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Factors Affecting on Flooring Labor Productivity

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Abstract - Labor is most important asset in construction industry. Flooring is one of the most repetitive activities involving skilled labors. In this paper, labor productivity with reference to flooring is studied in Kolhapur region. 23 variables which affect the productivity are analyzed by collecting responses from 40 respondents. By using Likert Scale and RII, the factor which will impact more is found out. For analysis, sites are selected, like industrial and residential which include flooring, flooring for parking, dados etc.

***Key Words*:** *Productivity, Likert Scale, RII.*

1. INTRODUCTION

Labor is the basic requirement of the any industry. Labor costs around 20% to 30% of construction project. For every project, productivity, cost quality and time are the main concerns. For better productivity management should work on the skill education, training ,work method, work quality location, health ,workload distribution, type of work should be improved. If productivity increased then standards can be raised. Calculating impact of factors on productivity will improve the standards and quality of the work; it can improve planning and scheduling and quality of the project work.

2. Body of Paper

Labor productivity, also known as workforce productivity, is relationship between output and input. Labor productivity is total work done in productive hours.

The formula for labor productivity is:

Labor Productivity = Total Output / Total Productive Hours.

The formula for flooring labor productivity is:

Labor Productivity=Total Tiled Area(m^2) / Total Productive hours (man hours)

2.1. MATERIAL AND METHODS:

A relevant meeting with the industry personnel helped to identify the significant factors which affect the labor productivity of construction projects. After the identification of factors, structured questionnaires were distributed among the industry experts. Important factors are identified and ranked using RII method.

On the basis of literature review on factors influencing labor productivity, 23 factors were identified which affects particularly on the process or design which can also be called as buildability factors. These factors were identified through several literature surveys and suggestions from experienced persons. A questionnaire is prepared using these factors. The questionnaire is distributed among builders and contractors of construction projects. The response were measured using a Likert scale system ranging from 1 to 5 i.e. 1.Strongly not effective, 2. Least effective, 3.Neutral, 4.Effective, 5. Most effective. The primary data was collected through self-administered questionnaire and analyzed. A sample set of 40 was taken. The survey was conducted among builders, contractors and site engineer of construction projects. The factors were rated using a Likert scale system ranging from 1. Strongly not effective to 5. Most effective. The results of survey is tabulated and Relative Importance Index (RII) was calculated.

Likert's scale is a technique developed by Dr. Rensis Likert, a sociologist. Likert scale is a psychometric response scale primarily used in questionnaire to obtain participant's preference or degree of agreement with a statement or set of statements .Likert scales are a non comparative scaling technique and unidimensional in nature. Respondents are asked to indicate their level of agreement with a given statement by way of ordinal scale.

Likert's scale is used because it is easy to construct, high reliable scale, and also it is easy to read for the participants.

RII was used for ranking the factors. In Table 1, the investigated factors and their RII scores are represented. The results of the study revealed that among the twenty three factors.

RII calculation is used to determine relative significance and for ranking the factors affecting labor productivity of flooring works.

RII is given as :

$$RII=\frac{\sum a}{A*n}$$

a= weighting given to each factor by respondent and it ranges from 1 to 5

A= highest response

n= total number of participants.

Ranking was done based on this RII value.

Sample calculation:

Relative Importance Index of each factor is calculated as shown below

$$RII=\frac{\sum a}{A*n}$$

$$RII=\frac{(0*1)+(0*2)+(0*3)+(20*4)+(20*5)}{5*40}=0.900$$

$$RII=\frac{(0*1)+(0*2)+(0*3)+(10*4)+(30*5)}{5*40}=0.950$$

3.RESULT AND DISUCUSSION:

The data collected and analysis, describes the factors affecting the productivity of floor tiling and wall tiling. Labor productivity rates are influenced by various factors present at the project site. Although, these factors are very difficult to consider during the measurement and estimation of production rates due to its variable nature. 23 factors were selected by studying literature surveys and surveys of sites.

Table (1) describes the list of 23 factors, table (2) describes the RII calculation for the factors affecting on the floor tiling and table (3) indicates RII calculation for the wall tiling.

Figure 1 and 2 shows graphical representation of factors affecting on flooring labor productivity and wall tiling labor productivity respectively.

Table 1. Factors affecting on the flooring labor productivity

Sr. No.	Factors Impacting
1	Quality of material
2	Area of room
3	Type of material
4	Area of tile
5	Thickness of tile
6	Tools used
7	Spacing
8	Levelling
9	Screed Thickness
10	Cleaning
11	Height of floor
12	Cut out
13	Setting out
14	Working overtime
15	Tamping
16	Shape of room
17	Tile laying Method
18	Transportation facilities
19	Material storage location
20	Variation in drawing
21	Change of order of owner
22	Change of order of designer
23	Design changes

Table 2. Factors affecting on floor tiling

Sr. No.	Factors Impacting	1	2	3	4	5	RII
1	Area of room	0	0	0	20	20	0.900
3	Area of tile	0	2	2	15	21	0.875
4	Type of material	0	2	2	15	21	0.875
5	Thickness of tile	0	0	5	20	15	0.850
6	Tools used	0	0	5	20	15	0.850
7	Spacing	0	8	9	3	20	0.775
8	Levelling	0	5	15	5	15	0.750
9	Screed Thickness	0	7	10	12	11	0.735
10	Cleaning	5	10	12	9	9	0.710
11	Quality of material	0	10	10	9	11	0.705
11	Height of floor	0	10	10	10	10	0.700
12	Working over time	0	12	11	14	5	0.690
13	Setting out	0	15	10	5	10	0.650
14	Cut out	0	10	20	10	0	0.600
15	Tamping	8	8	9	8	7	0.590
16	Shape of room	0	15	12	13	0	0.590
17	Tile laying Method	0	25	5	5	5	0.550
18	Transportation facilities	4	12	15	8	1	0.550
19	Material storage location	3	17	10	10	0	0.535
20	Variation in drawing	14	14	12	0	0	0.390
21	Change of order of owner	14	15	11	0	0	0.385
22	Change of order of designer	14	15	11	0	0	0.385
23	Design changes	25	9	6	0	0	0.305

