

Typical Challenges Faced In The Slum Transformation Construction Project

Tejal S. Solanki, Rohit. R. Salgude

Abstract: Nowadays, timely completion of the project has become a crucial part in the construction industry. The responsibility of cities is to mobilize in order to improve housing circumstances in slums as a medium of meeting fundamental human needs. Slum areas are highly populated regions created without adequate planning and lacking the key elements of day to day life. The slum rehabilitation is a critical project for any contractor or owner. Generally, consistent delays in the project show up in the preplanning and initial stages of the construction projects, for example, getting the general plans, getting the license, permissions, various legal clearances and so on. The complete construction stage is the shaping phase of any project where numerous unforeseeable events could occur. Lack in determination of the delay factors in the slum transformation project would contribute to the project delays, schedule overrun and capital overruns. This study aims to recognize the possible challenges faced in the construction of a slum rehabilitation project. This study classifies delay factors of the project in different stages i.e., pre-planning and construction stage and proposing a better type of approach to overcome delay related challenges in slum rehabilitation construction project.

Index Terms— Slum, delay factors, slum transformation, pre-planning stage, construction stage, schedule overrun, capital overrun

1 INTRODUCTION

AS the human population has grown, the need for housing for man has also increased. A speedily urbanizing population and governments' inadequacy to satisfy their requirements led in a shortage of accommodation and infrastructure. Slums contribute to a major portion of a city's population due to high density of occupants per km². But, such large amount of people aren't privileged to even basic amenities of daily life such as water supply, sanitation waste disposal, etc., making the living standards of a vast number of people miserable. Slums also obstructs the potential development of the land where they are located. Thus, government nowadays has started various slum rehabilitation projects for optimized use of land encroached by the slums. Also, these rehabilitation projects aim towards improving the living standards of the people living in the slums by providing better shelter and amenities. Many stakeholders are engaged in procedures of approval, legalizing, funding, and construction. When many groups are engaged, the general advancement is delayed by the act of finishing legal formalities and consenting to legal contracts. Therefore, most of the slum rehabilitation projects are delayed and affected the project completion. The slum rehabilitation construction project has many complexities such as management of the slum residents, dispute resolution, land acquisition. Among these complexities, delays are one of the most unwanted events affecting slum rehabilitation projects.

Objectives of the study

To rectify various challenges and difficulties in slum rehabilitation construction project. To determine the major challenges affecting the construction along with their sources. Classification of the factors causing difficulties in different stages of slum rehabilitation construction project. To use Primavera P6, a project management tool for representation & observational study of project schedule. Listing out challenges faced by slum rehabilitation construction project in the construction of a slum rehabilitation project.

- Tejal S. Solanki is currently pursuing master's degree program in construction engineering & Management in MIT World Peace University, Pune, India.
- Co-Author Prof. Rohit R. Salgude is the assistant professor of Civil Eng. Dept. in Maharashtra Institute of Technology, Pune, India.

2 LITERATURE REVIEW

Prakash Kumar and Piyush Raj (2015) examined on recognizable proof of reasons for delay in mining/manufacturing industries in Indian setting by using two distinct procedures are RII and Importance index dependent on level of seriousness and level of recurrence. Rathod Rajshekhar Gopal (2016) suggested that the arranging and planning of activities for development of huge construction works are mandatory. In this investigation, an exertion for arranging, planning and delay examination is made by refreshing of different exercises. The study of Amilcar Arantes and Pedro Fernandez (2015) focuses around distinguishing proof of the fundamental cause for the delays in Portuguese development industry and its effect. A questionnaire study with Five-point Likert scale was utilized to assess the significance of the causes and effect of delays in development work. Varma Santosh (2014) considered loss in profitability in connection with delay examination in structure development projects. In this investigation, a delay examination is finished by window investigation technique which fundamentally calculates the variations in planned and actual schedule to distinguish the schedule effect and loss in efficiency.

3 METHODOLOGY AND ANALYSIS

As discussed earlier, slums are the areas with a very high density of human population but with considerably less number of basic amenities. Thus, for the betterment of such a large part of population & to raise the standards of living, slum rehabilitation is a critical type of project. The methodology of research adopted for this paper included an observational study of a slum rehabilitation construction project in Pune. Total built up area of the project was 3,04,000 sqft with construction of three buildings. The challenges faced in the construction of the project were analyzed and identified by observing the site conditions and interviewing people associated with that project consisting of executive engineer, planning engineer, project head. After incorporating the views of responsible personnel in the project & observational analysis data it was found that delay in the schedule of the project was the most critical challenge faced by the slum rehabilitation project. There are extreme possibilities of occurrence of delays in the pre-planning and the construction phases of the project. The causes of delay occurred in the project were shortage of labours, slum transformation, material

