DEVELOPING A HUMAN RESOURCE ANALYZER TOOL FOR CONSTRUCTION PROJECTS

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Absract: ***Construction projects are mostly rely on different resources like men, material, machine & money. From these resources, labour resource plays a vital role when compared to other resources. So we need to utilize the labour resource in a proper way. Currently in our construction industry, the labour productivity is a major issue due to the various factors such as different cultured labours, health factor, poor quality of labour, lack of skill, etc... Productivity of present labour force is less compared to the productivity of labour in past decades. In this project, various factors affecting productivity will be identified through analysis and productivity of labour are compared with PWD and IS standard. The differentiation among productivity will be identified and a software tool for calculating resources will be developed based on the current performance of labour in construction works.***

Keywords :Labours, Optimization, Productivity, Resource.

1 Introduction

1.1 General

The construction industry is the second largest industry of the country after agriculture. It makes a significant contribution to the national economy and provides employment to large number of people.

The preceding scenario indicates that the construction industry requires and utilizes huge amount of material and human resources. Thus, its efficiency and effectiveness depends on among other factors on the quality and availability of its workforce. This also indicates its contribution to National Development can be seriously inhibited by shortage and poor quality of a skilled workforce. Here, there is little concern for construction health and safety. For these and numerous other reasons, there tends to be a great difference in productivity, quality control, and project duration.

Productivity is one of the most important factors affecting the overall performance of any organization, whether large or small. For every project, productivity, cost, quality and time have been the main concern. Better productivity can be achieved if project management includes the skills of education and training, the work method, personal health, motivational factors, the type of tools, machines, required equipment and materials, personal skills, the workload to be executed, expected work quality, work location, the type of work to be done and supervisory personnel.

1.2 Definition Of Productivity In Construction Industry

The term "productivity" expresses the relationship between outputs and inputs. Output and input differ from one industry to another. Also, the productivity definition varies when applied to different areas of the same industry. Labour is one of the basic requirements in the construction industry. Labourproductivity usually relates manpower in terms of labourcost to the quantityof outputs produced.

In 1883, Littredefined productivity as the "faculty to produce ,"that is, the desire to produce. In 1950, the Organization for European Economic Cooperation (OEEC) introduced the definition of productivity as a quotient obtained by dividing the output by one of the production factors.Depending on measurement objectives and the availability of

data, several productivity definitions are encountered.

Productivity is the ratio of output to all or some of the resources used to produce that output. Output can be homogeneous or heterogeneous. Resource comprise: labour, capital, energy, raw materials, etc.

Productivity = Output /Labour cost

At the project site, contractors are often interested in labour productivity. It can be defined in one of the following ways.

LabourProductivity= Output/Labour cost

Or

Labour Productivity = Output/Work hour

There is no standard definition of productivity and some contractors use the inverse of above,

Labour productivity = (Labour cost orWork hour) /Output

1.3 Objective of the project

The main objectives of this study include the following:

- To identify the various factors affecting labour productivity.
- To determine the productivity of labour and it is compared with PWD and IS codes.
- To identify the differentiation among labour productivity.
- Finally software tool will be developed for analyzing the labour resource for different construction works.

1.4 Scope of the project

The scope of the study is

- To optimize the labour resource for construction works.
- Reducing the project cost by optimizing the labour resource.
- Identifying the required labour resource in advance.

1.5 Theme of the project

Productivity is the major role for the overall completion of the project. For attaining the productivity in greater extent, labour resource should be adopted based on the requirement to perform the work. If labour is in excess for the work, idle time of labour may increases and thus productivity decreases. If labour is insufficient for the work, it also leads to decrease in productivity. So optimization of labour is necessary for better productivity. For this purpose, a software tool will be developed based on the current performance of labour productivity.

