



## A TECHNICAL STUDY ON PRODUCTIVITY IMPROVEMENT PLANNING AND EXECUTION OF CONSTRUCTION MANAGEMENT

<sup>1</sup> KODATHALA LAKSHMI PRASANNA

<sup>1</sup> M.Tech Student, Dept. of Civil Engineering in Global College of Engineering and Technology, Rayalapanthulapalle, KADAPA, AP.

<sup>2</sup> SAGILI CHENNAIAH

<sup>2</sup> Assistant professor, Dept. of Civil Engineering, Global College of Engineering and Technology, Rayalapanthulapalle, KADAPA, AP

### ABSTRACT:

The construction industry often accounts for about ten percent of GDP, with developing countries having the largest share. The productivity level of the construction industry largely depends on three factors, namely labor characteristics, management system and external issues. Many researchers have identified different factors that affect structural productivity. It is important to understand the level of productivity and to develop innovative methods to improve construction productivity.

The productivity of a construction site has been as an issue for many years. This study reviews current productivity measurement literature, especially those related to the construction site and provides recommendations / suggestions for improving on-site productivity. It also shows that productivity can be measured by the actual consumption of the monthly plan / target concrete data. The target is the output of concrete input price and actual consumption productivity of concrete. Considering the single factor type of productivity i.e. concrete, we calculated the productivity for the shell and core type contract. It also shows some of the possible reasons for reduced productivity on the construction site due to improper shuttering and reinforcement activity.

### I. INTRODUCTION

#### OVERVIEW TO CONSTRUCTION PRODUCTIVITY

The construction industry frequently constitutes about ten percent of the Gross Domestic Product, with the figure likely to be higher in developing than developed countries. Although most developing countries have adopted the construction industry as a sector to promote employment

and create employment opportunities, they still value the construction industry in support of economic growth.

Unlike many other industries the level of technology in the construction industry has not changed relatively over many decades. Technological development in construction keeps the industry at a slower pace compared to other industries that have achieved increased productivity through the use of modern technology. As the construction industry is a divergent sector of the national economy, which involves a wide range of meagre resources, its productivity is related not only too many individual activities, but to the industry as a whole.

The issue of raising the level of construction productivity has been repeatedly discussed. There are many rudimentary and wide-ranging topics that need detailed discussion before the industry can improve its status. Such issues have included:

- The footprint of raising productivity;
- Factors affecting productivity;
- The need for productivity measurement; and
- The methods of measuring productivity.

The impact of raising productivity can be identified by the following:

- Positive influence on people, capital, equipment and materials;
- Increase in competitiveness;
- Increase in profitability;

- Increase in market sales; and
- Decrease in unit cost.

There were many factors that affect productivity, and these include:

- Quality of the labour force;
- Type of management;
- Complexity of project;
- Quality of completed work;
- Motivation of workforce;
- Degree of mechanization;
- Type of contract used;
- Weather;
- Buildability; and
- Type of construction techniques.

## OBJECTIVE AND MOTIVATION

This study takes its point of departure in the productivity problem of the construction industry. The construction industry hosts specific examples of project-based organizations (Chino-Sky, 2011) operating in dynamic environments and short-term collaborative models. Project teams are usually disbanded upon completion of projects (Bower, 2003) so the transfer of valuable experience gained during project implementation is limited. In general, with each new construction project many things are rebuilt, making the same mistakes over and over again.

The aim of this study is to understand how modernization can help this problem. By dividing products, processes and organizations into components and modules, the thesis argues, it is possible to assign the work and experience involved and make manufacturing processes more efficient. I chose the construction industry as my field, due to its repetitive nature, for example, compared to infrastructure construction. My argument is that these examples are worthy of attention because modernization in the construction sector increases productivity in specific contexts and their ability to improve and promote related processes. These examples include various processes such as tendering, design, and construction in the long life cycle of construction projects. Although the examples are mainly from Denmark, cases from different geographies and contexts are included in the study to get a more general view of the problem being studied.

## II LITERATURE REVIEW

Shinde V. J., Hedao M. N., et al (2017)

The level of productivity of the construction industry largely depends on three factors, namely labor characteristics, operating system and external issues. Different researchers have identified different factors that affect structural productivity. It is important to understand the level of productivity and to develop innovative methods to improve construction productivity. This paper contains systematic literature reviews on productivity in the

construction industry, provides a review of the various methods used to measure construction productivity, influencing factors and theories to improve structural productivity such as labor factors, management factors and external factors. , Further review on various innovations undertaken to improve paper manufacturing productivity. Reviews have found that there are many different methods and strategies for improving construction productivity, but they vary by site conditions and factors affecting construction productivity.

