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Application of Work Study in Construction Project

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Abstract - *The aim of this paper is to present an overview on a new methodology for efficient improvement in productivity by using various Work Study Methods. This study gives better solutions & concepts for implementing Work Study Methods for a construction project. The study focuses on crucial area to increase productivity with use of work study technique mixed with modern technology. Management needs to implement its application not just from angle of production improvement or resource utilization, but also helps to understand psychology of different workers to give the best accepting solutions for productivity Improvement and a part during implementation to make the study really worth its time and effort. Time and motion study is carried out to assess human effectiveness by improved planning to its employees. It is employed in the assessment of the human efforts in various aspects to lead systematically to many factors which ultimately affects the indirect cost of project and economy of the situation under study in realizing the objectives of bringing about* improvements in productivity.

Key Words: Productivity Improvement, Time Study, Motion Study, Work Study Methods.

1. INTRODUCTION

Productivity improvement of worker is to do the right things better and make it a part of continuous process. Therefore it is important to adopt effective productivity improvement method so as to ensure individuals and organization's growth in productivity and to ensure minimum indirect cost Time and motion study is the scientific study of the conservation of human resources in the search for the most efficient method of doing a task. Contractors will organize labour, tools, materials and other logistics in such a way as to maximize their profits so work study helps to minimize this cost by measuring amount of work is done by comparing it with standard time.

In the case of most of the civil works, this is a simple matter as they consist of a series of well-defined tasks which are often carried out by skilled labours in a sequential manner or as interrelated parallel activities .For example, the construction of a building can be broken down in to various component activities, namely, site clearance, earth work for foundation, construction of foundation, basement, earth filling of basement, construction of walls, fixing door and window frames, lintel casting, roof casting, plastering, flooring etc. Each of the above activity is done in a sequential manner by a team of able bodied workers having special skills and tools with distinctly measurable outputs under the close supervision of the contractor.

To minimize the contingencies in project, work study is carried out and hence indirect cost of project is decreases. Work measurement is the application of techniques designed to establish the time for a qualified worker to carry out a task at defined rate of working. Work measurement as name suggests provides management with a means of measuring the time taken in performance of an operator or series of operations in such a way that the ineffective time is shown up and can be separated from effective time. By comparing observed time with standard time we can calculate wastages and this helps us to reduce indirect cost as well as total time required for project.

2. WORK STUDY

Work study is an important management tool to achieve higher productivity. It is related to human work, method of doing work and standard of performance. The survival of any organization is dependent on use of latest technology and efficient methods of production. To improve efficiency of production it needs effective utilization of plant, equipment and labor. This can be achieved by using work study which studies method and evaluate the performance. It divides work into smaller elements, studies it, and rearranges it to get same or greater efficiency.

Application of work study:

(i) To analyze the work in order to achieve improving productivity of the system.

Advantages:

(1) It is direct means of improving productivity.

(2) It results in uniform and improved production flow.

(3) It reduces the manufacturing cost.

Techniques of Work Study and their relationship with productivity Improvement:

Method study and work measurement are closely linked to each other as both are associated with work study. Method study reduces the content of job and work measurement investigates and reduces ineffective time associated with job with establishment of standard time. This results into efficient working operations leading to increase in productivity of that process.

2.1 Method study

Method study is the systematic recording and critical examination of existing and proposed ways of doing work. It is concerned with the reduction of work content of a job or operation.

2.1.1. Objectives of method study:

(1) Better design of plant equipment and buildings.

(2) Less fatigue or workers by avoiding unnecessary movements of manpower.

(3) Better working conditions and environment for workers/employees.

2.1.2. Procedure for method study:-

There are six steps in performing a perfect method study. They are

I. Select the work to be studied.
II. Record all the relevant facts about the present method by direct observation.
III. Examine the facts and in ordered sequence, using the techniques best suited to their purpose.
IV. Develop the most practical, economic and effective method, having due regard to all contingent circumstances.
V. Define the new method so that it can always be identified.
VI. Install that method as standard practice.
VII. Maintain that standard practice by regular routine checks

2.2 work measurement:

Work Measurement is the application of techniques designed to establish the time for a qualified worker to carry out a specified job at defined level of performance. It is concerned with the investigation and reduction of any ineffective time associated with it.