shortage, machine breakdown etc. All the challenges ultimately contributed to delays in some or the other way. Therefore, delay analysis of the project was done. The data collected for identifying and analyzing delay events consisted of planned schedules, actual schedules and hindrance reports. As- Planned Schedule- The schedule which was planned before starting of construction work. As- Built Schedule- The schedule made as per actual progress of work. Hindrance Register- Document with records of delays and related activities. Complete planned duration of the project was 19 months and the project was completed in 21 months. The project was delayed by 4 months. But by managing the construction activities i.e., shuttering, casting etc. and proper planning with catch up plan dates, the delays were minimized to 2 months. In this paper, schedule of building C is made with planned and actual dates using project planning software Primavera P6 (shown in Figure 1). Planned duration of building C is 301 days and actual duration is 360 days (shown in Figure 1). Until the project completion, slum residents were shifted to rented houses by government authorities on a temporary basis. The slum residents, most of them being daily wagers in the nearby areas were disliking the idea of rehabilitation which caused many conflicts during this phase of the project.

in Fig. 1). Therefore, the total delay in the duration of building C, Total delay = 360-301 = 59 days

4 RESULTS AND DISCUSSION

The challenges faced in the various phases of the construction of slum transformation project were determined and explained below.

4.1 Inception or Initial phase of the project

1. Temporary evacuation and mobilization of the people

This stage was a crucial and sensitive part of the project due to involvement of relocation of the local residents. As this was slum rehabilitation construction project, transformation of the slum to another area was essential for further progress of the project. Therefore, the total delay in the duration of building C, Total delay = 360-301 = 59 days

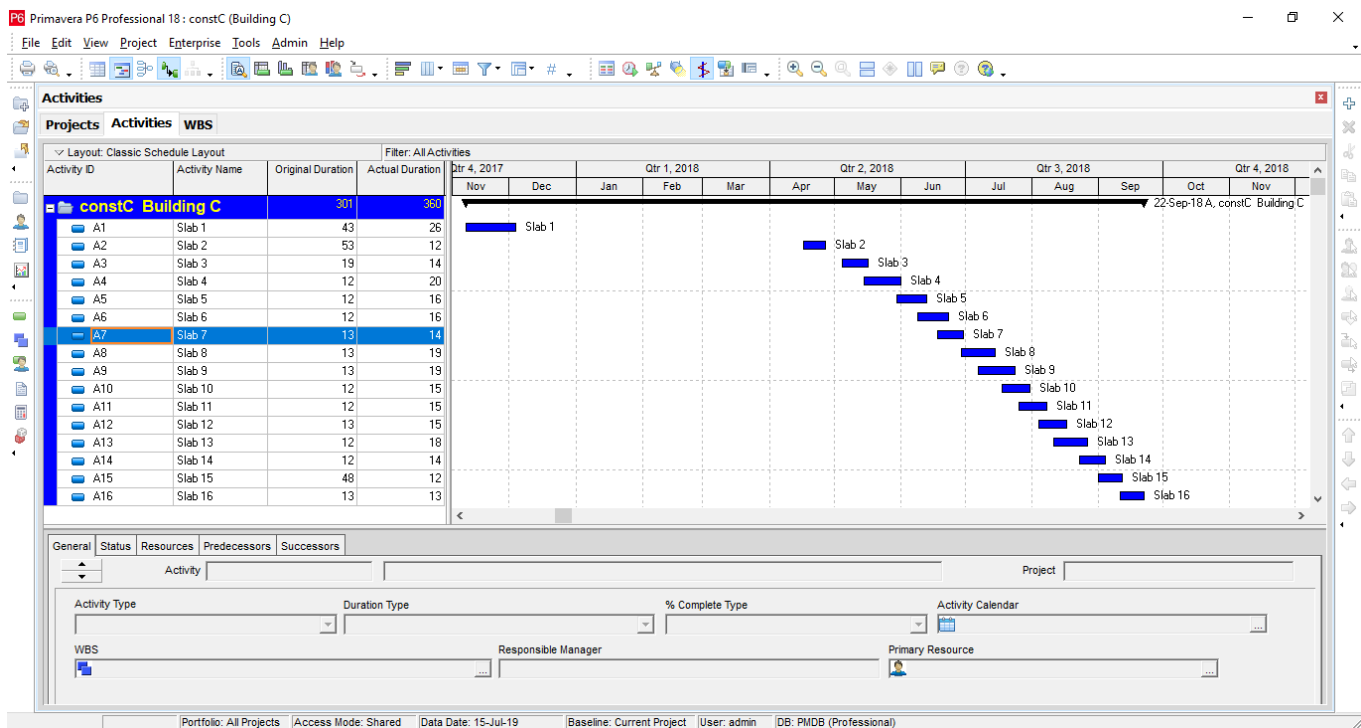


Figure 1. Schedule for Building C using Primavera P6

As Built Schedule- The schedule made as per actual progress of work. Hindrance Register- Document with records of delays and related activities. Complete planned duration of the project was 19 months and the project was completed in 21 months. The project was delayed by 4 months. But by managing the construction activities i.e., shuttering, casting etc. and proper planning with catch up plan dates, the delays were minimized to 2 months. In this paper, schedule of building C is made with planned and actual dates using project planning software Primavera P6 (shown in Figure 1). Planned duration of building C is 301 days and actual duration is 360