This study concludes that there are many ways to increase productivity in the construction industry. Much research has been done on methods to improve productivity, including material tracking, healthy and safe working conditions, and efficient management systems.

Sneha Jamadagni 1, Prof.BVBirajdar2, et al (2015)

Labor productivity is at the top of the concerns facing professionals in the construction industry worldwide. This study sheds light on the factors affecting the labor productivity of the construction industry. A questionnaire was used to collect data on members of Kolhapur Builders. It divides the ranking of 38 pre-defined factors into 4 categories: human / labor, external management and technology. The relative importance of the indices (RIIs) was determined and the factors were ranked. The first fifteen factors that affect construction labor productivity: clarity in technical description, overtime work, labor fatigue, delay in payment, unavailability of appropriate equipment, variation in execution / extension of change orders, incentive planning, labor supervision, construction policy, lack of leadership of construction managers, Labor skills, lack of training for operators, site layout, accreditation program, site management and communication between workers. Recommendations were made in the study to address these issues.

The study concluded that the description of the technical specification factor was first among 38 factors with a RII value of 79.22%. This is an important factor in productivity. Each task must be clearly stated. The working overtime factor ranks second among 38 factors with a RI value of 76.8%. Workers' work should not exceed 40 hours per week and not more than 8 hours per day. After 8 hours, labor efficiency decreases and this affects productivity. The Labor Fatigue Factor ranks third among 38 factors, including R.I.I. Value 76%. Labor was not mentally at the site even after 8 p.m. Another set of workers is used to reduce the fatigue of labor and increase productivity. Delay in payment item was fourth in 38 items with R.I.I. Value 75.2%. Payment strictly done on time which helps for increasing productivity.

Eng. Varma Santosh, Prof. M. R. Apte, et al(2014)

Productivity has for many years been an issue for the construction site. This paper reviews current productivity measurement literature, particularly that pertaining on the construction site, and offers recommendations/suggestions, for improvement of productivity at the site. It also shows that productivity can be measured by monthly planned/targeted concrete and actual consumption of concrete data. Whereas targeted concrete is the input value and actual consumption of concrete is the output of the productivity. Considering single factor type of productivity i.e. concrete we have calculated the productivity for shell and core type of contract. It also show few reasons, why

productivity at construction site is reduced due to improper shuttering, reinforcement activity.

From this study it was concluded that Appointing more subcontractors/ Agencies is recommended for splitting the work building wise. Increasing the shuttering material quantity. Storage of reinforcement so that cutting and bending of steel is done in advance. Make sure that all the resources and Material are available at site just in time and make funds available. Increasing resources/labour and subcontractors. Increasing site working time to cover the delays. Approve an alternate concrete Batching Plant. Offer incentives to labour & subcontractors for meeting the targeted production per week/ per month. Short out difficulties if any/ disputed/ weekly meeting with clients, consultant. Provide more supervisory staff to control the production.

Biren Patel<sup>1</sup>, Prof J. J. Bhavsar<sup>2</sup>, Dr. Jayeshkumar Pitroda<sup>3</sup> et al.,(2017)

Improving the production efficiency is the most challenging issue in both developed and developing countries. Building construction projects are affected by many problems such as cost, time, quality, safety etc. Now the competitive environment of building construction is forcing construction companies to increase their labor productivity values in order to maintain their position in the industry. Therefore, identification and analysis of factors affecting labor productivity in building construction becomes an important issue. In the academic literature, there is a lot of research that examines these topics. Systematic review of selected research papers from academic journals on construction management identifies key areas of research such as factors affecting labor productivity, methods of improving labor productivity, structural labor productivity trends, and comparisons.

The study concluded that low pay, poor construction practices, level of technology utilization / automation, delays in material delivery, etc. in Central Gujarat were the major factors affecting labor productivity. For larger companies, the equipment factor greatly affects labor productivity. In small and medium enterprises, the employer / consultant aspect requires special attention. Technology exploration increases productivity. Some construction workers are engaged in some other occupation such as agriculture, factory, domestic servant etc. and therefore they do not give full importance to construction work and work informally.

### III METHODOLOGY

#### RESEARCH METHODOLOGY

The object of research is a socio-technological phenomenon. As a starting point, companies work with processes to create products in a socio-technological world built on language and discourse (Hatch & Cunliffe, 2006). Therefore, DRM is a relevant strategy because it not only provides solutions to problems onsite, but also helps to recreate existing work paths in the construction industry through numerous studies implemented at various stages. And is presented in Figure 4. Also, the general understanding of each building project is unique and can be clearly questioned, with specific conditions and specific challenges.