2.2.1. Objectives of work measurement:

Objectives of work measurement are as follows:
(1) When two alternative methods which seem equally advantageous, one which requires less time for completion of the job (i.e. faster) can be established.

(2) The man power required for a job or new plant can be determined on the basis of accurate knowledge of the amount of work that has to be done so it helps in manpower economy.

(3) Work measurement data provides reliable basis to decide equipment.

2.2.2. Basic procedure of Work Measurement

The basic procedure needs to be understood to apply modified technique of work measurement. The basic procedure is divided into 6 steps namely selection, recording, examining, measuring, compiling and precisely defining methods. Full steps need to be performed only when standard time is to be calculated.

3.CALCULATIONS AND RESULTS :

3.1. Standard Time-The standard time for the particular task is the sum of the standard times for all the elements of which it is made up. It is the total time in which a job should be completed at standard performance. Standard Time is unit value for the accomplishment of work task as determined by proper application of appropriate work measurement technique.

$$Standard\ Time = Basic\ Time + Allowance$$

2. Allowances- Allowance is the amount of time added to the normal time to provide for personal delays, fatigue of the worker. Allowances when added to the normal time, it results in standard time. The fundamental purpose of allowances is to add enough time to the normal time to enable the average worker to meet the standard when performing at a normal pace.

Total Allowance allocated as follows

1. Personal allowance -5%
2. Safety Protective dress – 10%

3.2. Rating System- When collecting the data we observe carefully the performance of the worker during the entire course of time. Performance rating or Rating is a technique for equitably calculating the time required to perform a task by the normal operator after the been recorded. The rating factor is used to convert observed time into basic time. For

this work measurement analysis work we used the0-100 standard rating scale has been adopted as the

British Standard. In the 0-100 scale, 0 represents zero activity and 100 the normal rate of working of the motivated qualified worker that is standard rate. observed value of the operation under study have

Table no 1 : 0-100 Standard Rating Scale

0	No Activity.
50	Very Slow – No Interest in Job.
75	Steady, Deliberate unhurried performance of the worker.
100(standard Rating)	Brisk, businesslike performance with quality and accuracy.
125	Very fast with degree of assurance dexterity and coordination of moment.
150	Exceptionally fast, requires intense effort and concentrations, cannot be kept long periods.

Referring to the 0-100 Standard Rating Scale,
100 = represents standard performance

$$BasicTime = ObservedTime \times Rating\ in\ percent$$

Sample Calculation of standard Time,

WBS activities	Start Time	End Time	Observed time
Brickwork	00:00:10	1:15:43	1:15:33

Time given in (HH:MM:SS) format

Rating given for this activity is 100 on rating scale So basic Time =01:15:33

After Addition of Allowances to Basic Time we get the Standard time for the particular activity of the task. The Standard Time for the particular task is the sum of the standard times for all the activities of which it is made up.

For this calculation of standard time we only take personal allowance and S.P.D.A. allowance from given allowances.

Table -2: AAC Brick Calculation

Sr no.	Task	Basic time	Standard time		Standard time
			P.A	S.P.D.F	
1.	Mortar mixing	00:01:00	5%	10%	00:01:12
2	Chemical mixing	00:10:55	5%	10%	00:12:13
3	Leveling	00:03:55	5%	10%	00:04:58
4	Brick placing	00:29:82	5%	10%	00:35:00
5	Cutting of brick	00:03:08	5%	10%	00:04:37
6	Filling of joints	00:07:09	5%	10%	00:08:26

3. CONCLUSIONS

-Increase in time causes increase in indirect cost.
-From these studies, we conclude that we can optimize the time for any tasks for construction and save the construction cost by using work study techniques.

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