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2 Material shortages

The construction was done using MIVAN technique which resulted in difficulties for getting aluminum shuttering material. The material wasn't available on the site for a long period of four months. This affected the domains such as labor idle time, equipment and machinery cost etc.

4.1 Construction Stage

1 Labour payment issue

Irregularity in payments to the working staff was observed due to some issues. The labors' strike of three to four days affected the construction work in this phase.

2 Heavy rainfall

Being located in Pune, a region of heavy rainfall according to Indian monsoon conditions the project was naturally affected and delayed in rainy season Due to heavy rainfall the work got stopped and affected the project duration.

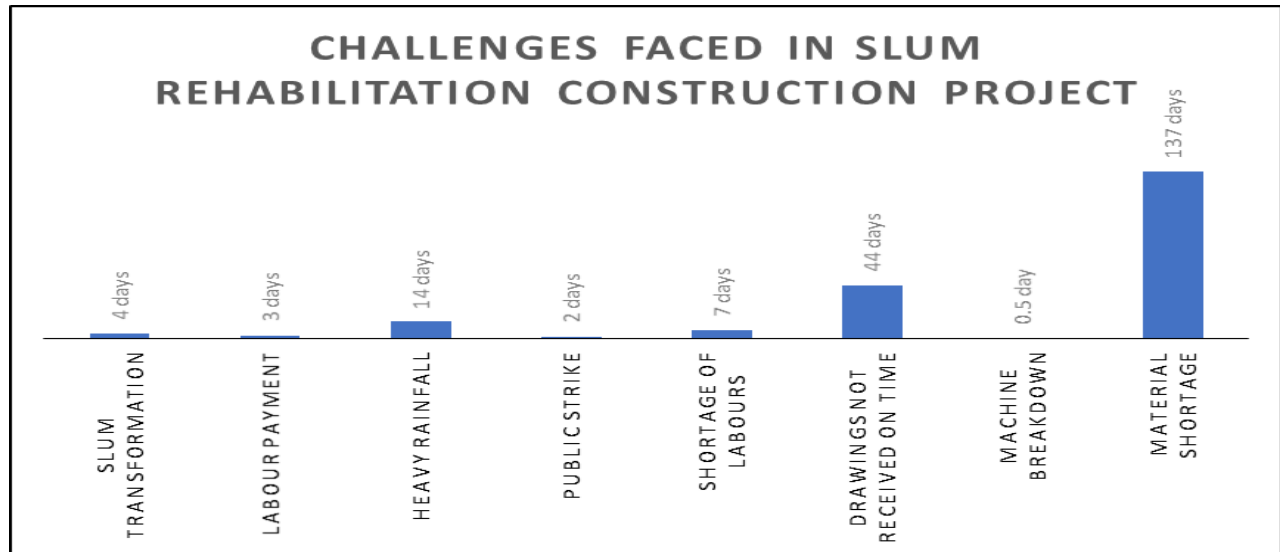


Figure 2. Challenges faced in slum rehabilitation construction project

3 Public strike

Social and political factors affected the project delay in direct and indirect means. The construction was affected two days due to public strike.

4 Labour's shortage

Poor workforce strength leads to delay in the construction work. Shortage of labours affected the delay of seven to eight days.

Drawings not received on time

Revised drawings with corrections were not received on time. So, the construction work was having delays due to redesigns and revisions of drawings.

5 Machine breakdown

There was a failure in the loader of the concrete batching plant. Therefore, the welding and repairing of loader was done and delayed slab casting activity.

6 Additional RCC work

Extra work-orders from the client with extra items of constructions i.e., Sewage treatment plant, Underground water tank and compound wall contributed in delay of the project.

5 CONCLUSION

In the slum rehabilitation project, the timely completion of project is of utmost importance. This study classifies the possible challenges faced by the contractor and the owner in the construction of slum rehabilitation project (Shown in Figure 2). The study could help to adopt a predictive approach for anticipation of delays in the construction of a slum rehabilitation project.

