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EVALUATION OF CRITICAL FACTORS AFFECTING LABOR PRODUCTIVITY FOR RESIDENTIAL AND COMMERCIAL BUILDING IN SURAT CITY

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Abstract: ***As we know construction is the world's largest and most challenging industry. Most of countries or we can say developing countries are facing low level of labor productivity and poor productivity. The main aim of this paper is to identify critical factor which is affect construction labor productivity. This paper presents the factors which affect the labor productivity for the residential and commercial buildings. Total 47 factors were identified out which 10 factors were found most important viz. inadequate instruction provided by supervisor, Variation in payment for the same work on site, storage of material is far from the site, lack of quality supervision, etc. The analysis to find out the most influencing factors was done by using the SPSS tool. Data collection was done by carrying out a questionnaire survey was carried out in the Surat City region of Gujarat state.***
Key words: **Labor productivity, Factors affecting labor productivity, SPSS, Commercial building, Residential building**

I. INTRODUCTION

The definition of productivity is varies from people to people, it is depending on who is explaining whether he is a politician, accountant, economist, industrial engineer, or construction manager, you will get a wide range of different meaning of the term Productivity. Some will define it as production rate, efficiency, effectiveness, performance or merely production.

The definition of productivity in construction industry varies with its application to different areas. "The term productivity usually refers to the output produced per unit input." "Ratio of the output quantities to the input work hours".

Labor Productivity = Output Quantity / Work Hours

Labor Productivity = Output / Labor cost.

Poor productivity of labor is one of the most daunting problems that construction industries, especially those in developing countries, face. And in India the construction industry having share of 8% of its GDP and provides employment to around 35 million people.

Labor is one of the basic requirements in the construction industry. Labor productivity usually relates manpower in terms of labor cost to the quantity of outputs produced.

Labor cost generally make up 30 to 50% of overall project cost in construction phase. Economy of projects id depends on the labor productivity, if you can control labor productivity and its factor than you can also increase overall productivity. We all know that number of activity are involved in construction industry and most of them relies on labor or we can say human resource, because of it effective use of labor and proper management of each and every activity is most important. Labor productivity and construction productivity are most important think which can determine your projects profit and loss.

II. LITERATURE REVIEW

Ahmed H. El-Batreek, Ahmed S. Ezeldin, Mohamed M. G. Elbarkouky [1] identified top 9 factors that affect labor productivity in Egypt in which availability of material, Respect for craft workers and foremen, availability of health and safety training, Availability of power tools, Availability of drawing, Absenteeism, jobsite orientation program. Awad S. Hanna, Chul-Ki Chang, Kenneth T. Sullivan, Jeffery A. Lackney [2] identified shift work impact , over manning, extra work affect labor productivity. Abdulaziz M. Jarkas[4] identified top 4 factors that affect labor productivity in concreting in which Concrete workability, Reinforcing steel congestion, Volume of pours, and Height relative to ground level.

B.Prakash Rao , Ambika Sreenivasan,Prasad Babu NV[5] define different method to analyzing the different factor affecting labor productivity Reliability test, Factor analysis, Correlation analysis, Regression Analysis, Descriptive statistics. Gholamreza Heravi, and Ehsan Eslamdoost[7] identified top 18 main factor and sub-factor that affect labor productivity in Iran in which supervision, Proper coordination, Effective communication, Proper planning, Proper HSE program, Technical excellence, Suitable site layout, Labor competence, Sufficient facilities and accommodation, Motivation of labor, Poor decision making, Schedule compression, Frequent change order, Materials, tools and equipment deficiency, Unfavorable external condition after that they apply artificial neural networks for measuring and predicting labor productivity and create the model.

Henry Mwanaki Alinaitwe, Jackson A. Mwakali, Bengt Hansson[8] identified top 36 factor labor productivity in Uganda in which they found all that factor with respect to Time, Cost and Quality. In which Poor construction method, lack of tools and equipment.

III. RESEARCH METHODOLOGY

A. Identification of Factor

In this research main part is questionnaire survey so, from the literature study and the site survey, 47 Factor affecting the labor productivity were identified

B. Questionnaire Formulation

All the 47 identified factor were classified into 8 main factors which is 1) Management 2) Supervision 3) Safety program & motivation 4) Technical Excellence & Site layout 5) Proper planning & scheduling 6) Labor competence 7) Effective communication & language understanding 8) External condition.

The questionnaire has five part

I. Project title and personal information of surveyor

II. Short description of labor productivity and respondent's detail

III. Sample of filled questionnaire
IV. Main questions with 1-5 ratings
V. Suggestion section for respondent

C. Pilot Study and Validation

The pilot study was carried out to ensure the validity of the questionnaire. In this study questionnaire given to experts who have 20+ year experience. For review the questionnaire and after that done some changes as per their suggestion.

D. Data Collection

All the data were collected by the questionnaire survey. The questionnaire was prepared and distributed to 250 Engineers, Consultants, Architects and Contractors in all. Out of which 193 responses were obtained.

E. Data Analysis

The received data were analyzed using the SPSS Software. From that, frequency, mean and standard deviation were obtained.

IV. RESULT

A. Frequency Test

Frequency test was carried out by using SPSS tool. Following tables show the frequencies of top 10 factor.

