

EFFECTIVE UTILIZATION OF MANPOWER AND ITS MANAGEMENT IN PROJECT TIME OPTIMIZATION USING PRIMAVERA P6

Usha V Bagari¹, Amey A. Kelkar²

¹ P.G. Student of Construction Technology, Civil Dept., Jain College of Engineering, Belgavi-PIN-590014

² Assistant Professor, Civil Dept., Jain College of Engineering, Macche, Belgavi, Karnataka -PIN-590014

Abstract - In the construction industry the completion of work in time and cost is very important, to achieve this result the rate of productivity of the project should be high. The labour is considered as main cost component of the project. Thus, the need to understand labour productivity is high. The labour productivity is dependent on many factors such as, site condition, labour experience, weather conditions, management strategies and others. The questionnaire survey was conducted based on the literature review and the analysis of that result was done. Then the residential project was taken and it was scheduled in Primavera. The delay in the project was observed due to the lockdown and then the another schedule was prepared without delay. The main objective of this thesis is to understand the fluctuation in the labour productivity by using project management tool called Primavera and reduce the duration of the project by considering the factors obtained from the questionnaire survey.

Key words : Labour Productivity, Primavera P6

1. INTRODUCTION

Construction industry in one of the prominent and largest industry, it plays a very significant role in development of country by contributing to the GDP (Gross Domestic Product). It also reduces the unemployment by providing many job opportunities to the people. In Construction Industry the Productivity plays an important role. So, the improvement of the Productivity is of prime importance.

Several studies have been conducted on Productivity and that too mainly on Labour Productivity. Many studies were performed to calculate the effect of many factors which have great impact on productivity. The measurement of the factors that affect the labour productivity is difficult as the factors on which productivity depends keep on changing. It is difficult to have one standard method to calculate the loss in the productivity by different factors.

Construction industry's most dominant problem is achieving the productivity. As the construction projects have their

importance in the society and in economic resources, special attention is given to improving the productivity. Increase in the productivity of construction industry leads to improvement of the productivity in various sectors there by it improving the standards of living.

1.1 OBJECTIVE OF THE STUDY

This project mainly concentrates on how the labour productivity has reduced over the years and how it has affected the construction industry. This study helps us to know what are the main factors and the steps to be followed to enhance the rate of the productivity.

The following objectives are set, to achieve the desired goal

1. To list the factors that affect the labour productivity from the literature review.
2. To conduct the questionnaire survey.
3. Identifying and ranking the main factors affecting the labour productivity.
4. To consider a Case Study of Residential Building for studying labour productivity.
5. To schedule the different activities using Primavera.
6. To analyse labour productivity in the considered Case Study.
7. Rescheduled activities to overcome the loss of duration by considering enhanced labour productivity.
8. To compare project duration and cost of both the schedules.
9. To give recommendations to enhance labour productivity by using the project management tool Primavera.

2. LITERATURE REVIEW

The following are the past research survey based on which I have carried out my work.

B. NIRMALKUMAR et al. [1]. In this paper mainly concentrates on the problems faced by construction project from different factors. And then differentiating the factors in different categories . The factors are mainly divided into groups such project group , safety group ,motivational group, supervision group, manpower group and material group. The importance index and ranks of the factors were obtained after the research is carried out. The conclusion was done and the suggestions were given to each group after ranking the factors.

MR. AKASH RAJKUMAR WADHWA et al. [2]. The research was mainly carried to know the difference between Traditional method and conventional method using Primavera. Survey was conducted and its analysis was carried.. Primavera software is taken for this study because of its comparable and optimum project plans to stimulate the adjustments. This software is widely used, especially in the construction industries of developing countries has made the large projects easy to be handled, it effectively reduced the cost of the project when compared with conventional methods of management of project. This management tool has many features and benefits that will lead to a successful project completion. Primavera is mainly used by professional project schedulers to plan and analyze multiple projects to complete the project within and time and budget.

3] SYUHaida ISMAIL et al . [3]. The main aim of this research is to identify the main factors affecting labour productivity of Turkish construction workers of Turkmenistan. Based on the opinions taken from management persons. Questionnaire survey was conducted based on the qualitative data collected through literature review. When the literature review was done it showed 28 factors affecting labour productivity were found, after the consistency test , the factors reduced to the 24 . Factors were ranked according to their rate given before the factor analysis of result was done. The recommendations were given for improving construction labour productivity on the sites of Turkmenistan.

