



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 6, June 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com

Influence of Constraints Analysis and Critical Chain Scheduling for the Improvement of Housing Development and Bridge Construction Projects

Miss. Vaishnavi D. Bandabuche ¹, Prof. Mr. Pranav Lende ²

Student, M.TECH Construction and Management, Department of Civil Engineering, G. H. Rasoni University,
Amravati, India ¹

Professor, Department of Civil Engineering, G. H. Rasoni University, Amravati, India ²

ABSTRACT: Constraints are encountered in every working environment whether it may be manufacturing industry, supply chain, construction industry etc. Construction companies are time bound endeavours meant to be realized within stipulated time. They have a particular goal to be achieved in time but constraints in the project create imbalance of sources and form barrier in completion of the project. Theory of constraints has application in manufacturing, project management, marketing and sales, finance and accounting, supply chain distribution. Critical chain project management (CCPM) is utilized in project management. CCPM uses schedule network analysis technique. It focuses on those activities having longest chain. Buffers are used throughout the TOC. Buffers are placed before the governing constraints, to ensure that the constraint is never starved. Buffer are placed behind the constraint to prevent downstream failure from blocking the constraints output. This concept of identifying the constraints and eliminating by using CCPM scheduling will be conducted on selected projects. First and foremost, field study and questionnaire survey are conducted for collection of basic information and to study current situation of the constraints in today's construction industry.

I. INTRODUCTION

Delay in completion of infrastructure projects in India has become normal and frequent occurrence. Such delays are caused by a number of reasons such as contractual issues, shortage of manpower, delay in obtaining environmental clearances, delay in tendering, redundant laws and rules etc. The above number of reasons are actually the limiting factors (i.e. constraints). The effect of such delays not only lead to loss of profits and cost overruns but also to a compromise in the quality of construction, disputes between contractors and buyers. On construction projects, as well as on other projects where a schedule is being used to plan work, it is not uncommon for delays to occur. It is what is being delayed that determines if a project or some other deadlines, such as milestone, will be completed late. Delays are categorized in four basic ways,

- i) Critical or noncritical,
- ii) Excusable or non-excusable,
- iii) Compensable or non-compensable,
- iv) Concurrent or non-concurring.

To successfully manage and eliminate those delays proper planning, execution and monitoring of a project is necessary. Project scheduling is a written or graphical representation of the contractor's plan for completing a construction project that emphasizes the elements of time and sequence. The plan will typically identify the major work items (activities) and depict the sequence (logic) in which these work items will be constructed to complete the project. The project schedule should include every element of the project sequenced in a logical order from the beginning of the project through completion. In addition, the schedule should define specific time periods for each activity in the schedule. A project schedule is a valuable project control tool that is used by successful project managers to effectively manage construction projects. A contractor can use different types of schedules to depict its construction plan. The most common scheduling techniques used for construction projects are narrative schedules, gantt chart, linear schedules, and critical path method schedules.

Construction project involves multi party participation. It may be a government project, or a private developer. Multi party participation brings numerous constraints as the needs are different. Different needs may lead to constraints in project resulting in delay of work which can ultimately result into new constraints as the project will not be on schedule, which can bring cost consequences. The project manager or that particular engineer appointed for the project completion must handle the project on time, meet the clients needs, as well as make sure that the project will not be under any constraint, at present and also in future. It is necessary for the project manager to learn from the completed project and make sure that news projects are constraints free. Although new projects have different needs and a new structure which may give rise to a new constraint not encountered before, one can always identify potential constraints. Therefore controlling and eliminating the constraint is the pre-condition before any new project is started.

II. STATE OF DEVELOPMENT

A lot of research works have been done on the Constraint analysis,

Anjay Kumar Mishra et. al. In this paper according to the authors saying, in the early days management of project was of short duration with more stable environmental conditions. Whereas modern projects have complex site nature, they consume more time, cash flow is not balanced and the contractual agreements are also complex. The authors undertaken project was a rural road project namely Sankosh - Tipling Road and Bhimdhunga-Lamindanda Road in Nepal having sufficient human resources available with Nepal construction firms. The undertaken project had many constraints resulting into delay of the project.

