

Regression Analysis of Construction Site For Labour Productivity

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Abstract- *With the continuous decline in profit margins and increased competition in construction projects, construction contractors are finding ways of eliminating waste and increasing profits. Although numerous approaches have been developed to improve efficiency and effectiveness of construction process, implementing statistical techniques offer the promise to minimize, if not eliminate non value-adding work.*

The construction industry is one of the largest industries in any economy. It makes a significant contribution to the national economy and provides employment to large number of people. Time and motion study (also referred to as motion and time study, the terms are used interchangeably) is the scientific study of the conservation of human resources in the search for the most efficient method of doing a task.

Time and motion study is carried out to asses' human effectiveness by improved planning and sound incentive schemes to its employees. It is employed in the assessment of the human efforts in various aspects to lead systematically to many factors which ultimately affect efficiency and economy of the situation under study in realizing the objectives of bringing about improvements.

The purpose of this work is to highlight the benefits of time and motion study employed in construction sector. Time and motion study has been employed to measure the productivity of the operations.

It is expected that employing lean concepts to construction will help in increasing productivity and reduce risks. Statistical analysis will help in life cycle of a construction project right from concept to completion and finally in operation and maintenance of the process.

In essence, the focus is to apply time and motion study and statistical analysis to various construction process to the observation data sets generated for various construction process on site and determine the productivity and establish regression model using statistical analysis

Keywords- Labour productivity, time motion, work study, regression analysis

I. INTRODUCTION

The number and intensity of domestic and international terrorist According to Marvin E. Mundel [1] Time and motion study (also referred to as motion and time study, the terms are used interchangeably) is the scientific study of the conservation of human resources in the search for the most efficient method of doing a task. A fascination with the word "efficiency" began in the late 19th and early 20th centuries when it was considered one of the most important concepts.

This approach has been successfully applied to factories, hospitals, department stores, housework, banks, cafeteria work, libraries, music, and to many other human activities. However, the goal of a time and motion study is not simply efficiency. These studies are done to create a baseline that can be used in the future when evaluating procedural, equipment, or personnel changes. The goal can be to understand the skills required to enable individuals to perform the work and, thus, to provide the correct training. Time study is a direct and continuous observation of task, using a timekeeping device (e.g. decimal stopwatch, computer-assisted electronic stopwatch, and videotape camera) to record time taken to accomplish a task and it is often used when there are repetitive work cycles of short to long duration, wide variety of dissimilar work is performed or process control elements constitute a part of the cycle. In contrast to, and motivated by Taylor's study method, the Gilberts proposed a technical language allowing for analysis of labor process in a scientific context known as motion study

II. LITERATURE REVIEW

In construction projects, there are three basic planning elements: time, cost, and quality. These concepts are in a close relationship with each other. Labour productivity is also a key concept of construction planning efforts and has a direct interrelationship with the triple constraint mentioned above. (SerdarUlubeyli, AynurKazaz, BayramEr., 2014). Lower labour performance is strongly related to the presence of

change of work, disruptions and rework. On average 30% loss of efficiency occurs when changes are done. The most significant types of disruptions are lack of materials and information and having to perform the work out of sequence. These disruptions result in daily loss of efficiency in range of 25% - 50%. (H. Randolph Thomas & Carmen I. Napolitan). Labour productivity is also one of the performance indicators to assess the success of the construction project. Because construction is a labour intensive industry, it can be argued that the work force is the dominant productive resource. Thus construction productivity is primarily dependent on human effort and performance. Labour productivity is important index because of concentration of labour needed to complete specific work. (Wen yi & Albert P.C.Chan, 2014). Productivity is generally ratio of output to input. In form of equation it can be shown as follows:

$$\text{Productivity} = \text{Output} \div \text{Input}$$

$$= \text{Total output} \div \text{Total work hour.}$$

III. AIM OF THE PRESENT WORK

To analyses labour productivity for residential building site

IV. OBJECTIVES: LABOUR PRODUCTIVITY AND USES:-

- To identify problem in the production work process for construction industry
- To improve the work process in terms of production time and to identify the parameters to increase productivity
- To analyses the present method of doing job systematically.
- To measure the work content of a job by measuring the time required to do the job for a worker. To do work sampling for various construction activities.
- To find correlation various human activities related to concreting and establish regression equation between them for concreting as well as finishing work