To understand this social world, built epistemologically, through the working methods of generations transferred from master to apprentice, we need a constructive approach rather than a positive approach (Hatch & Conliff, 2006). In a very eclectic and narrative context and, as opposed to positive experiments in the natural sciences, the different views of different stakeholders, such as designers and contractors, are elaborated through a structured approach. However, although the data are contextual and the identified problems vary according to different sites, the trends observed and suggested solutions play a common role in this thesis. To illustrate, the similar solutions suggested because of the detailed studies are universally applicable, although the circumstances may vary.

### IV RESULTS AND ANALYSIS

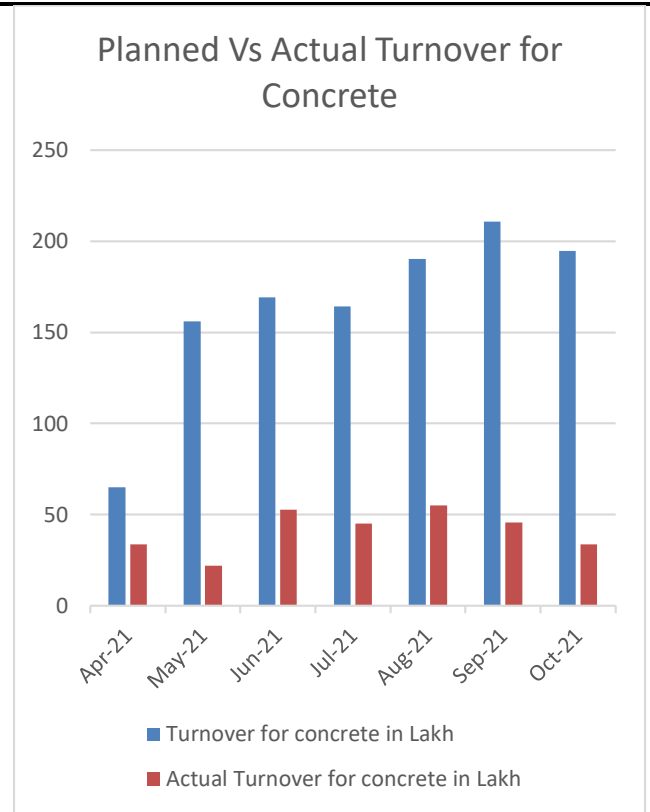
S.No	Month and Year	Shuttering in Sq. m		Reinforcement in T		Concrete in cum	
		Planned	Executed	Planned	Executed	Planned	Executed
1	Apr-21	4663	2402	216.62	215.28	1050	541
2	May-21	12790	1808	421.3	378.71	2518	356
3	Jun-21	20643	6373	635	602.84	2731	843.17
4	Jul-21	21980	6026	780.68	539.81	2649	726.26
6	Aug-21	27558	7963	891.92	567.32	3070	887.1
7	Sep-21	31054	6707	1029.2	595.24	3400	734.4
8	Oct-21	26915	5238	1120	607.53	3139	611

