

Research Paper

FACTORS AFFECTING LABOR PRODUCTIVITY ON CONSTRUCTION PROJECT

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Construction projects suffer from various problems and complex factors which affect each phase of the project life cycle. Construction labor productivity has become a big problem in construction industry in most countries, hence it is necessary to see how the human factors will affect the labor productivity in construction projects. Labor productivity is one of the least studied areas within the construction industry. Productivity improvements achieve higher cost savings with minimal investment. Due to the fact that profit margins are small on construction projects, cost savings associated with productivity are crucial to becoming a successful contractor. In construction, the output is usually expressed in weight, length, or volume, and the input resource is usually in cost of labor or man-hours. There are many standards available in the construction industry for contractors as reference values for purposes of construction cost estimation. These standards may vary in values but most are similar in principle. The paper attempts to highlight some of the methods to study Labor productivity, its importance and most factors which affect labor productivity on construction project.

Keywords: Labor productivity, Importance, Factors, Construction

INTRODUCTION

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.

CONCEPT OF LABOR PRODUCTIVITY

What Is Labor Productivity?

The term “productivity” expresses the relationship between outputs and inputs.

The measure of the rate at which work is

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performed is called “productivity”. It is a ratio of production output to what is required to produce it. The measure of productivity is defined as a total output per one unit of a total input. Labor productivity usually relates manpower in terms of labor cost to the quantity of outputs produced.

What Is the Importance of Labor Productivity?

Productivity has a great importance in construction. Labor productivity constitutes a significant part of production input for construction projects. In the construction industry, many external and internal factors are never constant and are difficult to anticipate. This factor leads to a continuous variation in labor productivity. It is necessary to make sure that a reduction in productivity does not affect the plan and schedule of the work and does not cause delays. The consequences of these delays could result in serious money losses when any of those external and internal factors become out of control in any construction project.

Productivity is the outcome of several interrelated factors. There are many factors that affect the productivity of labor in construction. Discussed below are various factors affecting labor productivity:

1. Time
2. Schedule Compression
3. Type of Project
4. Safety
5. Quality
6. Managerial Factors
7. Manpower Group

8. Motivation
9. Supervision
10. Material/Tools
11. Project Management Factors
12. Natural Factors
13. External Factors

TIME

There are many tasks which cause a loss of productivity. Past study shows productivity decreases with working overtime. The most frequently stated reasons are fatigue; increased absenteeism; decreased morale; reduced supervision effectiveness; poor workmanship, resulting in higher rework; increased accidents. Working overtime may initially result in increased output, but continuing overtime may lead to increased costs and reduced productivity, time used by a construction laborer on productive activities averages about 30% of the total time available.

Scheduling of extended work days or weeks exceeding a standard eight-hour work day or 40-hour work week, lowers work output and efficiency through physical fatigue and poor mental attitude.

Schedule Compression

When there are delays in a project, compression of the overall time frame for a later activity are often the way to compensate interruptions and to complete the assigned task on schedule. From a professional scheduling perspective, schedule compression may be possible without accelerating individual work activities by utilizing float in the project's overall schedule. However, on many projects, schedules are not

fully resource loaded. As a consequence, a properly updated schedule reflecting the delays may show the project finishing on time without shortening individual activities. Schedule compression may result in employing extra labors for the desired task by the contractor because of shortening of the overall duration, allowing the contractor to complete the total remaining work. Schedule compression, when linked with overtime, often results in major productivity losses due to shortages of material tools or equipment to support the extra labor, resulting in difficulty in planning and coordinating the task, and unavailability of experienced labor.

Types of Project

To accomplish substantial productivity, every member of a crew requires adequate space to perform a task without being affected with/by the other crew members. When more labors are allotted to perform a particular task, in a fixed amount of space, it is probable that interference may occur, thus decreasing productivity. Additionally, when multiple trades are assigned to work in the same area, the probability of interference rises and productivity may be reduced. Interference among the various crews and laborers is due to mismanagement on construction sites.

The types of activities and construction methods also influence labor productivity.

Safety

Accidents have high impacts on labor productivity. Various types of accidents occur at the site. An accident causing death will be resulting in a total work stoppage for a number of days. An accident that causes an injured person to be hospitalized results in decrease

in productivity of the crew for which the injured employee worked. Even a small accident resulting from nails and steel wires can stop work. Even insufficient lighting shows decreased productivity because sufficient lighting is required to work efficiently and because insufficient lighting has negative effects. Employing a safety officer helps labors to recognize the required safety regulations and to follow them, which can reduce the number of accidents, thus increasing productivity.

Quality

Inefficiency of equipment and poor quality of the raw material are factors which cause low productivity. The productivity rate of inefficient equipment is low. Old equipment is subject to a great number of breakdowns, and it takes a long time for the laborers to complete the work, thus reducing productivity. Poor-quality material used for work is the other factor because poor materials generally lead to unsatisfactory work and can be rejected by supervisors, thus reducing the productivity.

Managerial Factors

Managers' skill and attitudes have a crucial bearing on productivity. In many organizations, productivity is low even though the latest technology and trained manpower are made available. Low productivity is because of inefficient and indifferent management. Experienced and committed managers can obtain surprising results from average people. Employees' job performance depends on their ability and willingness to work. Management is the catalyst to create both. Advanced technology requires knowledgeable laborers who, in turn, work productively under

professionally qualified managers. It is only through sound management that optimum utilization of human and technical resources can be secured.