Avinash Adinath Chougule et. al. in this paper identified the constraints on infrastructure construction project. The scope of the paper was to study and identify the constraints in construction industry for residential building scheme. The major root causes of financial related problems that would lead to delays in project was identified. Opinions of the parties upon the actions that they undertake to manage the financial problem was investigated. Quantitative techniques were used to analyze causes in order to give suggestive recommendations to reduce the delay problems by considering case study. Study was carried out based on literature survey and questionnaire survey. Author concluded that identifying and removing constraints from bottleneck activities help to reduce uncertainties in construction process and increase the transparency of project management.

Azar Izmailov et. al. The overall project consists of many critical and non-critical activities which has a clear time frame, giving a unique result in the form of products, services achievements and extending according to a predetermined plan. According to author any project task may take longer time but the entire project should complete in time. This paper introduced the implementation of critical chain project management which is a TOC tool used for planning and project management. Author used three steps i.e. i) coordination of conveyor of project with restriction, ii) time planning of project implementation, iii) using buffer for management decision. The result of applying these three steps accelerated the flow of work and completion of the project. According to authors study companies using this concept completed their project more than 95% on time and project duration was reduced by 20-25%.

Mr. Harish R Rajmane et. al. With the increase in construction companies there is also a rise to struggle and survive in a global competition. In this paper author conducted study based on literature review and questionnaire through email and in personal. Following literature review were studied by the author i) key constraint analysis with integrated production scheduler ii) Quantification of delay factors using the relative importance index method for construction project in Turkey iii) Identification of constraints in construction projects to improve performance iv) An assessment of factors causing delays on building construction projects in Uganda v) Financial related causes contributing to project delays.

Hemaloshinee Vasudevan et. al. The author in this paper has studied the working of different construction companies and states the importance of quality management. According to the study quality management techniques has significant effect on organizational networking and organizational success ultimately improving the product quality, thereby reducing cost and increasing consumer satisfaction. Apart from the theory quality management is actually used in many industries across the countries. Finding the project constraints can led to better implementation of quality management. To overcome all the limitations affecting quality management author has mentioned the use of TOC procedure and methods. Activity based costing (ABC) is used by organization to handle the cost management methods such as target costing and theory of constraint. TOC and ABC was differentiated based on assumptions, resource

capacity, Direct labor cost behaviour and cost operation, process / quality improvement, profit improvement and horizontal plan for mixed products and volume.

Marylin Mumbi et. al. Any project is said to be a successful project if it is completed within a defined schedule by implementing management skills, tools, resources. But the project nowadays stop at different stages due to many constraints. Author in this project mentions the progress of construction companies in Kenya which has always maintained an upward trend in growth. In 2013 and 2014 the construction industries in Kenya had contributed 4.8% and 7 % respectively to the gross domestic product (GDP). According to authors study the construction regulation authorities had eliminated those corrupted cases in construction filed which focuses mainly on material quality and contractors performance. And in order to neglect such cases building codes are revised to ensure relevance. The inspection units are bribed to avoid inspection of those construction projects which do not meet the building specifications. Author further states that in Kenya, it continues to face a number of challenges i.e nothing but the constraints. Author has conducted few studies on how those constraints can be eliminated or managed so that the expected project goal is achieved.

Priya Bhagdevani et. al. Construction industries need to follow and grow with new technology and concepts, but still traditional management concepts are followed. Theory of Constraints is a management philosophy which has derived CCPM scheduling from traditional methods. Author in this paper has conducted literature survey covering many blogs on TOC though many papers have discussed it theoretically it is also useful to collect and analyze the actual reported data. Although the main application of TOC is in manufacturing field, it has also proven to be successful in construction project management.

Saba Sultana et. al. In this paper author Saba Sultana used questionnaire survey with five point scale questions and some ranking form various parties involved in the construction project about the constraints they faced during the completion of the project in the company. The impact of a given constraint on the project was to be ranked by the respondent. Later the questionnaire survey was analysed and recommendation for the administration was specified to have the constraints reported and to consider those constraints in the relevant plant and schedule just as the planning of the organizational structure. It was mentioned by the author that managers play a vital role in execution stage of project therefore it's their duty to monitor the advancement and know about the constraints they experience. The author proposed that the manager should enable versatile management of the prevailing conditions. Author regarded the outcomes adequately demonstrated of how constraints in construction project would resemble.

