

# Effect of Labour Productivity on Project Performance

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**ABSTRACT:** *Labour productivity is one of the rarely studied areas within our construction world. It is necessary to identify the factors affecting or contributing to the delay of project completion and reduce project cost overrun which are directly associated with labour performance. Field personnel play a significant role in reducing the amount of direct cost of waste. By conducting proper onsite training programs for their construction personnel, contractors can reduce direct cost of waste up to 90%, for that, factors affecting onsite productivity and ways to improve productivity are discussed here.*

## INTRODUCTION

Improving productivity of the construction workforce is crucial to the success of any construction firm as labour costs comprise 30 to 50 % of the overall project cost. Efforts to produce better performance and increasing productivity in construction require an understanding of the various indicators of productivity as a path to understand the performance of the project. Besides that, efforts to improve productivity in construction industry can essentially be done by reducing project cost overrun and also project completion delay. Identification and evaluation of factors affecting labour construction productivity have become critical issues facing project managers for a long time. Understanding critical factors affecting productivity, both positive and negative can be used to prepare a strategy to reduce inefficiencies and to improve the effectiveness of project performance. Good project management in construction must vigorously pursue the efficient utilization of labour, material and equipment. Improvement of labour productivity should be a major and continual concern of those who are responsible for cost control of constructed facilities. With a strong technological base, there is no reason why the construction industry cannot catch up and reassert itself to meet competition wherever it may be. Individual design and/or construction firms must explore new ways to improve productivity for the future. Of course, operational planning for construction projects is still important, but what is needed the most is strategic planning to user in a revolution which can improve productivity. Strategic planners should look at opportunities and ask whether there are potential options along which new goals may be sought on the basis of existing resources. Ultimately, decisions for action, not plans, will dictate future outcomes.

## CONCEPT OF PRODUCTIVITY

Productivity denotes the efficiency with which the various inputs are converted into goods and services. However it is a multi-faceted concept and no single definition can describe it. Technically it signifies the ratio between input and output. Productivity is said to be high when more output is delivered with same input or same output is obtained with less input. It is well understood as the ratio of Input to Output with respect to given resources. Productivity is an attitude of mind which is intolerant of waste of any kind and in any form. Productivity does not refer merely to a work system but to the development of right attitude and strong concern for efficient working.

### 1. Definition of productivity

European productivity agency defined productivity as "a state of mind, an attitude that seeks continuous improvement of what exist". It is a conviction that one can do better today than yesterday and that tomorrow will be better than today"

Productivity = Output / Input

Output measure how much we produce, productivity measure how much we produce per unit input. Higher productivity leads to lower cost and shorter construction program.

### 2. Labour Productivity-

Labour productivity has been defined in literature as the ratio of the output quantities to the input work hours, or as ratio of the work hours to the quantity (also called the unit rate) of work.

## FACTORS AFFECTING JOB SITE PRODUCTIVITY

Job-site productivity is influenced by many factors which can be characterized either as labour characteristics, project work conditions or as non-productive activities.

### 1. Labour Characteristics

Performance analysis is a common tool for assessing worker quality and contribution. Factors that might be evaluated include: (Productivity improvement in construction by Clarkson Hill Oglesby, Gregory A. Howell, McGraw-Hill, 1989)

Quality of Work	Caliber of work produced or accomplished.
Job Knowledge	Demonstrated knowledge of requirements, methods, techniques and skills involved in doing the job and in applying these to Increase productivity.
Related Work Knowledge	knowledge of effects of work upon other areas and knowledge of related areas which have influence on assigned work
Dependability	Reliability in assuming and carrying out commitments and Obligations.
Analytical Ability	Effectiveness in thinking through a problem and reaching Sound conclusions.
Communicative Ability	Effectiveness in using oral and written communications and in keeping subordinates, associates, superiors and Others adequately informed.
Ability to Work Under Pressure	Ability to meet tight deadlines and adapt to changes.
Leadership	Ability to develop in others the willingness and desire to work towards common objectives.

### 2. Project Work Conditions

Project size and complexity.	For very large construction projects, the labor productivity index tends to decrease as the project size and/or complexity increase because of logistic problems and the "learning "that the work force must undergo before adjusting to the new environment.
Job-site accessibility	Often may reduce the labor productivity index if the workers must perform their jobs in round about ways, such as avoiding traffic in repaving the highway surface or maintaining the operation of a plant during renovation
Labour availability.	Shortage of local labor will force the contractor to bring in non-local labor or schedule overtime work or both. In either case, the labor efficiency will be reduced in addition to Incurring additional expenses.
Equipment utilization.	The degree of equipment utilization and mechanization of a construction Project clearly will have direct bearing on job-site labor productivity.
Contractual agreements.	The contractual agreements play an important role in the utilization of union or non-union labor, the use of subcontractors
Local climate.	Since on-site construction essentially involves outdoor activities, the local Climate will influence the efficiency of workers directly.