Manpower Group

Construction Literature shows that a lack of labor experience is the factor which negatively affects labor productivity and proves that, to achieve good productivity, labor plays a significant role. Contractors should have sufficiently skilled laborers employed to be productive. If skilled labor is unavailable and a contractor is required to complete specific task with less-skilled labor, it is possible that productivity will be affected. The absence of any crew member may impact the crew's production rate because workers will, typically, be unable to accomplish the same production rate with fewer resources and with different crew members. Misunderstanding among laborers creates disagreements about responsibilities and the work bounds of each laborer, which leads to a lot of work mistakes and decreases labor productivity. Lack of compensation and increased laborer age negatively affect labor productivity because labor speed, agility, and strength decline over time and reduce productivity.

Motivation

Motivation is one of the important factor affecting construction labor productivity. Motivation can best be accomplished when workers' personal ambitions are similar to those of the company. Factors such as payment delays, a lack of a financial motivation system, non-provision of proper transportation, and a lack of training sessions are influenced directly on workers' performance.

In the long run, the most direct route by which labor productivity affects living standards is through real wages, that is, wages adjusted for the cost of living. Economic theory holds that at the aggregate level the growth of real wages is determined by labor productivity growth, a relationship mediated by the labour's share of output and labour's terms of trade (the price of output produced by workers relative to the cost of living).

Supervision

Generally, projects come across some design, drawings and specification changes during construction. If drawings or specifications are with errors and unclear, productivity is expected to decrease since laborers in the field are uncertain about what needs to be done. As a result, task may be delayed, or have to be completely stopped and postponed until clear instruction are received. Work inspection by the supervisor is an essential process to proceed. For example, the contractor cannot cast concrete before an inspection of the formwork and steel work, thus affecting labor productivity . With non-completion of the required work according to the specifications and drawings, supervisors may ask for the rework of a specific task. Supervisors' absenteeism stops the work totally for activities that require their attendance, such as casting concrete and backfilling, further delaying inspection of the completed work which, in turn, leads to delays in starting new work.

Material/Tools

Material management is one of the most important factors in construction industry. Productivity can be affected if required materials, tools, or construction equipment for

the specific task are not available at the correct location and time. Selection of the appropriate type and size of construction equipment often affects the required amount of time it is, therefore, essential for site managers to be familiar with the characteristics of the major types of equipment most commonly used in construction. In order to increase job-site productivity, it is beneficial to select equipment with the proper characteristics and a size most suitable for the work conditions at a construction site. Laborers require a minimum number of tools and equipment to work effectively to complete the assigned task. If the improper tools or equipment is provided, productivity may be affected (The size of the construction site and the material storage location has a significant impact on productivity because laborers require extra time to move required materials from inappropriate storage locations, thus resulting in productivity loss).

Project Management Factors

Improper scheduling of work, shortage of critical construction equipment or labor, may result in loss of productivity. Improper planning of project-initiation procedures generally lead to lost labor productivity. Additionally, poor site layout can contribute to a loss of productivity. Laborers have to walk or drive a long way to lunch rooms, rest areas, washrooms, entrances, and exits, affecting overall productivity.

Natural Factors

Various natural factors affecting labor productivity collected from previous study are weather conditions of the job-site and geographical conditions. Others factors such as fuel, water, and minerals also affect

productivity to certain extent. Productivity is found to be highly affected if weather conditions are too be extreme (too cold, heavy rainfall, too hot).

External Factors

Weather conditions are significant factor to consider for completion of any construction project. Adverse winter, winds and rains, reduce productivity, particularly for external work such as formwork, T-shape work, concrete casting, external plastering, external painting, and external tiling. Adverse weather sometimes stops the work totally.

CONCLUSION

In today's world, the construction industry is affected by many factors which cause great losses to the economy of many countries. One important factor which affects the construction industry is "Labor Productivity" and this factor in turn influenced by a range of factors leads to significant losses.

Study and knowledge of construction productivity are very important because they cause losses to the governing agencies and also influence the economics of the construction industry. Prior knowledge of labor productivity during construction can save money and time. Investments for these projects are very high and because of the complexity in construction, various factors can highly affect overall productivity, thus the project can end up adding even more time and money in order to be completed.

This paper is intended to explain the causes of probable factors affecting labor productivity in building construction. For example: taking into account the conditions of the workers and

improving their skills will help increase labor productivity at any construction project and the same thing will happen if the project partners (Client, Contractor and Consultant) will make more efforts to enhance all the other factors that will help improve labor productivity which will result in saving more money and time.

The basic idea of the paper is to study various factors affecting labor productivity on construction, to focus more on the factors mentioned in this paper, to get the highest standards of economic benefit and enhance the income of workers in the construction industry, especially construction companies and the sector in general.

In additional, this paper focused on the so many references as (mentioned) to obtain full ideas based on that references in several types of projects in order to make as survey through these references to see how the importance various factors are impacted on the labor productivity in construction projects and all these are studies from the mentioned references had shown the various factors in different countries.

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