JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Life Cycle Analysis Of Building

Prof. Sneha Sawant[a,*], Sam Pullantharail[b], Ritesh Gaikwad[b],

Vishal Madane[b], Tushar Barate[b], Omkar Markad[b]

[a]*Assistant Professor, Dept. of Civil Engineering, DYPCOE Akurdi, Pune 411044, India*
[b]*Student of B.E.,Civil Engineering, DYPCOE Akurdi, Pune 411044 India*

Abstract

With the goal of determining the most effective strategy for shortening construction times in building projects, this study proposes to undertake an extensive life cycle analysis of two construction methods, namely conventional and mivan techniques. The LCA covers every stage of a building's life cycle, including the extraction of raw materials, manufacture, construction, operating phase, and end-of-life scenarios. The examination starts with an extensive evaluation of the literature that is already available on traditional building methods and mivan techniques, emphasising their essential features, benefits, and limits.

Keywords: Life Cycle Analysis, LCA, Mivan techniques, Conventional techniques, Construction time.

1. Introduction

One of the important economic sectors in India is construction, which plays a crucial role in development. India currently has the second-largest urban population in the world, and as it continues to develop, housing demand will only increase. To address this issue, India urgently needs to plan for the acquisition of land and the quick construction of houses. The complex process of construction primarily involves the fields of architectural planning, engineering, and construction. Today, there is a growing understanding that building pace needs to be given more weight, especially for major housing projects. This is necessary not just to achieve the national goal of creating more jobs, but also to enable faster equipment and investment turnover, which could reduce the cost of housing.

Literature Review

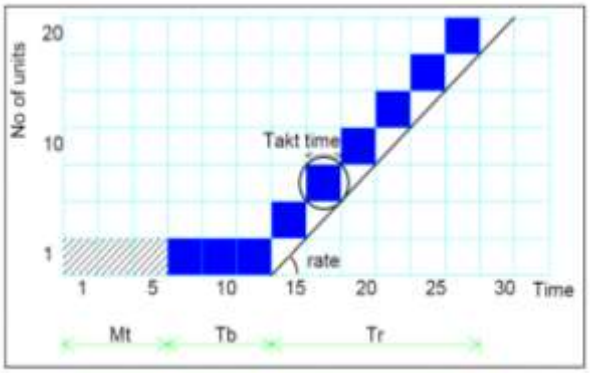
The building industry is a significant economic sector in India and is essential to growth. The second-largest urban population in the world is now found in India, and as the country develops, housing demand will only rise. India must make urgent plans for the purchase of land and the prompt construction of homes in order to address this issue. Architectural planning, engineering, and construction are the three main disciplines that go into the complicated process of construction. Building pace needs to be given more consideration in modern society, particularly for large housing developments. This is required to enable faster equipment and investment rotation, which may lower the cost of housing, in addition to helping the country reach its goal of increasing employment. [Mr. Trahash K. in 2017]

Time and money are two crucial components that are essential to every building operation. It is now necessary to estimate the construction's cost and completion time. There is a shortage of housing due to the simultaneous development in the stock of the Indian building industry, rapid population growth, and urbanisation. Mivan Technology is one of the quickest methods of construction technology. The author attempts to compare the nonlinear behaviour and performance of Mivan structures to conventional structures. The models for both types of structures use the same materials, the same loading configuration, and the same plan and elevation. [Pawan M in 2017]

India currently has the second-largest urban population in the world, and as it continues to develop, housing demand will only increase. To address this issue, India urgently needs to plan for the acquisition of land and the quick construction of houses. The formwork employed in the project, which makes up around 35 to 40% of the entire project cost of the structure, is one of the most crucial elements in determining the success of a construction project in terms of speed, quality, cost, and safety of work. Both the client and the contractor want to complete a construction project quickly because the client wants to use the facility for its intended function as soon as possible. To increase his profit, the contractor wants to complete the project as soon as feasible. By establishing a very short floor cycle, the job can be completed in mass house construction more quickly than any other method. The formwork type, which is the primary time component in a building project, had a

significant impact on how quickly a floor would be constructed. The author discusses the current formwork system employed in Tamilnadu's mass home building and illustrates how each one would impact project length, project cost, and project quality. [R. Thiyagarajan in 2017]

. [Arditi, Detal in 2002]