V. PROBLEM STATEMENT:

- Higher productivity in organization leads to national prosperity and better standard of living for the whole community. Improving productivity through time and motion studies is used in construction sector and allied industries. Work study consists of 2 aspects, method study and measurement which when applied effectively results

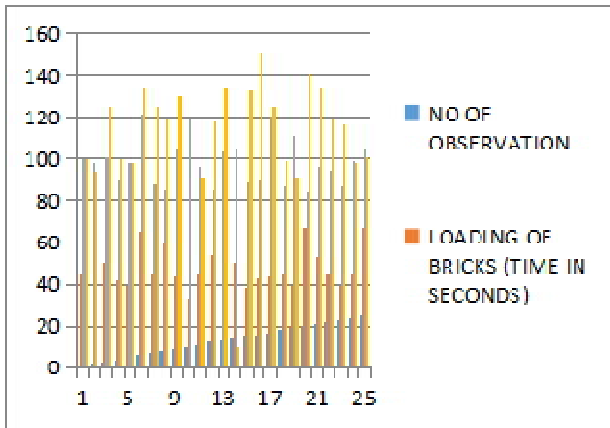
to higher productivity. The main problem of constructions productivity depends upon how labors are utilized. Labour productivity can be higher or lower depending on factors like availability of work load, material, working tools, availability of power, work efficiency, level of motivation, level of training of working condition (comfortable or poor) etc.

- For above objective 5 days observation are recorded from site stargaze, kolte patil,pune.

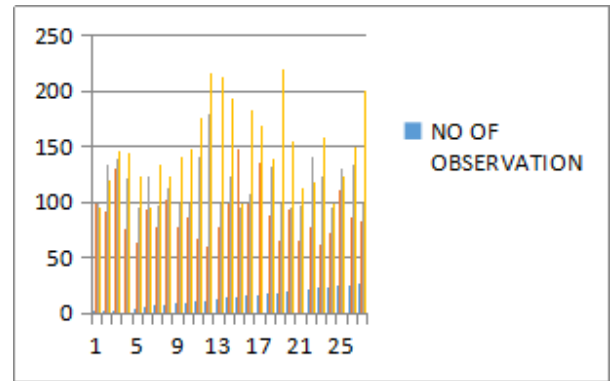
VI. SITE DETAILS

- Name of site : stargaze
- Location of site : Bavdhan, West Pune zone, Pune, Maharashtra 411021
- A P+14 proposed building of 8 flats and 7 towers is taken for case study location is
- Design Team : jw consultancy
- Owner and Developer :kolte patil
- Architect :manoj tatuskar and vikas acharikar
- Cost of 1 flat: 64.4 Lakhs Onwards
- Cost of project:52 cr.
- Structural Engineer : jw consultant
- Builder : kolte patil
- Area : 1.91 acre
- Present condition of the project : under construction
- Starting date:14/04/2014