2. Methodology

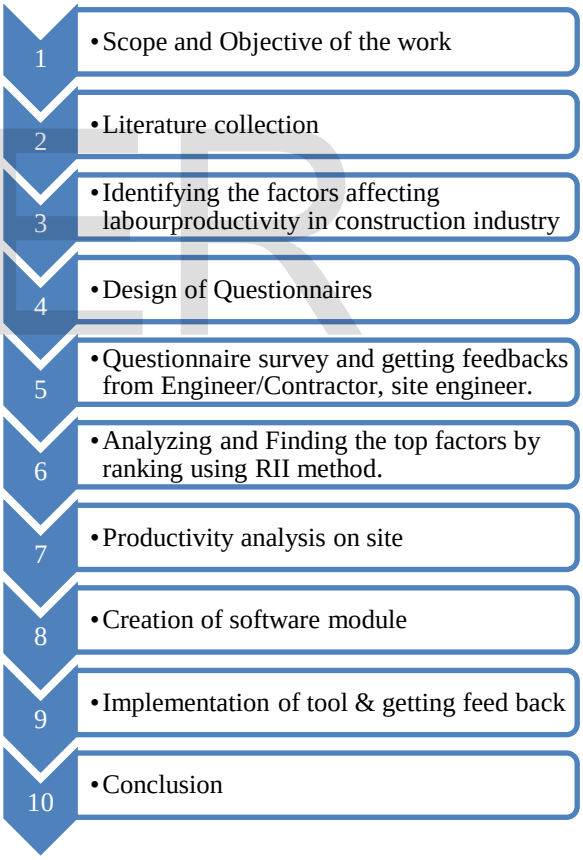

Fig 2.1 Methodology Chart

3. Data collection

For this research, I approached two different methods to collect the data. One is through semi-

structured interview with engineers/contractors and site engineers. The second is through structured questionnaire. For the data collection, I met the engineer/contractor, site engineers of different companies and collected data through structured interview and questionnaire survey. Answers from experienced people are more appropriate.

3.1 Relative importance index (rii) analysis

The survey evaluation was done using Relative Important Index (RII) method and found the top most factors affecting the labour productivity in construction industry. The following formula is used to calculate the relative importance index.

Formula used in Relative Important Index

$$RII = \frac{\Sigma (X_i * Y_i)}{(Z_i * 5)}$$

Where,
RII = Relative Importance Index
Xi = number of responses to the factors
Yi = the value of rating
Zi = total number of responses to the factors

3.2 Design of questionnaire

Questionnaire is designed to identify the factors affecting the labour productivity in the construction industry which leads to low productivity of construction works. The questionnaires are prepared with reference of literature reviews and by direct interviews with engineer /contractor and site engineer.
The importance scale consists of five constraints namely very high, high, medium, low and very low.

Table 3.1 Importance scale for ranking the factors

Very High	High	Medium	Low	Very Low
5	4	3	2	1

4. Data analysis

4.1 Questionnaire analysis

The data was analyzed based on the data collected from the respondents.

4.1.1 Number of respondent

Respondents are building engineer/contractor, site engineer. Totally of thirty two (32) questionnaires were distributed, 22 were responded to the questionnaire properly.

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4.2 Factors affecting labour productivity

The RII of each of the sub-factors affecting the labour productivity are presented in table 4.1 according to engineer, contractor and site supervisors point of view. Rank of each factor is also listed .Materials, communication, human factors, equipment and state of labours are the highest five factors which affects labour productivity.

Table 4.1 Ranking of factors

S.NO	FACTORS	RII VALUE	RANK
1	Materials	0.7455	1
2	Communication	0.7424	2
3	Human factors	0.7409	3
4	Equipment	0.7364	4
5	State of labours	0.7045	5

