for construction company.
Until today, construction industries are still facing problems regarding the low labour productivity in India. Thus the effective use and proper management regarding labour is very important in construction projects. Also, there are number of factors that directly affect the productivity of labour, thus it is important to study and identify those factors and take an appropriate action for improving it. Lower productivity of construction workers is a cause of cost and time overruns in construction. If we improve productivity, ultimately it reduces the cost of project, project is completed in its estimated time and also adds to overall best performance. The important factors responsible for poor labour productivity were studied referring the previous research findings. Those factors were compiled and classified in various criteria viz; material factors, labour factors, supervision factors, design factors, equipment factors, financial factors, working time factors, owner/consultant factors, external factors, project factors, health and safety factors. It is proposed to study the various factors affecting labour productivity in residential construction activities such as : excavation, laying of formwork and steel, brickwork, concreting, plastering, flooring work etc by conducting a questionnaire survey of 45 Civil Engineers, Architects and Contractors of Nashik city.

II. METHODOLOGY.

In the present study general information on various factors affecting labor productivity in construction all over Nashik city is collected. The purpose and approach used in the survey was fully explained to the 45 respondents. The main consideration for the survey was that it should be easy for respondents to understand. Care was taken so that the initial factors did not negatively influence the results. Preliminary text was introduced for explaining the survey project to the respondents. Study was done in order to obtain reliable information from construction industry.
A list was prepared targeting the factors affecting labor productivity in the 11 different groups. Each respondent had a choice to select only one option for each factor. Respondents had to rate the factors considering how all factors affect productivity of labour. Then most importantt factors affecting the productivity of labour for construction projects in the city were identified through this process and ranking was given.
In this survey, a measurement scale 1 to 5 (a to e) was used to determine the effect level. Respondents were asked to rate factors affecting labour productivity according to the degree of effect (a = with very low effect; b = with low effect; c = with average effect; d = with high effect; e = with very high effect). 45 respondents were visited personally and the questionnaire format was got filled from them.

III. ANALYSIS.

Respondents were asked to rate factors affecting labour productivity according to the degree of effect. For analyzing of data, a relative importance index was applied.The various factors are then given ranking in order of their relative importance index in ascending order (factor with highest RII was ranked as 1).The relative importance index was calculated by using the following two equations:

3.1. Importance Index = $\frac{5e+4d+3c+2b+a}{5\,(a+b+c+d+e)}$

Where;
a: number of respondents who answered very low effect
b: number of respondents who answered low effect
c: number of respondents who answered average effect
d: number of respondents who answered high effect
e: number of respondents who answered very high effect [9]

3.2. Importance Index = $\frac{\sum W}{A \times N}$

Where;
W: weightage given to each factor by respondents (ranging from 1 to 5);
A: highest weight (i.e., 5 in this case);
N: total number of respondents. [1]

IV. RESULTS.

The results of the calculations done are represented in a tabular format given below.

Table 1. RII of factors affecting labour productivity by formula '3.1'.

Factor affecting labour productivity	RII	Rank
Material factors		
Lack of material	0.68	20
Delay in arrival of materials on site	0.657778	26
Bad resources management	0.671111	23
Poor quality of raw materials purchased	0.626667	33
Labour factors		
Lack of skill	0.684444	19
Labour shortages	0.702222	15
Improper training	0.711111	12
Poor turnout of labours	0.716279	10
Lack of discipline and consumption of alcohol and drugs	0.675556	21
Labour personal problems	0.661111	24
Labour disloyalty	0.555556	39
Supervision factors		
Changing Supervisors	0.675556	22
Improper instruction to labour	0.764444	2
No proper supervision method	0.711111	13
Bad leadership	0.697778	16
Inspection delay	0.688889	17
Design factors		
Ease of construction	0.64	27
Design changes	0.728889	7
Inaccurate design	0.733333	6
Rework	0.595556	37
Equipment factors		
Lack of equipment	0.751111	3
Frequent damage of equipments	0.742222	4
Inefficiency of equipment	0.786667	1
Financial factors		
Payment delay	0.733333	5
Working time factors		
Unproductive time	0.716667	9
Overtime	0.626667	34
Misuse of working time schedule	0.657778	25
Owner/consultant factors		
Hault in work because of disputes with owner	0.631111	32
Hault in work because of disputes with consultants	0.636364	30
External factors		
Humidity	0.493333	42
Wind	0.515556	41
Rain	0.52	40
Access to electricity and water	0.631111	31
Insufficient lighting	0.617778	35
Project factors		
Poor communication in site	0.608889	36
Construction method	0.724444	8
Insufficient transportation mean	0.711111	14
Health and safety factors		
Unhygienic working conditions	0.64	28
Accidents	0.64	29
Lack of place for relaxation and eating	0.56	38
Working at higher altitude	0.688889	18
Deliberate negligence of safety precautions	0.715556	11

Table 2. RII of factors affecting labour productivity by formula '3.2'.