MOHAMMED A. HIYASAT, at al. [4]. As productivity is directly linked with the profit improving productivity increases profit. The labour productivity in the country Jordan, is very low and it need to be developed for the country to be developed. The main objective of this paper is

to define and analyzing the factors that affect construction labour productivity. A questionnaire survey of 27 questions was prepared.It was sent to 200 people .The 90 responses were returned . They were numerically analyzed by calculating the average, RII and standard deviation, of each variable. Top three conditions were concluded from the survey. “Financial increments increase productivity”, “Productivity is directly proportional to experience” and “Trust and communication “should be good to increase the rate of labour productivity. After the data analysis only 11 factors were considered after filtering other factors as they had low affect.

3. RESEARCH METHODOLOGY

3.1 GENERAL

Application of the project management tool gives us a well-defined path for the project execution so the delay , cost over-run, over allocation of resources and also the delay can be reduced . Labour productivity is one of the main concern of the construction industry as it directly affects the project cost .So there is need to improve and increase the rate of productivity. So, the following methodology is proposed to achieve the objectives.

The following methodology is used in this project

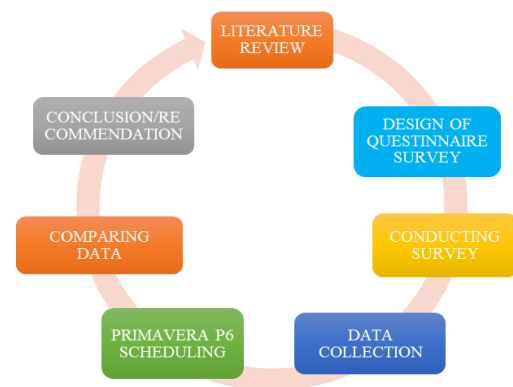


Figure 3.1 : Proposed methodology

4. RESULTS AND DISCUSSIONS

4.1 Questionnaire survey

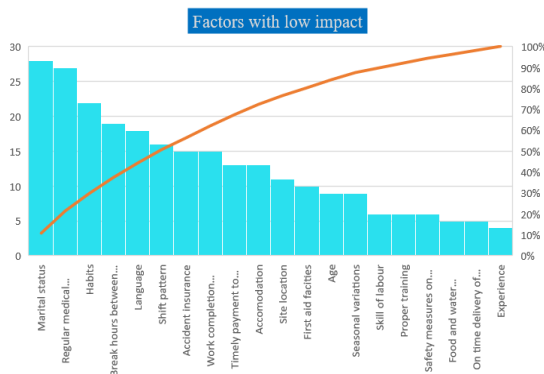
The result mainly consists of two parts they are,

- Questionnaire survey results
- Primavera scheduling results

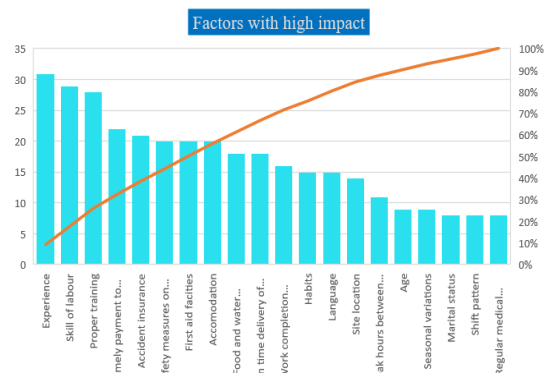
Questionnaire survey results

The questionnaire survey was conducted to know the impact of the various factors which affected the labour productivity. The google form was created for this survey and it was sent to the Engineers, Contractors and many other people who was in construction field.

The google form mainly contains of questions with the options which gives the impact of each factor.



Graph 4.1 : Graphical representation of High impact factors



Graph 4.2: Graphical representation of Low impact factors

4.2 The productivity improvement by taking the factors into consideration.

The primary factors are

1] Food and water facilities

The main need of the labour to work is that he should have the proper facilities so that he should not get distracted by the other things. The proper facilities gives the better efficiency of work as the workers will be strong enough to work continuously and it will reduce the wastage of time for breaks in the search of these essential things.

