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Analysis of Labor Productivity

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Abstract: *This paper deals with the analysis* of productivity of labors for construction of basic elements of a building which are casting of slab, beams, columns and construction of burnt brick masonry. The study was done for the duration of 15 weeks within which all the elements regarding the productivity of labors were studied. The productivity of labors was analyzed by considering man hours required for accomplishing particular cubic meter of work done. The results of the paper show various factors which affected the productivity of labors and caused the delay in completion of project.

Keywords:- Labor productivity, cost of work done, working man-hr.

I: Introduction

The analysis of labor productivity has become an important part of construction of the buildings. A company should be able to generate maximum output from labors without increasing their working man-hours.In this paper the productivity of labors is identified in terms of rs./man-hr. i.e. the output is considered in rs. and the input is considered in working man-hrs.

Thomas and Sudhakumar**[2]**, reported the results of a questionnaire survey of project managers, site engineers, supervisors and craftsmen, in the state of Kerala in India, to identify the factors influencing construction labor productivity. Leo Sveikauskas*et.al.***[3]**, analyzed the productivity growth in construction. This paper first reviewed Bureau of Labor Statistics (BLS) estimates of productivity growth in the overall construction sector. Gupta and Kansal**[4]**, discussed about the improvement of construction labor productivity in Chambal region. Dozzi and AbouRizk**[5]**, analyzed the productivity in construction. This paper is about the importance of differentiate between macro-level and micro-level productivity factors in order to analyze cause/effect relationships and take appropriate action.Mistry and Bhatt**[6]**, reported the critical factors affecting labor productivity in construction Projects.This paper is about the case study of south Gujarat Region of India. Productivity improvements achieve higher cost savings with minimal investment.

II: Methodology

Labor productivity can be measured in two terms viz., physical or in terms of price. In this paper the productivity is measured in terms of price. The formula **[1]** used for measuring productivity is

$$\text{Labor Productivity} = \frac{\text{Output in rs.}}{\text{Work Hour}} \quad \ldots \text{(eq. no. 1)}$$

In simple terms, the formula can be noted down as

$$\text{Labor Productivity} = \frac{\text{Output}}{\text{Input}}. \ldots \text{(eq. no. 2)}$$

III: Data collection and analysis

The data was collected from construction at Gents Hostel, Pune University under the firm Saurabh Construction The output of work done is obtained in terms of cubic meters from daily reports written on site. This data in cubic meter is converted in terms of cost with the help of Schedule of Rates.Whereas the total work hour is calculated as average work hour per week of all the labors working for 9 hours a day.

Table I Labor data collected

Week	Avg. Man-hrs
1	350
2	318.5
3	132
4	135
5	150
6	118.5
7	114
8	126
9	135
10	60
11	136.5
12	97.5
13	136.5
14	7.5
15	42

As per the Schedule of rates,

1. For casting of slab, the rate of 1 cubic meter is Rs. 1892.
2. For casting of columns, the rate for 1 cubic meter is Rs. 1363.
3. For providing second class Burnt Brick masonry, the rate for 1 cubic meter is Rs. 4937.00.

Therefore, the total output in terms of rupees is calculated as shown.

Table II Work done data collected

Week	Work done(cu.m)	Output (rs.)
Casting of slab and beams		
1	86.251	163186.89
2	36.96	69928.32
Casting of columns		
3	5.94	8096.22
4	7.13	9718.19
5	8.71	11871.73
6	7.92	10794.96
7	9.11	12416.93
8	6.33	8627.79
BBM		
9	1.85	1635.4
10	4.85	4287.4
11	5.04	4455.36
12	2.56	2263.04
13	0.46	406.64
14	0	0
15	1.08	954.72

The data was collected daily from site and then weekly average was found out and taken into consideration as shown in table above.

Now, using the formula as shown, the productivity of labors is calculated and tabulated below.

Table III Calculation of productivity

Week	Working man-hrs	Output (rs.)	Productivity (rs./man-hr)
Casting of slab and beams			
1	350	163186.89	348.71
2	318.5	69928.32	
	668.5	233115.212	
Casting of columns			
3	132	8096.22	79.34
4	135	9718.19	
5	150	11871.73	
6	118.5	10794.96	
7	114	12416.93	
8	126	8627.79	
	775.5	61525.82	
BBM			
9	135	1635.4	22.77
10	60	4287.4	
11	136.5	4455.36	
12	97.5	2263.04	
13	136.5	406.64	
14	7.5	0	
15	42	954.72	
	615	14002.56	

The expected productivity was as follows:-

The expected productivity for casting of slab and columns is 259.01 rs./man-hr. and 56.96 rs./man-hr.The total quantity of brickwork for

fourth floor of the considered building is 122.29 cubic meter. The brickwork was expected to be completed if 8 labors would have worked for 45 days for 9 hrs./day. Therefore, the working man-hrs.would be 3240.Also the amount of work done would be 108104.4 rs. Therefore, the expected labor productivity, using the same formula, is found out to be 33.37 rs./man-hr.

IV: Results and analysis

i. Analysis of Labor Productivity of Casting of slab and Beam.

The graph shows the comparison between expected and actual weekly productivity in terms of cost. The total expected Labor productivity for the casting of slab and beams was **259.016rs/man-hr**and the actual productivity has come out to be **348.71 rs./man-hr**.