Factor affecting labour productivity	RII	Rank
Material factors		
Lack of material	0.68	20
Delay in arrival of materials on site	0.657778	26
Bad resources management	0.671111	23
Poor quality of raw materials purchased	0.626667	33
Labour factors		
Lack of skill	0.684444	19
Labour shortages	0.702222	15
Improper training	0.711111	12
Poor turnout of labours	0.716279	10
Lack of discipline and consumption of alcohol and drugs	0.675556	21
Labour personal problems	0.661111	24
Labour disloyalty	0.555556	39
Supervision factors		
Changing Supervisors	0.675556	22
Improper instruction to labour	0.764444	2
No proper supervision method	0.711111	13
Bad leadership	0.697778	16
Inspection delay	0.688889	17
Design factors		
Ease of construction	0.64	27
Design changes	0.728889	7
Inaccurate design	0.733333	6
Rework	0.595556	37
Equipment factors		
Lack of equipment	0.751111	3
Frequent damage of equipments	0.742222	4
Inefficiency of equipment	0.786667	1
Financial factors		
Payment delay	0.733333	5
Working time factors		
Unproductive time	0.716667	9
Overtime	0.626667	34
Misuse of working time schedule	0.657778	25
Owner/consultant factors		
Hault in work because of disputes with owner	0.631111	32
Hault in work because of disputes with consultants	0.636364	30
External factors		
Humidity	0.493333	42
Wind	0.515556	41
Rain	0.52	40
Access to electricity and water	0.631111	31
Insufficient lighting	0.617778	35
Project factors		
Poor communication in site	0.608889	36
Construction method	0.724444	8
Insufficient transportation mean	0.711111	14
Health and safety factors		

Unhygienic working conditions	0.64	28
Accidents	0.64	29
Lack of place for relaxation and eating	0.56	38
Working at higher altitude	0.688889	18
Deliberate negligence of safety precautions	0.715556	11

V. CONCLUSION.

The most effective factors are: inefficiency of equipments, unclear instructions to labour, lack of equipment, frequent damage to equipment, and payment delay. There is also a need to pay attention towards the health and safety factors of the labour as safety is of great concern these days in construction sector. Supervision of the work carried out is also important for better efficiency. It is difficult task improve labour productivity by giving complete efficiency of work. The people concerned to the construction sites and the labour associated with it should pay attention on these factors to improve labour productivity so that increased profits from the construction projects can be achieved.

REFERENCES

1. AynurKazaza, SerdarUlubeyli, "Drivers of productivity among construction workers:A study in a developing country", Building and Environment, 42 (2007) 2132–2140, 10 April 2006.
2. Abdul Kadir, M. R., Lee, w. P., Jaafar, M. S., Sapuan, S. M., and Ali, A. A. "Factors Affecting Construction Labour Productivity For Malaysian Residential Projects." Struct. Surv., 23 (1), 42–54, 2005.
3. Abdulaziz M. Jarkas, Ph.D.; And Camille G. Bitar, "Factors Affecting Construction Labor Productivity In Kuwait". Journal Of Construction Engineering And Management .ASC , July 2012
4. Adnan Enshassi, Peter Eduard Mayer, Sherif Mohamed, Ziad Abu Mustafa (2007) " Factors affecting labour productivity in building projects in the gaza strip", Journal of Civil Engineering and Management, 13(4); 245-254 2) ASCE M, 2007.
5. ArunAkulsawartudom, MargarretEmsley And Sinthawanarong, "Critical Factors Influencing Construction Productivity In Thailand", The Journal Of Kmitnb, vol 14,jul Sep.2004.
6. Bengt Hansson, Henry MwanakiAlinaitwe, Jackson A. Mwakal, "Factors affecting the productivity of building craftsmen- Studies of Uganda", Journal of Civil Engineering and Management . 2007, 13; 169-176.5), 2007.
7. Khaled M. EI-Gohary, Mostafa E. Shehata, "Towards improving construction labour productivity and projects performance", Alexandria Engineering Journal, 50; 321-330, 2011.
8. Khaled, Mahmoud El-gohary And Remon, Fayek Aziz, "Factors Influencing Construction Labor Productivity In Egypt" Journal of Management In Engineering, Doi:10.1061/(Asce)me.1943-5479.0000168, Jan 4 2013.
9. M.R. Abdul Kadir, W.P. Lee, M.S. Jaafar, S.M. Sapuan And A.A.A. Ali Universiti "Factors Affecting Construction Labour Productivity For Malaysian Residential Projects", Putra Malaysia, Selangor, Malaysia structural Survey Vol. 23 No. 1, 2005 Pp. 42-54 Q Emerald Group Publishing Limited 0263-080X, 2005.