#### Planned and Executed Quantity Of Major Activity

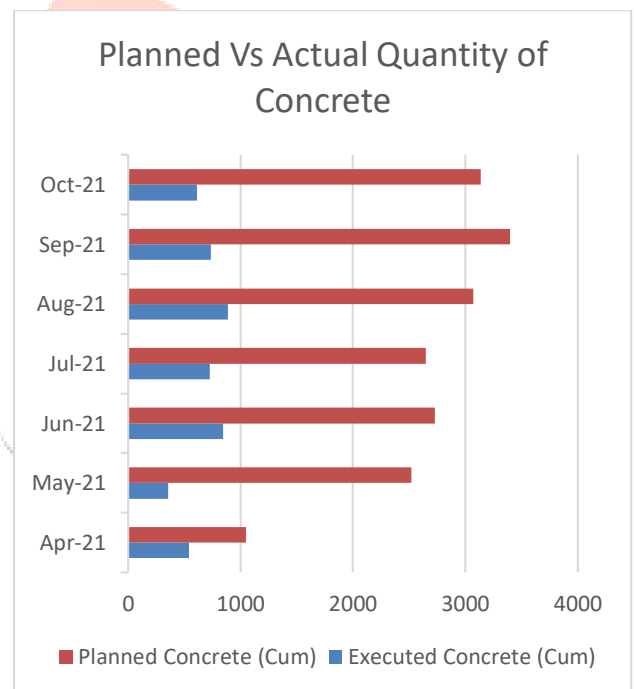
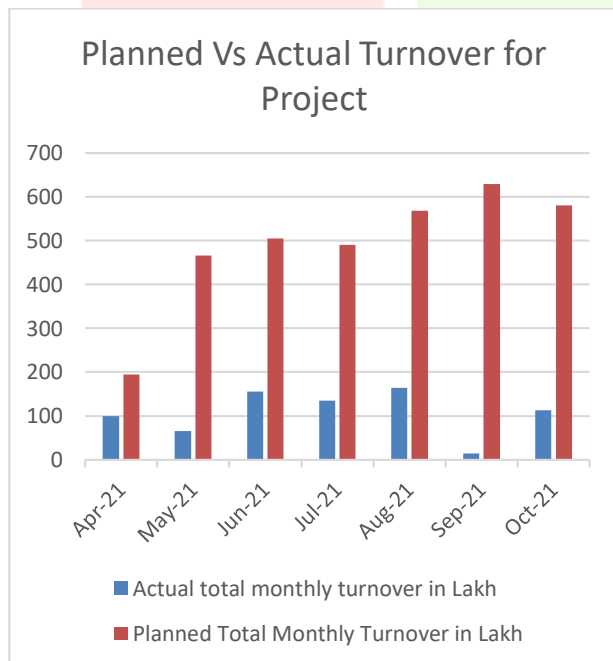
S.No	Month and Year	Planned Total Monthly Turnover in Lakh		Planned Concrete (Cum) Turnover for concrete in Lakh	
		Planned	Total	Planned	Turnover for
1	Apr-21	194.25		1050	65.1
2	May-21	465.83		2518	156.11
3	Jun-21	505.24		2731	169.32
4	Jul-21	490.07		2649	164.23
6	Aug-21	567.9		3070	190.34
7	Sep-21	629		3400	210.8
8	Oct-21	580.72		3139	194.61

Monthly Planned Progress of Project

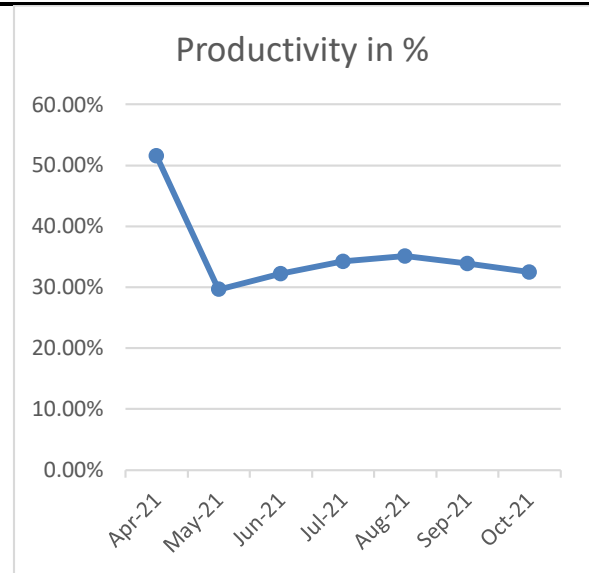
S.No	Month and Year	Actual total monthly turnover in Lakh	Executed Concrete (Cum)	Actual Turnover for concrete in Lakh
1	Apr-21	100.09	541	33.54
2	May-21	65.88	356.1	22.08
3	Jun-21	155.99	843.17	52.58
4	Jul-21	134.36	726.26	45.03
6	Aug-21	164.11	887.1	55
7	Sep-21	13.86	734.4	45.53
8	Oct-21	113.04	611	33.54



Monthly Actual Progress of Project



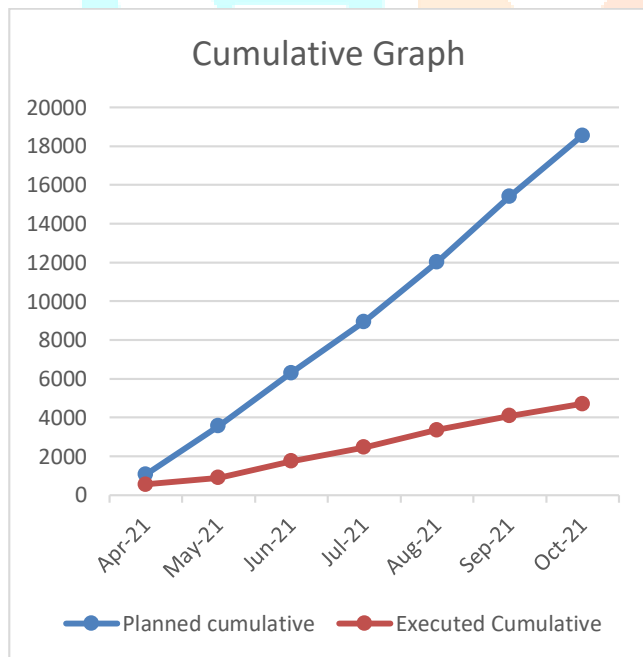
Month and Year	Planned Concrete (Cum)	Planned cumulative	Executed concrete (Cum)	Executed Cumulative	Productivity in %
Apr-21	1050	1050	541	541	51.52%
May-21	2518	3568	356.1	897.1	29.64%
Jun-21	2731	6299	843.17	1740.27	32.22%
Jul-21	2649	8948	726.26	2466.53	34.22%
Aug-21	3070	12018	887.1	3353.63	35.11%
Sep-21	3400	15418	734.4	4088.03	33.89%
Oct-21	3139	18557	611	4699.03	32.48%