REFERENCES

- [1] Aditi Dinakar, "Delay analysis in construction project", ISSN 2250-2459, International Journal of Engineering Technology and Advanced Engineering, volume 4, issue 5, May 2014, Page No. 784-788.
- [2] Amilcar Arantes, Pedro Fernandez, "Delay in construction projects- Causes and impacts", IESM Conference, October 2015.
- [3] Anil Upadhyay, Vishant Gupta, Dr. Mukesh Pandey, "A case study on schedule delay analysis in construction projects in Gwalior", International Research Journal of Engineering and Technology, Volume 03, Issue 05, May 2016, Page No. 1312-1315.
- [4] Aradhana Rathod, "Delays in Residential Building Construction", International Journal of Innovative Research & Development, Volume 2, Issue 5, May 2013, Page No. 1908-1922.
- [5] Dhanashree S. Tejale, "Analysis of Construction

- Project Cost Overrun by Statistical Method, International Journal of Advanced Research in Computer Science and Management Studies, Volume 3, Issue 5, May 2015, Page No. 349-355.
- [6] Hardik Lokhandwala and Dr. Rajiv Bhatt "Identification of Causes of Delay for Industrial Construction Projects in Indian Context", Journal of International Academic Research for Multidisciplinary, Volume 2, Issue 12, January 2015, Page No. 379-387.
- [7] Hui-Yu Chou and Jyh-Bin Yang, "Preliminary Evaluation of BIM-based Approaches for Schedule Delay Analysis", IOP Conf. Series: Materials Science and Engineering 245, 2017.
- [8] Jonathan Jingsheng Shi, S. O. Cheung and David Arditi, "Construction Delay Computation Method", Journal of Construction engineering And Management © ASCE, 2001, Page No. 60-65.
- [9] Jyh-Bin Yang and Chih-Kuei Kao, "Review of Delay Analysis Methods: A Process-Based Comparison", The Open Construction and Building Technology Journal, Volume 3, 2009, Page No. 81-89.
- [10] Jyh-Bin Yang and Ming-Kuan Tsai, "Computerizing ICBF Method for Schedule Delay Analysis", Journal of Construction engineering And Management © ASCE, August 2011, Page No. 583-591.
- [11] Kumar Neeraj Jha, Construction Project Management, 2nd ed., Pearson India Education Services Pvt. Ltd., 2005, Page No. 655-662.
- [12] Kunal Banthia, Akshay Andure, Shantanu Raj Deshmukh etc., "Statistical Analysis of Delays in Construction Projects", International Research Journal of Engineering and Technology, Volume 4, Issue 5, May 2017, Page No. 2427-2430.
- [13] Ming-Kuan Tsai, Jyh-Bin Yang and Nie-Jia Yau, "Developing Computer-Based Schedule Delay Analysis Methods Based on Information Flow Analysis: A Case Study", Journal of Civil Engineering and Management, e-ISSN 1392-3730, January 2012, Page No. 823-835.
- [14] Meena. V and K. Suresh Babu "Study on Time Delay Analysis for Construction Project Delay Analysis", International Journal of Engineering and Technology, Volume 4, Issue 3, March 2015, Page No. 1076-1083.
- [15] M.Z. Ramli, "Study of factors influencing construction delays at rural area in Malaysia", Journal of Physics, Conf. Series-1049 012017, IOP Publishing-2018.
- [16] Nuhu Braimah, "Construction Delay Analysis Techniques - A Review of Application Issues and Improvement Needs", Buildings ISSN 2075-5309, May 2013, Page No.506-531.
- [17] Pablo González, Vicente González, "Analysis of causes of delay and time performance in construction projects", Journal of Construction engineering And Management © ASCE, 2013.
- [18] Prakash Kumar, Piyush Raj, "Delay analysis of projects and effects of delays in mining/manufacturing industries", IOSR Journal of Mechanical and Civil Engineering, Volume 12, Issue 6, Nov.-Dec. 2015, Page No.61-71.
- [19] Rathod Rajshekhar Gopal, "Planning Scheduling and Delay Analysis- Case Study", International Advanced Research Journal in Science, Engineering and Technology, Volume 3, Issue 6, June 2016, Page No. 24-28.
- [20] Varma Santosh (2014), "Loss in Productivity in Relation with Delay analysis in Building Construction Projects", IOSR Journal of Mechanical and Civil Engineering, Volume 11, Issue 3, May-June 2014, Page No. 73-80.
- [21] Vasilyeva-Lyulina, Masamitsu Onishi and Kiyoshi Kobayashi, "Delay Analysis Methods for Construction Projects: Mathematical Modelling", International Journal of Transportation, ISSN: 2287-7940, 2015, Page No.27-36.
- [22] Vishal Annappa Nimbale and Balasaheb Jamadar, "Planning, Scheduling and Allocation of Resources for Multi-Storied Structure using Oracle's Primavera P6 Software", International Research Journal of Engineering and Technology, Volume 7, Issue 7, July 2017, Page No. 2762-2768.