International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 06 | June-2018 www.irjet.net p-ISSN: 2395-0072

A Study on Factors Affecting Labour Productivity by Application of Relative Importance Index

Srilakshmi V. Annigeri[1], Prof. Amey A. Kelkar[2]

[1]M.TECH student, Civil Engineering Dept, Jain College of Engineering, Karnataka, India.
[2]Assistant Professor, Civil Engineering Dept, Jain College of Engineering, Karnataka, India.

Abstract - *The triumph of a construction project relies on the administration of various inputs like labours, materials, tools and equipments and capital. Labour force is the most complex one to handle among the above mentioned inputs. Hence it is imperative on determining the factors influencing labour productivity. The main aim of this study is to determine the critical factors affecting labour productivity and how to overcome those factors. The technique used in this research is application of Relative Importance Index (RII). It is a technique that is used to rank the different factors that results in reduced labour productivity and cause delay in construction projects. In this method the various factors which are being listed are rated on the scale of 1 to 4 depending on the basis of their impact on the construction project. Higher the value of RII, more important is that factor affecting on labour productivity.*

Key Words: Labour productivity, Relative Importance Index (R.I.I.)

1. INTRODUCTION

The Indian construction industry is the largest industry of the country after farming. It makes a critical commitment to the national economy and gives vocation to huge number of individuals. Construction industry consumes about half of the country's capital expenditure and co-assist 11% of GDP. Construction industry generates generous occupation and stipulate an advancement energy to other sectors through contrarily and progressively linkages. It is, therefore essential that, this key action will be nurtured for the sound development of the economy.

The construction sector has skilled agility over the last few years. Construction has played a key part in development of our country. Additionally improved designs, materials, equipments have aided the growth of this sector. The interest shown by the government on infrastructure development has become major factor for the growth of the construction industry. Labour is an essential aspect of construction industry hence sound labour management cannot be disregarded. It is that process which has a view point of extracting the required work from the labours to achieve the set goals. It is a scientific methodology which takes care of both the parties such that the required work is extracted without exploitation of the labour class.

Improving productivity is significant concern for benefit oriented association. In construction industry productivity is defined as the units of work done per man hour. Nature of the development generally relies upon the caliber from claiming worth of effort carried out by labour. Construction productivity is influenced by labour productivity.

1.1 OBJECTIVE

The main objectives of this study are as follows:

- To identify the factors influencing labour productivity.
- To analyze the factors using relative importance index (R.I.I.)
- To suggest mitigation measures for the same.

1.2 LITERATURE REVIEW

Labour productivity and its management is a very important concept in civil industry. Labour productivity has a huge impact on the outcome of any project. Hence to understand various aspects of labour productivity management a literature review was conducted.

Yogendra Kumar et.al.,[11] investigated various aspects which help to reduce "Idol Time". The investigations joined meetings with on location personnel, work sampling, work measurement and observations made directly at the site. This contemplate indicated that the rate of direct work was changing between 32-44.6%, indirect work between 40-44% and no work between 15-20%. It was additionally found that benefit was higher to those destinations where the percentage of direct work was higher. It is thus concluded that there is an enormous degree of profit by decreasing no work and indirect work.

Mistry Soham et.al.,[9] conducted survey to figure the basic elements influencing labour productivity. A survey was conducted in urban areas of South Gujarat. The feedbacks were broke down through Analytic Hierarchy Process (AHP) and Relative Importance Index (RII). Five practically significant factors were identified from both AHP and RII. It was concluded that the improvement of the critical factors yields high labour productivity.

Muhammad Asadullah Tahir et.al.,[7] recognized and ranked the factors affecting labour productivity, as productivity is the ruling angle in construction industry. A questionnaire review was led to record the factors that influence the work productivity. The questionnaire comprised of components which were analyzed and ranked as per Relative Importance Index (RII). Investigation uncovered 5 basic elements that negatively influence the work profit.

T.R. Vignesh et.al.,[5] In this paper 2 diverse projects (Residential and Industrial Building) located at 2 different places thanjavur and chennai are selected. An overview was directed to figure out the factors influencing the labour profit by the method of questionnaire survey. The variables were then positioned based on the survey conducted. It was concluded that the critical factors have to be kept in mind while execution of the project in order to attain optimal labour productivity.