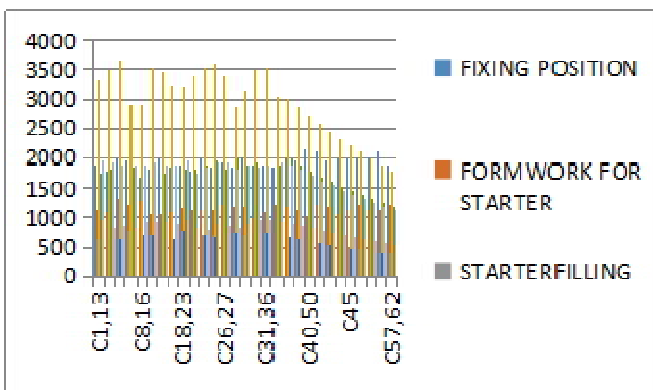
VII. DATA ANALYSIS



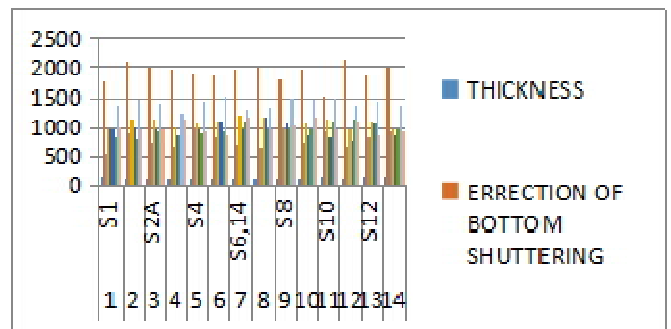
Graph: Relation between components of material handling of bricks



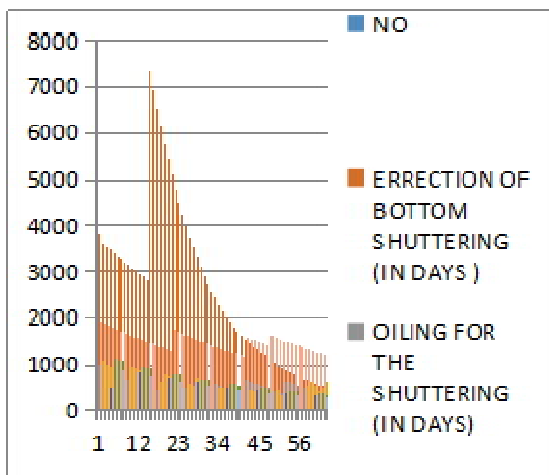
Graph: Relation between components of material handling of sand



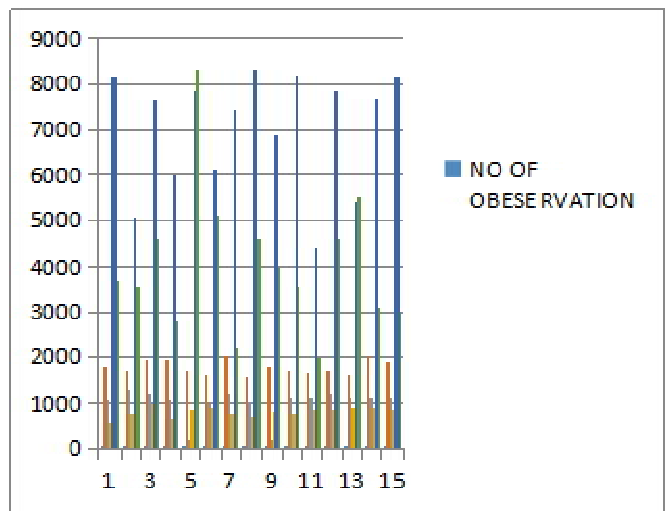
Graph: Relation between components of material handling of column



Graph: Relation between components of material handling of slab



Graph: Relation between components of material handling of beam



Graph: Relation between components of material handling of plastering

VLSUMMA RY AND DISCUSSION

In this study time motion studies are analyzed for labour productivity for 5 days total 170 sampling done for plastering, concreting (for beam ,column ,slab) and following conclusions are made

1. Expected productivity is 90% but it is observed up to 80% in sampling for 5 days for 170 sampling
2. The delays observed on site is mainly due to change in activity for same labour, some labours observed with insufficient skill for handling the material and shifting the material.
3. From work sampling it can be concluded that for sub activities such as handling material, shifting material machineries with proper operator should be available
4. It is also inferred that if all sub-activities are efficiently performed and the average time requires is reduced to minimum time required around 20% -30 % of time saving can be achieved

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