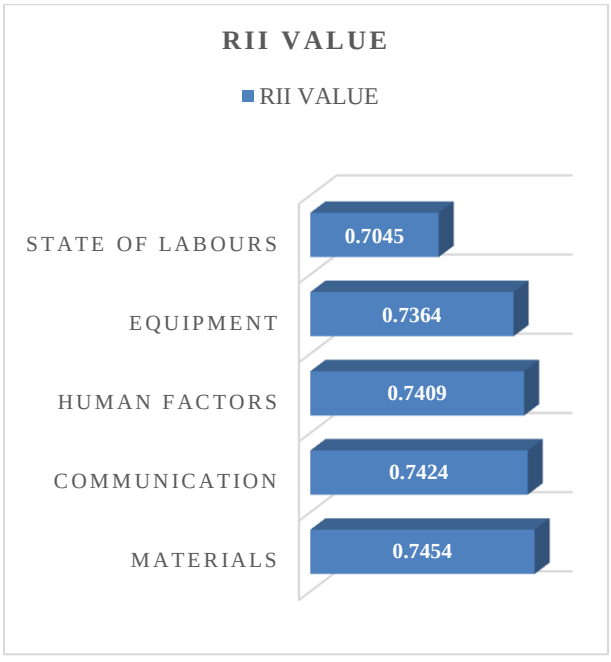

Fig 4.1 List of factors affecting labour productivity

4.3 Comparing the productivity of labour between tamil & hindi labours

Plastering work in m^2/day

Table 4.2 Productivity of plastering work

Work day	Type of labour					
	Tamil labour			Hindi labour		
	No of masons	Total productivity	Productivity/mason	No of masons	Total productivity	Productivity/mason
1	2	23.8	11.9	2	26.5	13.25
2	4	48	12	3	44	14.6
3	3	31	10.3	3	32	10.6

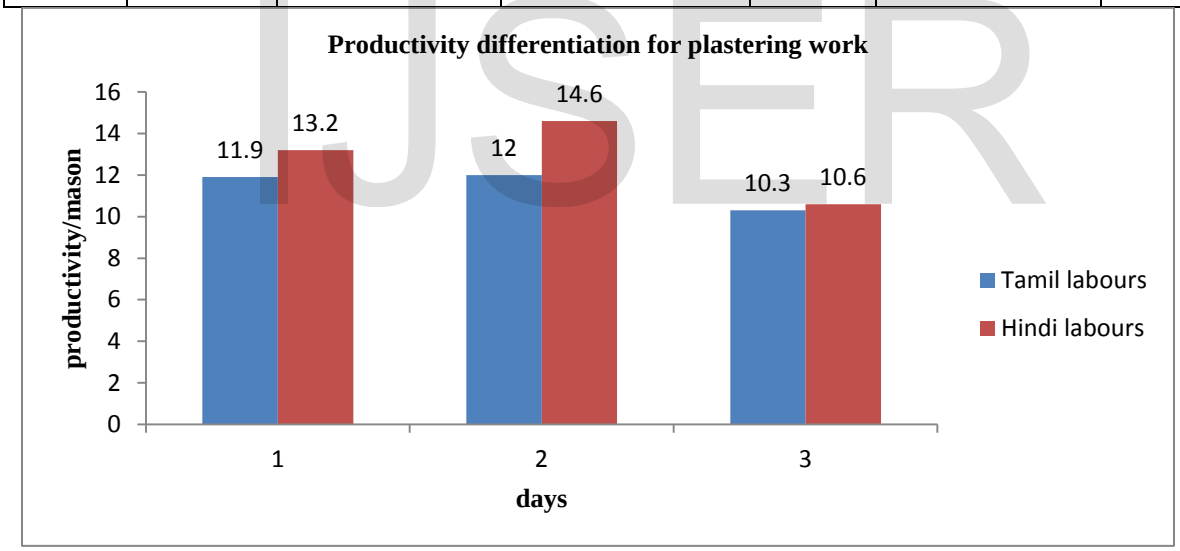

Fig 4.2 Labour productivity for plastering work

The above chart shows the productivity of masons per day for plastering work carried out by them. The productivity of hindi labours is higher when compared with tamil labours.

Brick work in m^3/ day

Table 4.3 Productivity for Brick Work

Work day	Type of labour					
	Tamil labour			Hindi labour		
	No of masons	Total productivity	Productivity/mason	No of masons	Total productivity	Productivity/mason
1	4	5	1.25	4	5.7	1.43
2	4	5.7	1.43	5	6.2	1.24
3	4	5.5	1.38	3	4.45	1.46
4	4	5.7	1.43	4	6.12	1.53