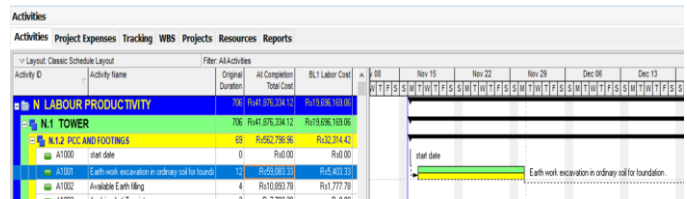


Figure 4.3 : Activity duration after giving the facilities

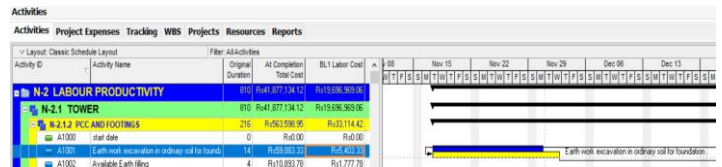


Figure 4.4 : Activity duration before providing the facilities.

The reduction in the duration of activity was seen as the food and water facilities were given on site so that the work was reduced by two days. So by using this the rate of the work will be increased.

2] On time delivery of materials

The material procurement is very essential thing in these days. Because of the lockdown the materials transportation was very difficult and it led to the delay of works as the materials were not available.

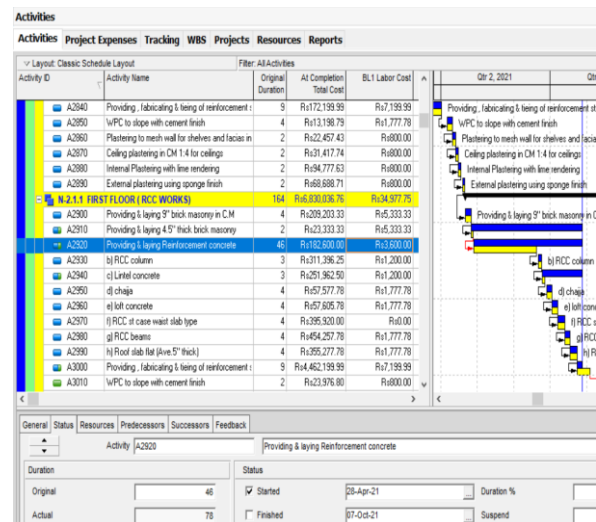


Figure 4.5 : Activity showing delay

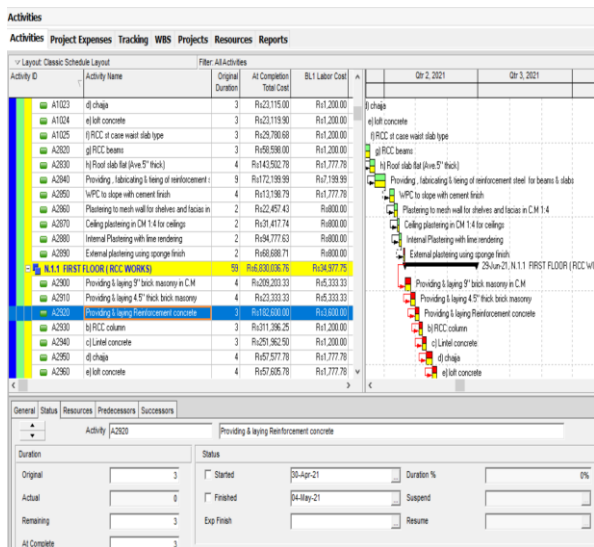


Figure 4.6 : Activity without delay

As we can see that due to the lockdown the materials were not available and the activity providing and laying reinforcement was delayed by 43 days, as the procurement of the steel was not done and it led to the delay of the project. The delay can be avoided if the planning was done in before hand that to procure the materials then the delay could have been avoided. And also one more factor comes into consideration that by giving the accommodation facility to the labours the migration of the labours can be avoided.

The secondary factors that affected the productivity are

- 1] Site location
- 2] Habits
- 3] Experience
- 4] Proper training
- 5] Language
- 6] Safety measure on site
- 6] First aid facilities
- 7] Accident insurance
- 8] Work completion bonus
- 9] Timely payment to labours

5.5 COMPARISON OF DURATION

Reduction in the duration of the project after enhancing productivity.