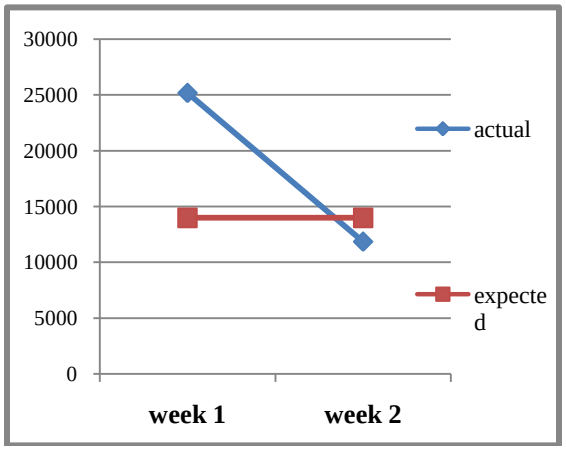

Fig. 1 Comparison of Expected and actual Output (rs.) for casting of slab and beams

Therefore, here we got actual productivity more than that of expected Labor productivity. Hence the casting of slab and beam was economically profitable.

ii. Analysis of Labor Productivity of Casting of Columns.

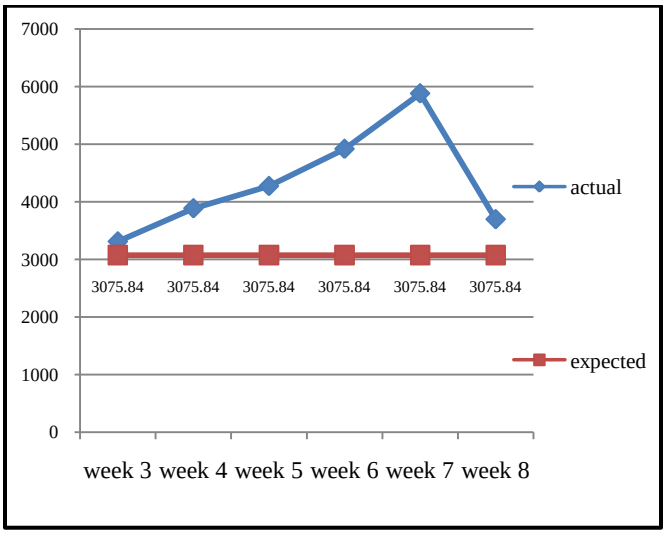

Fig. 2 Comparison of actual and expected output for casting of columns

The graph shows the comparison between expected and actual weekly productivity in terms of cost. The total expected Labor productivity for the casting of slab and beams was **56.97rs/man-hr**and the actual productivity has come out to be **79.34 rs./man-hr**. Therefore, here we got actual productivity more than that of expected Labor productivity. Hence the casting of slab and beam was economically profitable.

iii. Analysis of Labor Productivity for Burnt Brick Masonry

The graph shows the comparison between expected and actual weekly productivity in terms of cost. The total expected Labor productivity for the construction of BBM was **33.37 rs/man-hr**and the actual productivity has come out to be **22.77 rs./man-hr**. Here we got the actual productivity less than that of the expected productivity.

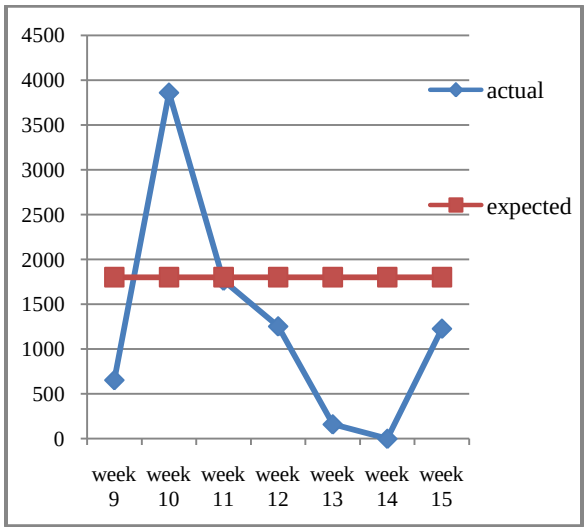

Fig. 3 Comparison of Expected and actual Output (rs.) for BBM

V: Conclusions

From the observation and calculation of productivity of labor it can be concluded that the consistency of labors affects the productivity in terms of time and cost. Also it is observed that industrial factors like unavailability of material, strikes of labors, strikes of suppliers affects the productivity of project. Many factors other than the skill and quality of labors affect the productivity of Labor. Improper workmanship of labors also affects the productivity of project.The more the Labor force would be productive, less time would be required for completion of the project and the more would be the profit of the company.

VII: References

1. B.Prakash Rao , AmbikaSreenivasan,PrasadBabu NV, 'Labor Productivity – Analysis and Ranking' *International research Journal of Engineering and Technology*,June 2015 e-ISSN 2395-0056/ p-ISSN 2395-0072, **2(3),** 151-152.
2. Anu V. Thomas and J. Sudhakumar,'Factors Influencing Construction Labour Productivity: An Indian Case Study' *Journal of Construction in Developing Countries*, 19(1), 53–68, 2014,
3. Leo Sveikauskas,Samuel Rowe, James Mildenberger, Jennifer Price, Arthur Young, 'Productivity Growth in Construction'*BLS Working Papers, U.S. Department of Labor, U.S. Bureau of Labor Statistics, Office of Productivity and Technology*.
4. Vaishant Gupta, R. Kansal, 'Improvement of Construction Labor Productivity in Chambal Region'*International Journal of Research in Engineering and Technology*, e-ISSN: 2319-1163 / p-ISSN: 2321-7308,**3**(10).
5. S. P. Dozzi, S. M. AbouRizk, 'Productivity in Construction' *National Research Council* December 1993 NRCC 37001 / NR16-2411993E,
6. MistrySoham, Bhatt Rajiv, 'Critical Factors Affecting Labor Productivity In Construction Projects: Case Study Of South Gujarat Region Of India' *International Journal of Engineering and Advanced Technology* ISSN: 2249 – 8958, April 2013,**2**(4), 583-59