2. RESEARCH METHODOLOGY

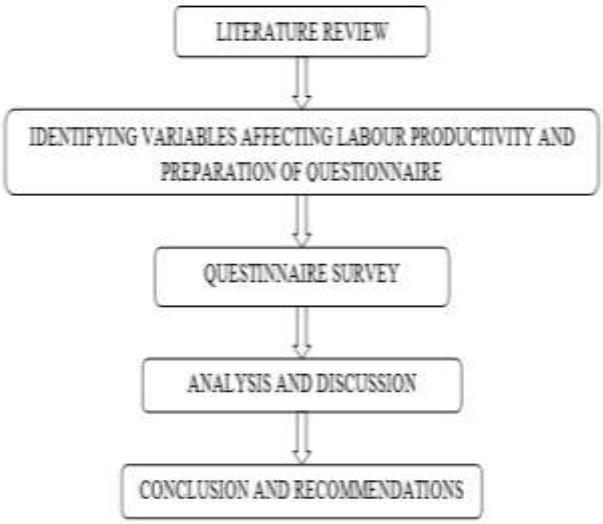

Fig -1: Flow Chart of Methodology

In this research work the present condition of the infrastructure projects has been studied. The main aim is to develop some tool and technique that can be utilized for the completion of the projects on time with optimum cost and desirable quality.

This research holds two phases. The first phase includes the preliminary knowledge of the subject information needed for this study is collected through literature review. The literature review was directed through different references. Various factors contributing towards reduced labour productivity in construction industry were listed down on the basis of literature review. These factors were branched under 8 different categories which are documentation, technical parameters, managerial parameters, resources, safety parameters, wages, weather and other parameters.

The second phase involves the preparation of questionnaire based on the above described factors. These questionnaires were distributed to civil engineers, contractors and repudiated organizations by mail, postal and in person and valuable feedbacks were collected.

2.1 DATA ANALYSIS

Questionnaire survey was conducted to find the dominating factors under various categories which have highest impact on the Labour Productivity. The questionnaire form was distributed to 50 respondents to rank the various factors

The technique used in this research is application of Relative Importance Index (RII). It is a technique that is used to rank the different factors that results in reduced labour productivity and cause delay in construction projects. In this method the various factors which are being listed are rated on the scale of 1 to 4 depending on the basis of their impact on the construction project. Higher the value of RII, more important is that factor affecting on labour productivity. The R.I.I. is obtained by applying the following equation:

$$R.I.I. = 4(n_4) + 3(n_3) + 2(n_2) + 1(n_1)/\ 4\ (n_4 + n_3 + n_2 + n_1)$$

Where, 1 to 4 are the ratings based on the impact to be collected from survey which is read as follows:

1 = NIL, 2 = LOW, 3 = MODERATE, 4 = HIGH

n_x = number of respondents

2.2 SUMMARY OF THE RESULTS

From the data collected the various factors were ranked and analyzed by using relative importance index (R.I.I.) technique. Results of this study are summarized below:

Table -1: Documentation Result

Sl. No.	CATEGORY	FACTORS	RELATIVE IMPORTANCE INDEX
1	DOCUMENTATION	Delay for approval of permission drawing	0.69
		Changes in permission drawing	0.61
		Availability of concerned approval authority	0.69
		Corruption or demands	0.66
		Site inspection	0.71

Table -2: Technical Parameters Result

Sl. No.	CATEGORY	FACTORS	RELATIVE IMPORTANCE INDEX
2	TECHNICAL PARAMETERS	Delay in drawings	0.65
		Drawing errors	0.66
		Lack of construction knowledge	0.71
		Lack of experience	0.68
		Rework due to different reasons	0.7
		Trade expertise	0.7
		Construction methods adopted	0.79