Table 3. Factors affecting on wall tiling**:**

Sr No.	Factors affecting	1	2	3	4	5	RII
1	Area of tile	0	0	0	10	30	0.950
2	Height of floor	0	0	0	11	29	0.945
3	Thickness of tile	0	0	0	21	19	0.895
4	Screed thickness	0	0	10	10	20	0.850
5	Levelling	0	0	11	10	19	0.840
6	Type of material	0	0	11	15	14	0.815
7	Quality of material	0	0	11	15	14	0.815
8	Tamping	0	0	14	10	16	0.810
9	Spacing	0	0	14	13	13	0.795
10	Cleaning	0	2	12	12	14	0.790
11	Tools used	0	2	14	12	12	0.770
12	Transportation	0	10	5	20	5	0.700
13	Working overtime	0	10	5	20	5	0.700
14	Area of room	0	11	11	9	9	0.680
15	Tile laying Method	0	13	12	10	5	0.635
16	Cut out	7	5	10	10	8	0.635
17	Shape of room	0	15	15	0	10	0.625
18	Setting out	5	15	15	5	0	0.500
19	Material storage location	16	24	0	0	0	0.320
20	Change of order of owner	18	22	0	0	0	0.310
21	Design changes	20	20	0	0	0	0.300
22	Variation in drawing	20	20	0	0	0	0.300
23	Change of order of designer	22	18	0	0	0	0.290

3.1 Graphical Representations:

Graph shows, X-axis denotes serial number of the factor impacting from table 2 for graph 1 and table 3 for graph 2 and Y-axis denotes RII from table 2 for graph 1 and table 3 for graph 2.

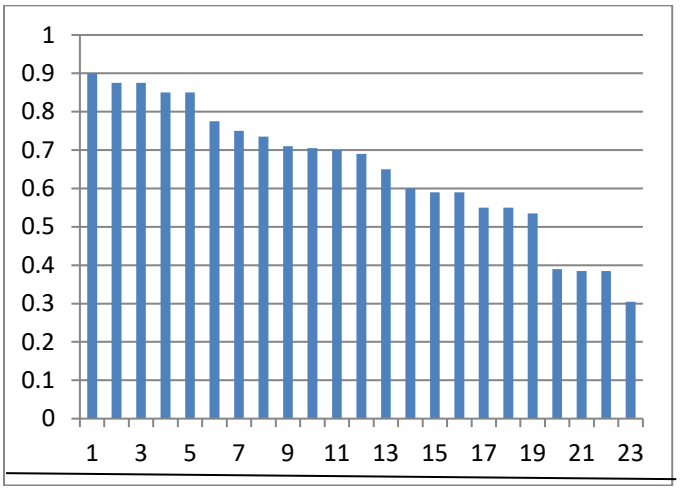

Figure 1. Graphical representation of factors affecting on flooring labor productivity

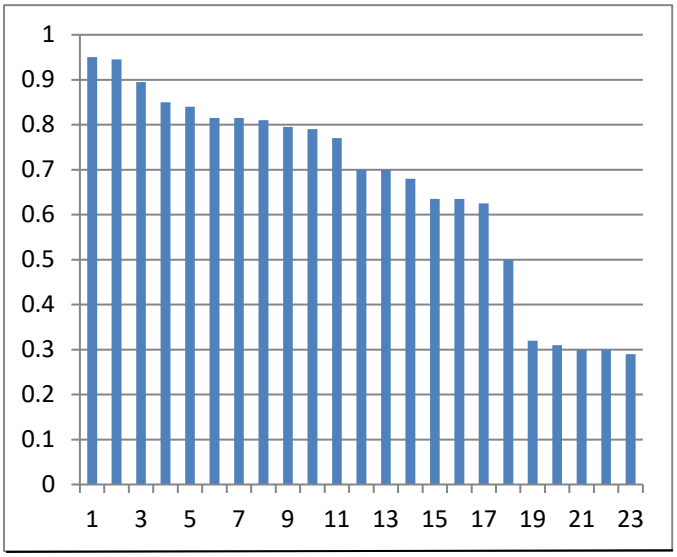

Figure 2: Graphical representation of factors affecting on wall tiling labor productivity

4. CONCLUSIONS

Construction tasks are expensive and low labor productivity results in more cost and time to any construction project. Quality of material should be appropriate ,from results, it is clear that in both cases of tiling that is wall and floor tiling area of tiling affects more on productivity of labor. Material quality should be chosen appropriately by every owner since it affects the efficiency on the productivity. Dimensions of tile also affect on the tiling productivity that's why suitability of each material and dimensions should be checked.

In case of floor tiling, height of floor does not affect more that is it affects 70%,but in case of the wall tiling height of floor affects around 94.5%.Working overtime affects 70% since if working hours exceeds more than 8 hours, efficiency decreases; while change in drawings, change in order of designer and owner does not affect more on the efficiency of the labor.

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