According to the author, a Malaysian company created the aluminium formwork system, which is how the aluminium formwork technology got its name. Mivan is a novel building technique that will soon be used to successfully complete a large housing project in India. The author compares the costs of mivan technology and traditional construction techniques. In comparison to conventional, Mivan technology is excellent in terms of cost, quality, and time savings. To acquire feedback on mivan technology from the residents of the houses built using this technology, the author solicits reviews from them. By employing "Master Glenium ACE 30JP" admixture, the author has provided a corrective remedy for one of the flaws in mivan technology, namely segregation during the placement of the concrete, which results in honeycombing in shear walls. [Kushal Patil in 2015]

LCCA Procedure

The stages of the LCCA structured technique may be described as follows:

1. Specify the project's options.

2. Choose between a likely and a decisive strategy.

3. Choosing general economic factors: Discount rate, analysis timeframe.

4. Create a different expenditure stream:

a) The timing and design of policies for rehabilitation.

Cost projection from the agency.

c) Calculate the user cost difference.

d) A societal differential costs estimate.

5. Net Present Value is computed for each choice.

6. The sensitivity analysis compares and explains the results.

7. If necessary, reevaluate your design tactics.

Methodology

It is difficult for the project manager to find which activity is going on particular floor when it comes to the construction project that is broken down into a large number of activities. Application of MSP scheduling technique can be done to the project consisting of repetitive activities as it facilitates the continuous monitoring of the project, at each milestone.

Case Study performed on site using mivan technology with the help of MSP software for scheduling.The main objective of this study is to draw graph for repetitive activities and compare the actual and delay work at each stage of work and crash the activities which are critical and to draw the inferences.

In high-rise residential building, number of activities is carried out like brickwork, plastering, plumbing, electrification, etc. on each unit, and same activities are repeated from one floor to another. For drawing graphs, such repetitive activities and duration of each activity was collected. Also, to draw the histogram and to calculate activity progress rate, EFR and IFR, number of labours associated for each activity was collected in detail from the respective site.

Sl. no	Shuttering items	Shuttering quantity	Total Cost of Mivan Technology	Total cost of Conventional formwork
1	Column	40.38	363420	20190
2	Beam	24.2292	218062.8	12114.6
3	Slab	256.11	2304990	128055
			2886472	**160359.6**

Sl. No	Description	Unit	Mivan technology
1	Material cost	Sq. mtr	900(From site)
2	Labour cost	Sq. mtr	37.1612(From site)
3	Number of repetitions		200-300 times
4	Minimum duration of slab cycle		10 days
5	Total cost per slab (Material + Labors)		=Total Area per slab*Labour cost *Material cost=966.67*37.1612*900= 32330355.48
6.	No. of days per tower		467

Sl. No.	Description	Unit	Convention al formwork
1	Material cost	Sq. mtr	500 rs. (from site)
2	Labour cost	Sq. mtr.	10.1 rs. (from site)
3	Number of repetitions		15-20 times
4	Minimum duration of slab cycle	days	21 days
5	Total cost per slab (Material + Labors)		=Total Area per slab*Labour cost *Material cost=966.67*10.1*500=4881683.5
6.	No. of days per tower		992

Result

For repetitious work, the assumed productivity rate is twice the actual production rate.The project's chosen activity is RCC work and bricklaying, which is done 14 times every level.The Mivan formwork approach is suggested, in which brickwork activities and RCC slab activities are lowered and R=2 i.e. 467.2 days is obtained, in order to achieve the goal rate of production for these two activities (400-500 days as).

Refrences

1 Mr.Trahash K. Matey, Col. B. K. Bhonde Asst. Prof ,Asst . Prof. SudhanshuPathak , Mr. Bharat Kholia,*'A Case Study: Line of Balance (LOB) Method for HighRise Residential Project'*,Vol-3 Issue-4 2017

2 Pawan M. Walvekar, Hemant L. Sonawadekar, *'Seismic Performance Evaluation of Mivan Structural System v/s Conventional Structural System with Effect of SSI by Pushover Analysis'*,Volume: 04 Issue: 06 | June -2017

3 Arditi, D., Tokdemir, O. B., and Suh, K. (2002). "Challenges in Line-of-BalanceScheduling". ASCE, J. of Constr. Engrg. And Mgmt., 128:545-556.

4 Thiyagarajan, V.Panneerselvam, K. Nagamani, ''Aluminium formwork system using in high-rise buildings construction'' Volume 8, Issue 6, Nov - Dec 2017

5 KushalPatil, AjitkumarJadhav, Nikhil Shingate, ''Mivan TechnologyIJRET: International Journal of Research in Engineering and Technology,ISSN: 2321-0869, Volume-3, Issue-6, June 2015''