### 3 Non Productive Activity

- a. Rework for correcting unsatisfactory work
- b. Temporary work stoppage due to inclement weather or material shortage
- c. Time off for union activities
- d. Absentee time, including late start and early quits
- e. Non-working holidays
- f. Strikes

## **WAYS TO IMPROVE PRODUCTIVITY AT CONSTRUCTION SITE**

### 1. Analyze the entire construction process in detail.

A company should analyze each and every phase of its process to identify what kind of problem may occur for productivity. Company can analyze the different type of projects done and compares productive and non-productive time at site. As already known, labour cost comprises 30 to 50 % of overall cost. Company needs to analyze which type of labour is required for particular project so that productivity can be achieved.

### 2. Proper planning.

Proper planning is needed to develop exact requirement of materials, equipments & labour for appropriate jobs in the project for successful completion. It is necessary to develop a realistic benchmark for labour to achieve targets as per schedule.

### 3. Communication at each level increases productivity

Communication is the most important bond between each level of working hand. It should be two way but unfortunately in most of the companies, communication is only one way i.e. (top level to bottom level). The lower level workers are the ones who are doing the job on site on whom productivity is dependent. So a construction company should enlist the entire workforce in their search for greater productivity. Company should communicate explicitly to their workers and welcome their suggestions. Company should arrange reward system for the suggestions that increase productivity. Involving the workers in improving productivity will ensure, they will come to look upon the goal of the company as their own, thus making progress together.

### 4. Train supervisors and the working hands

Training means educating the field personnel not only in how to complete a job, but completing the job both effectively and efficiently in the correct manner without compromising the quality. Most of the labours are unskilled or semiskilled, directly hired from the villages. Even the supervisors are also freshers and need to get training. Trainer should first train the supervisors technically so that they get their work done in proper manner. Communication language should be common and should be understood by every working hand on the site. Trainer should give all the technical knowledge of construction by arranging 30 min to 1 hour. training programme for the labour before work starts. He should show a presentation of the particular work to be done on a daily basis. Trainer should give basic idea of handling equipment, taking measurements etc to get quality work. To get better results of on-site training, it is important that training programs are designed to be responsive to the demand for training rather than simply providing a supply mechanism to deliver pre-packaged courses in pre-determined areas of training. Training should bear a high degree of relevance to the work that labours currently do, or to the work that is planned to do. Ultimately, the success of any training activity will depend on individual motivation of the participant and the commitment of the companies from which they come. Proper card identification should be given to the field personnel who have received on site training, so that supervisors are able to identify new field personnel, to give them proper training before the start of the job.

### 5. Employ new technologies

In many medium scale Construction Companies, they are still doing the construction work in a traditional way. On site, no new equipment or new technologies are adopted easily. Workers hesitate to operate new equipment and this directly affects the productivity. Efficiency of labour decreases and they can't achieve the desired target. Training workers in the use of modern equipment as well as new technologies can save time and increase productivity to a great extent.

## 6. Health and safety

Health and safety of labour should be important considerations in all stages of a project. In this the project manager and the whole of the project management team are concerned. Indeed, they should encourage a general awareness and commitment from all parties involved in the project. Most people will take steps to reduce risk if they have sufficient knowledge of its existence. They need to know not only that the risk exists but where, when and with what ferocity it will emerge. With better information, instruction and training, most health and safety problems could be avoided. The difficulty faced by a manager is in making people fully aware of the need for safety. It is obvious that accidents and illness mean, additional costs and perhaps disruption of a project. There are as many possible causes of accidents as there are occasions. Among these are technical defects in equipment and the method of work, negligence in organization and dangerous acts by workers. Industry should provide helmets, safety belts, rubber shoes and other protective shields to the workers. There has been large scale violations of Building & Other Construction Workers (Regulations of Employment and Conditions of Service) Act, on many of the project sites, particularly with respect to provisions of providing basic amenities such as drinking water (section 32), provision of latrines and urinals (section 33), accommodation (section 34), crèches (section 35), First Aid (section 36) and access to canteen facilities (section 37) on the site. Provision of these facilities will increase productivity as per requirement.