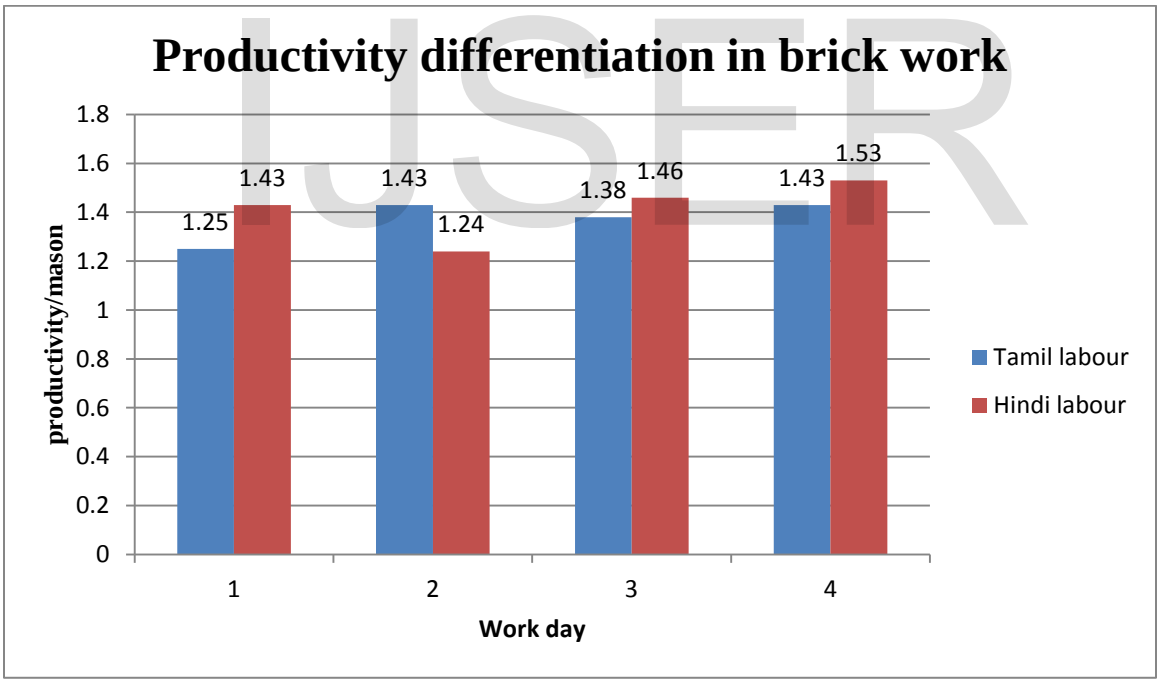

Fig 4.3 Labour productivity for brick work

The above chart shows the productivity of masons per day for brick work carried out by them. The productivity of hindi labours is higher when compared with tamil labours.

5. Conclusion

The productivity growth in the construction industry may have considerable effects on the economic development and stability. This study has found that there have been labour productivity problems and disclosed the five most significant, which were rated to have more than a moderate

influence on productivity, affecting labour productivity in construction industry are materials, communication, human factors, equipment and state of labours are the highest five factors which affects labour productivity.

By considering all these factors and productivity of labour for various construction works will be analyzed. Finally a software tool will be developed for optimization of the human resources for various construction works.

6. References

1) Abdel Razek RH, Elshakour H, Abdel-Hamid M (2006) "Labor productivity: Benchmarking and variability in Egyptian projects." International Journal of Project Management.
2) 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.
3) Ahsan Ali Khan, SadiaAjmal (2015) "Role of management in motivating labor to improve labor productivity." Journal of Advanced Management Science.
4) JanaganS.S , K. Thirumalairaja (2014) "Comparative study of local and migrant labours for productivity enhancement in construction field." International Conference on Engineering Technology and Science.
5) Makulsawatudom A, Emsley M (2001) "Factors affecting the productivity of the construction industry in Thailand: the project managers' perception." Association of Researchers in construction Management.
6) Nurulzatushima Abdul Karim, SitiHafizan Hassan, JuzailahNurYunus, MohamadZainHashim (2013) "Factors influence labour productivity and the impacts on construction industry." Caspian journal of Applied Sciences Research.
7) Peter A. Kuroshi, Mohammed Lawal (2014) "Study of internal factors affecting labour productivity in medium sized construction firms in Nigeria." International Journal of Education and Research.
8) Rateb, Ghaleb J Sweis, Ayman A. Abu Hammad, Malek Abu Rumman (2009) "Modeling the variability of labor in masonry construction." Jordan Journal of Civil Engineering.
9) SerdarDurdyev, Syuhaida Ismail (2012) "Pareto analysis of on-site productivity constraints and improvement techniques in construction industry." Science Research and Essays.
10) Shashank K, SutapaHazra, KabindraNath Pal (2014) "Analysis of key factors affecting the variation of labour productivity in construction projects." International Journal of Emerging Technology and Advanced Engineering.
11) Vijay Antony Raj B, P.S. Kothai (2014) "Improving the labour productivity through other resources in construction field." International Journal of Engineering Research and General Science, volume 2.