

Factors Affecting Labour Productivity and Methods to Improve it in Building Construction

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ABSTRACT - The most challenging issue in Construction industry is to improve the production efficiency. The main outcome from the literature is that there is no standard definition of productivity. It covers the construction labour productivity definitions, aspects, factors affecting it. The productivity of labour is particularly important especially in developing countries, where most of the building construction work is still on manual basis. The aim of this study is to get the latest information and to identify the key factors that affect the labour productivity in and around Pune. So, survey is carried out through questionnaire and is distributed to respondents who work at various projects in wide area in Pune and the questionnaires are rated by project managers, experienced engineers and also with labours using their experiences. And the data is collected and analyzed; using this the affected factors are identified and ranked, through these necessary steps are provided to improve the labour productivity. To investigate effects of labour productivity and affecting factors of it and also recommendations to improve labour productivity in construction.

Keywords: Labour Productivity, Construction management.

I. INTRODUCTION

Labour productivity is an important economic indicator that is closely linked to economic growth, competitiveness, and living standards within an economy. Labour productivity represents the total volume of output (measured in terms of Gross Domestic Product, GDP) produced per unit of labour (measured in terms of the number of employed persons) during a given time reference period. The indicator allows data users to assess GDP-to-labour input levels and growth rates over time, thus providing general information about the efficiency and quality of human capital in the production process for a given economic and social context, including other complementary inputs and innovations used in production. Given its usefulness in conveying valuable information on a country's labour market situation.

1.1 Concepts and definition:

Productivity represents the amount of output per unit of input. Output is measured as gross domestic product (GDP) for the aggregate economy expressed at purchasing power parities (PPP) to account for price differences in countries. The GDP represents the monetary value of all goods and services produced within a country over a specified period of time.

Employment comprises all persons of working age who during a specified brief period, such as one week or one day, were in the following categories: a) paid employment (whether at work or with a job but not at work); or b) self-employment (whether at work or with an enterprise but not at work).A

II. LITERATURE REVIEW

Title: Labor Productivity in the building industry

Author: Henry Alinaitwe

The cost of labor in the building industry is in the region of 25 - 40 % of the cost of building. Hence the cost of labor is quite high and yet it is the main cause of variability in construction costs. The time used by workers on daily basis on productive activities averages about 30% of the total time available for construction work. The remainder of the time, i.e. about 70% is wasted on non-productive activities, delays and added activities. For a company in the building industry to remain competitive, it must try to improve the productivity of its labor. This paper reviews the literature on labor productivity in the building industry. It looks at the definitions, measurement, use, factors affecting and theories on improvement of labor productivity in the building industry. It is noted in the industry lacks generally agreed strategies for improvement of labor productivity. The paper further reviews the paradigms of innovation, benchmarking, and industrialization among the theories aimed at improving the productivity of labor in the building industry.

Title: A Study of Various Factors Affecting Labor Productivity and Methods to Improve It

Author: Mr. A .A. Attar , Prof. A.K. Gupta ,Prof. D.B. Desai

The productivity of labor is particularly important especially in developing countries, where most of the building construction work is still on manual basis. This paper reports on a survey made on project managers and

experienced engineers of building projects in Sangli , Kolhapur & Pune districts, where an increase in productivity is being sought. Respondents were required to rate using their experience how all factors affect productivity with respect to time, cost and quality. The survey was carried out by a questionnaire and responses. The ten most significant factors affecting labor productivity for small, medium and large companies are identified.

Title: Improvement Of Construction Labor Productivity In Chambal Region

Author: Vaishant Gupta, R. Kansal,

In construction industry labor cost 30 to 50% of total cost of project. In Chambal Region (M.P.) construction industry is facing the problems of low productivity. The aim of this study, therefore, is to identify and rank the relative importance of factors perceived to affect labor productivity on construction sites. To achieve this objective, professional such as Project Manager, Project Engineer, Site Engineer, Architect, Assistance Project Manager, Assistance Project Engineer and other who work on the project from management to execution level, were invited to participate in a questionnaire survey.