Table -3: Managerial Parameters Result

Sl. No	CATEGORY	FACTORS	RELATIVE IMPORTANCE INDEX
3	MANAGERIAL PARAMETERS	Attitude towards labours	0.7
		Improper planning	0.74
		Improper resource allocation	0.7
		Poor co-ordination	0.72
		Flexibility for workers	0.75
		Motivation of labour	0.73
		Improper work schedule	0.76

Table -4: Resources Result

Sl. No.	CATEGORY	FACTORS	RELATIVE IMPORTANCE INDEX
4	RESOURCES	Material quality	0.74
		Material storage area too far from workplace	0.67
		Equipment maintenance	0.66
		Increase in the price of materials	0.76
		Late delivery of materials	0.75
		Shortage of water and power supply	0.72
		Material shortages	0.65
		Tool and equipment shortages	0.64

Table -5: Safety Parameters Result

Sl. No.	CATEGORY	FACTORS	RELATIVE IMPORTANCE INDEX
5	SAFETY PARAMETERS	Safety measures available at the site	0.73
		Labour insurance	0.74
		Safety trainings	0.76
		Dangerous working condition	0.75
		Availability of first aid	0.75

Table -6: Wages Result

Sl. No.	CATEGORY	FACTORS	RELATIVE IMPORTANCE INDEX
6	WAGES	Difference in pay scales	0.64
		Incentives and performance	0.65

		bonus	
		Payment delay	0.69
		Lower wages	0.71

Table -7: Weather Result

Sl. No.	CATEGORY	FACTORS	RELATIVE IMPORTANCE INDEX
7	WEATHER	Seasonal variation	0.63

Table -8: Other Parameter Result

Sl. No.	CATEGORY	FACTORS	RELATIVE IMPORTANCE INDEX
8	OTHER PARAMETERS	Availability of basic facilities	0.58
		Age	0.65
		Habits and addiction	0.67
		Personal problems	0.61
		Absenteeism	0.71
		Poor health of the workers	0.69

2.3 DOMINATING FACTORS

The following are the dominating factors from each categories bearing highest Relative Importance Index value by the survey carried out

Sl. No.	CATEGORY	DOMINANTING FACTOR	RELATIVE IMPORTANCE INDEX VALUE
1	DOCUMENTATION	Site inspection	0.71
2	TECHNICAL PARAMETERS	Construction methods adopted	0.79
3	MANAGERIAL PARAMETERS	Improper work schedule	0.76
4	RESOURCES	Increase in the price of materials	0.76
5	SAFETY PARAMETERS	Safety trainings	0.76
6	WAGES	Lower wages	0.71
7	WEATHER	Seasonal variation	0.63
9	OTHER PARAMETERS	Absenteeism	0.71

3. CONCLUSIONS

Labour productivity plays a key role in making a project successful. This study mainly deals with the factors influencing labour productivity which is an integral part of a construction project. The following are the conclusions and mitigation measures that are drawn from this work:

1. Labour productivity is an integral part of any construction project as it has an effect on timely completion of the project and also increases the cost of the project.

2. Labour productivity is neglected on many construction sites and hence it has to been given prime importance.

3. In documentation work carrying out site inspection is found to be the most critical factor with R.I.I. value of 0.71. Thus timely completion of the site visits by the concerned authorities has to be done by planning it well in advance to avoid delays.

4. The most effecting criteria in technical parameter are the construction methods and techniques adopted with R.I.I. value of 0.79. A need has arised to take a step further for improving and implementing new ideas and techniques, equipments and tools and construction planning methodologies to avoid unnecessary delays.

5. Under managerial parameter the most important factor is improper work schedule which affects labour productivity with R.I.I. value of 0.76. Labour management plays a key role in the success of a construction project and this factor can be optimized and maintained by proper planning and scheduling of the construction activities.

6. Increase in the price of the materials is the dominating factor under the category of resources with R.I.I. value of 0.76. Cost of the project mainly depends on the materials and human resource. In order to optimize cost of the project proper procurement and storage of materials has to be done also there should be optimal usage of the materials with minimum wastage.

7. In safety parameters the most critical criteria affecting labour productivity is safety training with R.I.I. value of 0.76. Accidents have a mental impact on labours which affects productivity. Accidents on the sites can be avoided by providing proper safety measures. Labours should undergo safety trainings and should have a basic knowledge of first aid. Thus employing these measures will improve labour productivity.