Table 5.1: Project details after reduction of duration

Project	Kiran raj Apartment
Project started	16/11/2020
Project completion	17/02/2023
Duration	706 days
Estimated cost	Rs 41,876,334.12

Table 5.2 : Project details before reduction of duration

Project	Kiran raj Apartment
Project started	17/11/2020
Project completion	20/06/2023
Duration	810 days
Estimated cost	Rs 41,890,334.12

After taking the required measures to prevent the delays and risks caused by the factors the duration of the project can be reduced. Thus the Primavera helps us to know the overall schedule of the materials ,labours and machineries. The delay of the project can be reduced.

5. CONCLUSIONS

5.1 GENERAL

There is shortage of the skilled manpower in the industry for construction work. So there is a need to improvise the present labour’s skills to overcome this shortage. Thus the facilities are provided on site such as water and food, medical, work completion bonus , accommodation and transportation .So that the labours wont migrate and even the lockdown should have less impact on the construction industry. The construction industry is becoming less productive with the global pandemics happening continuously, so the attempt is made to increase the productivity by using different techniques.

The conclusions drawn from this project are

- 1] By using Project management tool like Primavera to schedule gives the best results in managing the construction projects with desired results.

2] The WBS , Gantt chart, activities relationships , constraints and many other options in the Primavera gives the superior understanding of the project.

3] The delay caused by unavailability of materials and labours can be understood in the planning time.

4] In general the duration of the project always exceeds the planned duration. It may increase the estimated cost or it may remain constant . In this project we tried to reduce the duration of construction by keeping the estimated budget constant.

5] Initially the duration of the project was 810 days . after the reduction the duration of the project became 706 days.

6] A reduction of the 104 days is done by considering the main factors affecting productivity from the questionnaire survey and Primavera tools and techniques.

7] The labour productivity is enhanced in this project by reducing the duration of project and improving the quality of work by various techniques.

REFERENCES:

[1] B. NirmalKumar, MR.U.Yoganandhan & DR. P.L.Meyyappan(2018) Improve The Factors Affecting Labour Productivity In Indian Construction Industry.

[2] Mr. Akash Rajkumar Wadhwa &M R. Dattatray Santram Shinde (2016) Department of Civil Engineering, Swami Vivekanand Subharti University / Subharti Institute of Technology and Engineering, Meerut, India Department of Civil Engineering, India Project Management Using Primavera P6

[3]Syuhaida Ismasil , and Nooh Abu Bakar(2016): Construction productivity in Turkmenistan ,Survey of the constraining factors.

[4] Mohammed A. Hiyassat, Montaser A. Hiyari & Ghaleb J. Sweis(2016):Factors affecting construction labour productivity: a case study of Jordan.

[5] Serdar Durdyev & Jasper Mbachu(2013): Key constraints to labour productivity in residential building projects: evidence from Cambodia

[6] Wei Zhan, Nick Bansback,, Annelies Boonen, Johan L. Severens, , Aslam H. Anis, (2012):Development of a Composite Questionnaire, the Valuation of Lost Productivity, to Value Productivity Losses: Application in Rheumatoid Arthritis .

[7] Alemu Moges Belay (2012):Adoption of quality management practices An investigation of its relationship with labor productivity for labor-intensive manufacturing companies.

[8] Prachi R. Ghate , Ashok. B. More & Pravin R. Minde(2016) :Importance Of Measurement Of Labour Productivity In Construction .

[9] Vivek Kumar Patel, Sohit Agrawal, Dr. Mukesh Pandey(2017) :Construction technology & Management, I.T.M University Gwalior, Madhya Pradesh, India : Study Of Factors Affecting Labour Productivity In Construction Industry

[10]Mr.C.Thiyagu,&Mr.M.Dheenadhayalan(2015) :Construction Labor Productivity and its Improvement

BIOGRAPHIES



Usha V. Bagari

P.G. Student of Construction Technology, Civil Dept., Jain College of Engineering, Belgavi-PIN-590014



Amey A. Kelkar

Assistant Professor , Civil Dept., Jain College of Engineering, Macche, Belgavi, Karnataka-PIN-590014