Title: Factors Influencing Construction Labor Productivity: An Indian Case Study

Author: Anu V. Thomas and J. Sudhakumar,

Construction productivity is of interest to researchers and practitioners because of its impact on the performance of construction projects. Despite various studies to identify factors influencing productivity in other countries, no study has addressed productivity issues in India. This paper reports 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. The top five factors identified as having a significant impact on productivity: (1) timely availability of materials at the worksite, (2) delayed material delivery by the supplier, (3) strikes called by political parties or hartals, (4) frequent revisions of drawings/design, resulting in additional work/rework and (5) timely availability of drawings at the worksite. The findings provide a better understanding of the factors influencing productivity in the Indian context and will aid construction practitioners in making effective plans for productivity improvement.

Title: Construction Labor Productivity and its Improvement

Author: Mr. C. Thiyagu (Student), Mr. M. Dheenadhayalan

The most challenging issue in Construction industry is to improving the production efficiency. Many research have been done in the past, however a deeper understanding is still needed to improve the labor productivity. The main outcome from the literature is that there is no standard definition of productivity.

Title: Analysis Of Factors Affecting Labor Productivity In Construction

Author: Murali K

Worldwide construction industry faces challenges regard to problems associated with productivity and the problem are usually linked with performance of the labor. Productivity assists the construction industries to be competitive, to achieve the objectives and to meet the stakeholder's expectation. The aim of this paper is to identify and rank the relative importance of factors recognized to affect the labor productivity on construction sites. To achieve this objective, various professionals such as Project Manager, Site Engineer, Architect and other who work on the different level, were invited to participate in the online survey. In questionnaire, factors were divided into 9 groups such as (1) workforce; (2) management team; (3) psychological; (4) schedule compression; (5) material/equipment; (6) supervision; (7) safety; (8) miscellaneous; (9) external. After the analysis of questionnaire, top ten factors which affect labor productivity in construction are: (1) Lack of skill and experience of the workers; (2) Late payment; (3) Poor health of the workers; (4) Low amount of pay; (5) Lack of empowerment; (6) Poor work planning; (7) Design changes; (8) Lack of labor safety; (9) Poor condition of equipment/tools; (10) Ignore safety precautions. The results obtained can be used by the professionals for improving the labor productivity in construction.

Title: Importance Of Measurement Of Labor Productivity In Construction

Author: Prachi R. Ghate , Prof. Pravin R. Minde,

Productivity is an important aspect of construction industry that may be used as an index for efficiency of production. Efficient management of construction resources can lead to higher productivity which can help to achieve cost and time saving. Construction is labor oriented industry. It heavily relies on the skills of its workforce. The labor is industry's most valuable asset. It is important to improve efficiency of production by improving productivity of labor. Decreasing productivity of project has always been major concern for construction Industry. Aim of this project is to study the importance of measurement of labor productivity in construction industry around Mumbai sector after finding the factors affecting labor productivity. Factors affecting labor productivity were analyzed using RII method. Measurement of labor productivity is done using work study method. RII method revealed top ten ranked factors which affect labor productivity. The data collection is done by work study method shows skilled labor as highly important factor affecting labor productivity. From the analysis of data collected it is observed that measurement of labor productivity is helpful in saving the time of the project as well as cost of project without hampering the quality of work.

III. PROBLEM STATEMENT

- Labour productivity rates are used as indicators of the construction time performance. They are used in planning and scheduling of construction, controlling of the cost and worker performance, estimating and accounting.
- Changes in labour productivity shows whether output is increasing or decreasing per worker and is often used in wage settlements to compensate workers for productivity improvements. Growth in labour productivity is the key to higher living standards as a country can sustain real wage increases without losing competitiveness, only if labour productivity grows.
- Labour productivity relates output to the number of workers employed. It does not measure the specific contribution of labour alone. Rather, it reflects the joint effects of many factors, including new technology, capital investment, health and skills of workers and the use of more efficient management and production practices.
- If a company wishes to reduce risk, increase profits, or gain market share, there is direct need within the firm to have accuracy data on and use of labor productivity.
- The most challenging issue in Construction industry is labour productivity. Labour productivity directly affects on the construction performance. If a company wishes to reduce risk, increase profits, or gain market share, there is direct need within the firm to have accuracy data on and use of labor productivity.

IV. OBJECTIVES

- Identify Labour productivity in the construction industry.
- Analyze and calculate the Relative Important of those factors affecting labour productivity
- Effects of building material on the Labour Productivity.
- Time and Cost Management.
- To statistically analyze the factors affecting labour productivity.
- To make recommendations to improve labour productivity in construction.