TABLE I: - Frequency Analysis of Inadequate Instruction Provided

B4					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	1	.5	.5	.5
	2.00	14	7.3	7.3	7.8
	3.00	39	20.2	20.2	28.0
	4.00	81	42.0	42.0	69.9
	5.00	58	30.1	30.1	100.0
	Total	193	100.0	100.0	

TABLE II: - Frequency Analysis of Variation in payment for the same work on site

C4					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	3	1.6	1.6	1.6
	2.00	18	9.3	9.3	10.9
	3.00	38	19.7	19.7	30.6
	4.00	85	44.0	44.0	74.6
	5.00	49	25.4	25.4	100.0
	Total	193	100.0	100.0	

TABLE III: - Frequency Analysis of Material Storage Area too Far from Workface

D5					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2.00	24	12.4	12.4	12.4
	3.00	38	19.7	19.7	32.1
	4.00	79	40.9	40.9	73.1
	5.00	52	26.9	26.9	100.0
	Total	193	100.0	100.0	

TABLE IV: - Frequency Analysis of Lack of Quality Supervisors

B6					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	6	3.1	3.1	3.1
	2.00	21	10.9	10.9	14.0
	3.00	44	22.8	22.8	36.8
	4.00	56	29.0	29.0	65.8
	5.00	66	34.2	34.2	100.0
	Total	193	100.0	100.0	

TABLE V: - Frequency Analysis of Jobsite Congestion

D6					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	3	1.6	1.6	1.6
	2.00	9	4.7	4.7	6.2
	3.00	65	33.7	33.7	39.9
	4.00	62	32.1	32.1	72.0
	5.00	54	28.0	28.0	100.0
	Total	193	100.0	100.0	

TABLE VI: - Frequency Analysis of Change of Design, Plans, Scheduling, and Sequence

E6					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	2	1.0	1.0	1.0
	2.00	14	7.3	7.3	8.3
	3.00	54	28.0	28.0	36.3
	4.00	75	38.9	38.9	75.1
	5.00	48	24.9	24.9	100.0
	Total	193	100.0	100.0	

TABLE VII: - Frequency Analysis of Poor Decision Making

A2					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	3	1.6	1.6	1.6
	2.00	22	11.4	11.4	13.0
	3.00	53	27.5	27.5	40.4
	4.00	67	34.7	34.7	75.1
	5.00	48	24.9	24.9	100.0
	Total	193	100.0	100.0	

TABLE VIII: - Frequency Analysis of Bad Weather Conditions

H1					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	4	2.1	2.1	2.1
	2.00	15	7.8	7.8	9.8
	3.00	63	32.6	32.6	42.5
	4.00	65	33.7	33.7	76.2
	5.00	46	23.8	23.8	100.0
	Total	193	100.0	100.0	

TABLE IX: - Frequency Analysis of Communication Gap amongst Labor

G4					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	4	2.1	2.1	2.1
	2.00	19	9.8	9.8	11.9
	3.00	64	33.2	33.2	45.1
	4.00	59	30.6	30.6	75.6
	5.00	47	24.4	24.4	100.0
	Total	193	100.0	100.0	

TABLE X: - Frequency Analysis of High Rate of Labor Turnover

F3					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	12	6.2	6.2	6.2
	2.00	26	13.5	13.5	19.7
	3.00	64	33.2	33.2	52.8
	4.00	59	30.6	30.6	83.4
	5.00	32	16.6	16.6	100.0
	Total	193	100.0	100.0	

B. Ranking

Ranking is given by the Mean value.

TABLE XI: - Top 10 Factor (Mean, Mode and Std. Deviation)

Rank	Factor	Variable	Mean	Mode	Std. Deviation
1	Inadequate instruction provided	B4	3.9378	4.00	0.91644
2	Variation in payment for same work on the site	C4	3.8238	4.00	0.96827
3	Storage of material Far from site	D5	3.8238	4.00	0.96827
4	Lack of quality supervisors	B6	3.8031	5.00	1.11924
5	Jobsite congestion	D6	3.8031	3.00	0.95339
6	Change of design, plans, scheduling, and sequence of works	E6	3.7927	4.00	0.93461
7	Poor decision making	A2	3.6995	4.00	1.01697
8	Bad weather conditions	H1	3.6943	4.00	0.98680
9	Communication gap amongst labor	G4	3.6528	3.00	1.01996
10	High rate of labor turnover	F3	3.3782	3.00	1.10253

V. CONCLUSION

As discussed earlier, the SPSS Software was used to analyze the data collected and list out the factors affecting the labor productivity. The outcome was that the top 10 factors were identified viz. Inadequate instructions provided by the supervisor; Variation in payment for same work on the site; Storage of material is far from site. Lack of quality supervision; Jobsite congestion; Change of design, plan, schedule and sequence of work; Poor decision making by management; Bad weather conditions; Communication gap amongst the labors. These factors were identified from the questionnaire collection and analysis. This study will be helpful to the ones who are looking forward for increasing the productivity of their project. If the factors listed above are properly taken care of, then the labor productivity can be increased considerably. As a result of which, the time and cost could be reduced which are most important constraints that affect the project.

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