### V CONCLUSIONS

As project is already delayed by 3 months of its time schedule with productivity of 32.48% the management has to first maintain its progress as per planned and to keep the project on schedule management has to increase the Percentage of productivity.

### Difference between planned Quantity of Concrete and Actual quantity of concrete for project construction



- Major factor affecting labour productivity are low payment, poor construction methods, use of technology/level of mechanization, delay in material delivery
- For large companies, equipment factor is highly affecting labour productivity. While in small and medium companies owner/consultant factor need special attention.
- Some construction labours are engaged in some other profession like farms, factory, domestic servant etc. and hence they do not give full importance to construction work and tend to work informally.
- Key for productivity improvement is not to complete as many tasks as possible or to maximize workload but focus on maintaining a predictable workflow.
- The theoretical model of this study proposed fifteen independent groups affecting the variation of Labour Productivity in the construction projects namely Labour factors, Supervision factors, External factors, Owner/consultant factors, Execution plan factors, Designer, Working time factors, Equipment factors, Financial factors, Quality factors, Project factors, Organization factors, Leadership and coordination factors, Health and safety factors.

### REFERENCES

[1] Shinde V. J.1, Hedao M. N.2, "A REVIEW ON PRODUCTIVITY IMPROVEMENT IN CONSTRUCTION INDUSTRY", International Research Journal of Engineering and Technology (IRJET), Volume: 04 Issue: 11 | Nov -2017 www.irjet.net.

[2] Sneha Jamadagni1, Prof.B.V.Birajdar2, "PRODUCTIVITY IMPROVEMENT IN CONSTRUCTION INDUSTRY", International Research Journal of Engineering and Technology



- (IRJET) e-ISSN: 2395-0056 Volume: 02 Issue: 08 | Nov-2015 www.irjet.net.
- [3] Eng. Varma Santosh, Prof. M. R. Apte, "Productivity in Building Construction", IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) e-ISSN: 2278-1684,p-ISSN: 2320-334X, Volume 10, Issue 5 (Jan. 2014), PP 64-71 www.iosrjournals.org.
- [4] Biren Patel<sup>1</sup>, Prof J. J. Bhavsar<sup>2</sup>, Dr. Jayeshkumar Pitroda<sup>3</sup>, "A Critical Literature Review of Labour Productivity in Building Construction", International Journal of Constructive Research in Civil Engineering (IJCRCE) Volume 3, Issue 4, 2017, PP 76-80 ISSN 2454-8693 (Online) DOI: <http://dx.doi.org/10.20431/2454-8693.0304007> www.arcjournals.org.
- [5] Mr.C.Thiyagu, Mr.M.Dheenadhayalan, "Construction Labor Productivity and its Improvement", International Research Journal of Engineering and Technology (IRJET) Volume: 02 Issue: 08 | Nov-2015 www.irjet.net.
- [6] Mr.A .A. Attar<sup>1</sup>, Prof. A.K. Gupta<sup>2</sup>,Prof.D.B.Desai<sup>3</sup> "A Study of Various Factors Affecting Labour Productivity and Methods to Improve It.", IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) ISSN: 2278-1684, PP: 11-14 www.iosrjournals.org.
- [7] MUHAMMAD ASADULLAH TAHIR, HASHIMHANIF, "FACTORS AFFECTING LABOR PRODUCTIVITY IN BUILDING PROJECTS OF PAKISTAN", International Journal of Management and Applied Science, ISSN: 2394-7926 Volume-1, Issue-2, March-2015.
- [8] Absalom H. V. Lamka, Sylvester Munguti Masu, "Factors Influencing Effective Productivity on Construction Sites in Nairobi County", International Journal of Soft Computing and Engineering (IJSCE) ISSN: 2231-2307, Volume-4 Issue-5, November, 2014. • JOGLAKAR, Material and Labour constants.