V. INTERPRETATION AND USE OF THE INDICATOR

The basic ideas of the research is to study various factors affecting labor productivity on construction and recommendation methods for it. The Economic growth in a country can be ascribed either to increased employment or to more effective work by those who are employed. The latter effect can be described through statistics on labour productivity. Labour productivity therefore is a key measure of economic performance. The

Understanding of the driving forces behind it, in particular the accumulation of machinery and equipment, improvements in organization as well as physical and institutional infrastructures, improved health and skills of workers (“human capital”) and the generation of new technology, is important for formulating policies to support economic growth. Such policies may focus on regulations on industries and trade, institutional innovations, government investment programmers in infrastructure as well as human capital, technology or any combination of these.

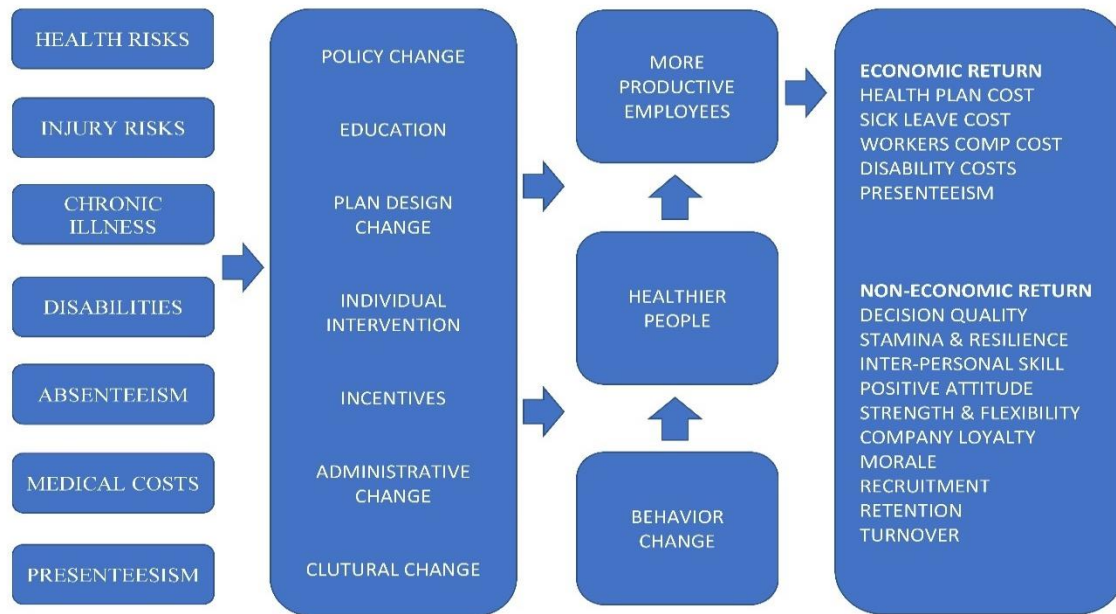
Labour productivity estimates can support the formulation of labour market policies and monitor their effects. For example, high labour productivity is often associated with high levels or particular types of human capital indicating priorities for specific education and training policies. Likewise, trends in productivity estimates can be used to understand the effects of wage settlements on rates of inflation or to ensure that such settlements will compensate workers for (part of) realized productivity improvements. Finally, productivity measures can contribute to the understanding of how labour market performance affects living standards. When the intensity of labour utilization (the average number of annual working hours per head of the population) is low, the creation of employment opportunities is an important means of raising per capita income in addition to productivity growth.

VI. HEALTH AND PRODUCTIVITY MANAGEMENT

The Constitution of India provide detailed provisions for the rights of the citizens and also lays down the Directive Principles of State Policy which set an aim to which the activities of the state are to be guided. On the basis of these Directive Principles as well as international instruments, Government is committed to regulate all economic activities for management of safety and health risks at workplaces and to provide measures so as to ensure safe and healthy working conditions for every working man and woman in the nation. Government recognizes that safety and health of workers has a positive impact on productivity and economic and social development. Prevention is an integral part of economic activities as high safety and health standard at work is as important as good business performance for new as well as existing industries.

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important as good business performance for new as well as existing industries.