## 7. Housekeeping

Project housekeeping (cleanliness, orderliness) is identified as a direct factor in determining labour productivity. When job sites are cluttered and disorganized, workers have to work around the mess and waste time searching for missing components. Contractors need to provide adequate facilities for disposing of trash efficiently and to provide appropriate general project cleaning. Another important element is to have clear expectations of workers and enforce the rules. Orderliness includes keeping an appropriate level of materials on-site and keeping them organized and located conveniently. Tools and equipment should also be stored properly and located near the work sites.

Workers should be expected to place trash and debris in proper receptacles, keep scrap lumber in an orderly manner and free of nails, keeping their work areas clean, tools and unused materials in the appropriate places. Storage and work areas that will be muddy should be improved using fill, gravel, plywood or planks. Stairs and emergency exits should be kept open at all times. Clean and orderly projects will also promote good safety practices and reduce the risk of accidents and injuries.

## 8. Avoid extended overtime

The impact of extended overtime on construction productivity has been studied for over 50 years. The results of many studies have been consistent in that; there is a direct negative impact of extended overtime on productivity.

Extended overtime has a multi-pronged impact on productivity.

1. Work fatigue is obvious for most people who have performed physical labour
2. There is outpacing of support services. Basically, since the workers are working more each week, there is a requirement for more planning, engineering support, materials delivery, etc. Many contractors do not increase support, only extend the hours.
3. Increase accidents and injuries which disrupt crew and site productivity.
4. Increased absenteeism and turnover. Many workers eventually start taking days off for rest or personal business or pursue other work with less demanding hours.

It has been shown that some of the effects of extended overtime can be avoided by creative front-end planning and increased supervision. Many "turnarounds" are successfully completed because they have thorough hour-by-hour planning of the work, extensive support for engineering, materials, tools, equipment, etc and additional supervision during critical times.

The easiest way to avoid extended overtime is to force managers to consider all the other options before they use overtime. In many cases, extended overtime is the first and easiest solution to solve a schedule problem. It has been shown that requiring the consideration of other options is a successful approach to reducing and eliminating extended overtime. The easiest approach is the establishment of a company policy of "no extended overtime" without the president's approval

### 9. Tight but Realistic Target

Some construction managers believe that you can motivate construction supervisors and workers by giving them "stretch" goals targets for doing the work for reduced budgets or schedules which have never been achieved. The proven approach for establishing targets for construction is based on the concept of "tight but realistic" targets. Targets need to be achievable with a little extra effort, but never unachievable. If it's never been done before it probably isn't achievable. With an impossible target, studies have shown that people give up trying. With targets which are too easy to achieve, people relax and meet the target, spending more hours and time than needed. So the best approach is to use "tight but realistic" targets. It is possible to do things that have never been achieved. But This is possible with a special initiative with extra planning and approach.

### 10. Core Workforce

Construction has a transient work force. To improve productivity on projects, one needs to have a long term strategy which includes developing and retaining a long term core workforce of the best skilled crafts workers. Core workforce is the most valuable resource and company should do everything to grow the number and skills of workers. Core workers will establish the standard for productivity, quality and safety that will ensure success on projects, cost effectiveness and customer satisfaction. They will execute projects successfully with minimum disruption and supervision and most important, core workforce will provide role models for the other workers; Core workers should be rewarded for their contribution to success with higher pay, better benefits, job security, skills upgrade training, etc. The extra investment in them will pay out in many ways in the future.

## **CONCLUSION**

It is necessary to identify the effect of on-site training programs of field personnel on construction productivity. The results indicate that a regular training program for the lower level of the construction personnel could reduce the amount of cost due to wastages significantly. It is important to note that the performance of field personnel is critical to the success of any construction project. Informal training such as on-site training could improve the skills of field personnel, decline waste costs and thus improve productivity on construction projects. The construction industry, especially consisting of small to medium contractors, is operating in a tight but growing economic market. These conditions make for fierce competition for jobs and skilled personnel. Many of the challenges that have been faced by the construction industry over the past five years continue to be compelling issues such as lack of skilled people at both the field and management levels. The need for training at the field personnel level is obvious, and, if addressed can improve construction productivity and competitiveness within a company and across the industry. While companies consistently identify the lack of skilled field personnel as a major challenge, they are investing the least amount of training amount in this area. Training is more useful when it is designed to address a specific problem. Providing training opportunities for employees beyond the executive level enhances employee morale, skills, abilities, and, hence productivity. By providing proper safety measures and modern equipment, rework can be reduced, so that cost, time and quality can be achieved on the construction project sites.

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