Uttpal Rai et. al. Author in this paper identified major constraints and their level of impact on construction project. For this purpose a questionnaire was prepared and sent to all stakeholders of the project such as government bodies, contractors, engineers, consultants, beneficiaries and local people. The responses from everyone were recorded and used as a major tool for their study. Also data was collected in terms of quality, quantity, primary data and secondary data and was analyzed by simple statistical tools and techniques and presented in the form of tables, charts and figures. It was concluded from the study that each constraint must be identified at the planning stage and must be a plan for encountering these constraints. There may be a number of constraints which cannot be either identified or they cannot be clubbed in the study. Those constraints may play a very vital role in implementation of the project. Economical, environmental and legal constraints must be identified in the planning stage. Social constraint must be solved keeping an eye on the sentiments of the local people.

III. CONCLUSION

This research is solely discussed in terms of a literature review. The study's findings suggest that in the early days management of project was of short duration with more stable environmental conditions. Quantitative techniques were used to analyze causes in order to give suggestive recommendations to reduce the delay problems by considering case study. Authors concluded that identifying and removing constraints from bottleneck activities help to reduce uncertainties in construction process and increase the transparency of project management. The overall project consists of many critical and non-critical activities which has a clear time frame, giving a unique result in the form of products, services achievements and extending according to a predetermined plan. According to the study quality management techniques has significant effect on organizational networking and organizational success ultimately improving the product quality, thereby reducing cost and increasing consumer satisfaction. Finding the review constraints can lead to better implementation of quality management.

REFERENCES

- 1) Anjay Kumar Mishra , Kailash Kumar Moktan (February 2021) “Identification Of Constraints In Project Schedule Management” International Journal of Research, Volume 7 Issue 2.
- 2) Avinash Adinath Chougule, Dr. D.N.Mudgal, Prof. S. B. Patil, (July 2019) “A review paper on quantifay the different constraints for delay in infrastructure construction project work and recommending corrective measures for the same”, International Research Journal of Engineering And Technology, ISSN: 2395-0056 , Volume 6 Issue 07 July 2019.
- 3) Azar Izmailova , Diana Kornevab , Artem Kozhemiakinc (2016) “Effective Project Management with Theory of Constraints” 5th International Conference on Leadership, Technology, Innovation and Business Management, Science Direct.
- 4) Harish R Rajmane, Dr. A. K. Gupta , Prof. D. B. Desai, (2017) “A review paper on To Identify the Various Constraints for Delays in Construction Work and Suggesting Remedial Measures for the Same” Imperial Journal of Interdisciplinary Research (IJIR) Vol-3, Issue-2, 2017.
- 5) Hemaloshinee Vasudevan, (August 2021), “Theory of constraint application on quality management and organizational performance in the construction industry” INTI JOURNAL eISSN:2600-7320 ,Vol.2021:003.
- 6) Marylin Mumbi, Michael Mundia (April 2020) “Influence of Management of Project Constraints on Completion of Building Construction Projects in Nakuru County, Kenya”, The International Journal of Business Management and Technology, Volume 4 Issue 2.
- 7) Priya Bhagdewani, Prof. A. K. Kanase, Prof. R.D.Shinde (June 2017), “ Applying Theory Of Constraints in Project Management” International Journal Of engineering Science And Research Technology, ISSN: 2277-9655 June 2017.
- 8) Purva Pardeshi , Dr Nagesh Shelke , Ashish P. Waghmare (February 2020) “ Approach of Critical Chain Project Management in Residential Construction Project” Iconic Research And Engineering Journals, volume 3 Issue 8.
- 9) Saba Sultana, (March 2019) “Empirical Study On Theory Of Constraints In A Construction Project Management” Journal of Emerging Technologies and Innovative Research (JETIR) Volume 6, Issue 3.
- 10) Siddesh Pai, S.Giridharan, “Application Of Theory Of Constraints And Critical Chain Method For Project Management In Ultra Mega Power Projects (Umpp)” International Journal of Power System Operation and Energy Management ISSN:2231-4407, Volume-2, Issue-3.
- 11) Surbhi Rithe, Maithilee Thakare (December 2020) “Theory of Constraints in Constructio Projects” International Research Journal of Engineering and Technology, ISSN:2395-0056 Volume 07 Issue 12 December 2020.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details