8. Lower wages is the factor affecting labour productivity with R.I.I. value of 0.71 under the category of wages. Labourers tend to work more efficiently when they are given higher pay scales and they can be motivated by providing incentives for their performances.

9. Under the category of weather, seasonal variation is the important factor that affects productivity with R.I.I. value of 0.63. Seasonal variation has an impact on labour productivity which can be mitigated by planning for work in a manner such that the execution of the project happens smoothly. For an instance, during rainy season indoor works can be scheduled and during the summer season outdoor work can be scheduled.

10. Absenteeism is the most dominating factor with R.I.I. value of 0.71 in the category of other parameters. Project duration will prolong when there is a continuous absence of labours and this may be caused due to physical fatigue, age, addiction etc. to overcome this factor regular health checkups and monitoring of the labours should be done. They should not be pressurized to work for overtime regularly. Social awareness and de-addiction programmes have to be organized to increase the awareness about social evils.

11. Along with the above mentioned mitigation measures it is very important that the contractor/ owner gives a rightful treatment to the labours. A social harmony should be maintained by mutually respecting each other to avoid any conflicts which affect the labour productivity.

REFERENCES

[1] Shinde V. J., Hedaoo M. N., "A Review on Productivity Improvement in Construction Industry" International Research Journal of Engineering and Technology (IRJET), Volume: 04, Issue: 11 (2017).

[2] Jisha Chakkappan, Lakshmi G Das, "Labour Productivity Analysis Using Multi-variable Linear Regression Technique", International Research Journal of Engineering and Technology (IRJET) Volume: 03, Issue: 09 (2016).

[3] Prachi R. Ghate, Ashok. B. More, Pravin R. Minde, "Importance of Measurement of Labour Productivity in Construction", International Journal of Research in Engineering and Technology (IJRET), Volume: 05, Issue: 07 (2016).

[4] Mr.C.Thiyagu, Mr.M.Dheenadhayalan, Mr.S.Janagan, "Construction Labour Productivity and Its Improvement", International Research Journal of Engineering and Technology (IRJET) Volume: 03, Issue: 06 (2016).

[5] Mr.T.R.Vignesh, Mr.S.S.Janagan, "Investigating Factors Influencing Labour Productivity in Construction Projects", International Research Journal of Engineering and Technology (IRJET) Volume: 02, Issue: 08 (2015).

[6] Dharani K, "Study on Labours Productivity Management in Construction Industry", International Journal of Latest Trends in Engineering and Technology (IJLTET), Volume: 6, Issue: 1 (2015).

[7] Muhammad Asadullah Tahir, Hashimhanif, Zuhaib Aslam Shahid, Abdullah Hanif, "Factors Affecting Labor Productivity In Building Projects Of Pakistan", International Journal of Management and Applied Science, Volume:1, Issue:2 (2015).

[8]Nay Chi Soe, Aye Mya Cho, "Current Practices on Labour Management in Building Construction Projects", International Journal of Scientific Engineering and Technology Research, Volume: 3, Issue: 10 (2014).

[9] Mistry Soham, Bhatt Rajiv, "Critical Factors Affecting Labour Productivity In Construction Projects: Case Study Of South Gujarat Region Of India", International Journal of Engineering and Advanced Technology (IJEAT), Volume: 2, Issue: 4 (2013).

[10] Desai Megha, Dr Bhatt Rajiv, "A Methodology for Ranking of Causes of Delay for Residential Construction Projects in Indian Context", International Journal of Emerging Technology and Advanced Engineering, Volume: 3, Issue: 3 (2013).

[11] Yogendra Kumar, Gadde Harish Kumar, Satish Babu Mynemi and C.V.N. Sai Charan, "Productivity Analysis of Small Construction Projects in India", Asian Journal of Applied Sciences (2013).

[12] P. Dayakar, P. JothiKrishnan, "Onsite Labour Productivity in Construction Industry in and Around Chennai", International Journal of Biotech Trends and Technology (IJBTT), Volume: 2, Issue: 4(2012).