VII. METHOD OF COMPUTATION OF LABOR PRODUCTIVITY

The indicator on labor productivity is calculated as follows:

$$\text{Labour productivity} = \frac{\text{GDP at constant prices}}{\text{Number of employed persons}}$$

Information on output, measured as GDP, is best derived from a country's national accounts. Labour force surveys are typically the preferred source of information on employment (to use in the denominator of the labour productivity indicator). Such surveys can be designed to cover virtually the entire non-institutional population of a given country, all branches of economic activity, all sectors of the economy and all categories of workers, including the self-employed, contributing family workers, casual workers and multiple jobholders. In addition, such surveys generally provide an opportunity for the simultaneous measurement of the employed, the unemployed and persons outside the labour force (and thus, the working-age population) in a coherent framework.

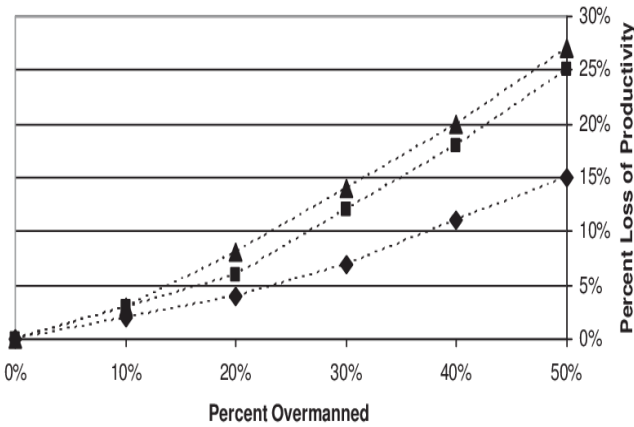
Other types of household surveys and population censuses could also be used as sources of employment. The information obtained from such sources may however be less reliable since they do not typically allow for detailed probing on the labour market activities of the respondents.

VIII. PRODUCTIVITY AND LABOUR

Factors Affecting Labor Productivity are Overtime, Morale and Attitude, Fatigue, Stacking of Trades, Joint Occupancy, Beneficial Occupancy, Concurrent Operations, Shorter Daylight Hours, Weather and Season Changes, Rain, Working in Operating Area, Over-manning, Shift Work, Hazardous Work Area, Learning Curve. On any construction site the contractor's financial gain is dependent, amongst other things, on completion of the work in good time and at the least cost, and the productivity of labour has a direct bearing on this being achieved. The factors affecting the performance of labour generally fall into three categories.

- The human capacity for work
- The competence of site management

- The motivation of the workers.



IX. SITE DATA COLLECTION

Project Name: Sahyadri camp
 Construction Type: RCC Frame Structure.
 No. of Floor: G+6 Floor
 Total Area of Building: 28268 Sq. Ft.
 Plinth level: 0.6 m
 Walls: 230 mm thick brick masonry walls only at periphery.
 Steel: HYSD reinforcement of grade Fe 415.

Respected Faculty	On site problems	Solution
Mr. Sachin Patil Jr. Site Engineer	Water and electric supply to labour camp	Management should fix a particular time period for this. Such as Water for 1:30 hr. day after day and electricity for night only.
Mr. Anand Bhosale Jr. Site Engineer	low wages of labour affect efficiency	That could lead to disputes between contractor and labour which prevent by providing as per current market rate.
Mr. Vinayak Sable Jr. Site Engineer	Disputes on less no of labour on site	That should be consider for daily work on site for the given time period to complete on time without expanding.
Mr. Satish Rathod Sr. Civil Engineer	Work in rainy season as well as summer causes illness to the labour community	Provide adequate staff on site issued by contractors which might be the great prevention to disputes and health of workers.
Mr. Pawan Nimse Jr. Site Engineer	Adequate land for labour camp	The responsibility of labour camp is toward the management which gives them the rights to provide the adequate land for build the labour camp besides the working site.
Mr. Sachin Patil Jr. Civil Engineer	Permit to work in night	They should put a target for particular time period.
Mr. Anand Bhosale Jr. Site Engineer	low wages of labour affect efficiency	That could lead to disputes between contractor and labour which prevent by providing as per current market rate.

X. CONCLUSIONS

There are many factors that affect labour productivity and their effects vary from one industry to another. There is need to quantify the effects that those factors have on labour productivity so that remedial measures are sought. Although a few have been explored in specific industries, there are still many gaps to be filled in this area. The survey results are subjected to analysis, and the ranking of factors is calculated using the Relative Important Index.

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