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TO ANALYZED THE BUILDING BY MIVAN TECHNOLOGY

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ABSTRACT

In this Research Paper, we have analyzed the Mivan method of construction and compared it with Conventional method on the basis of Cost, time of construction and method of construction. By the analysis, it has been determined that building facilities produced utilizing mivan formwork technology are quite expensive (i.e., 0.132%) than those built using the conventional method. This technology allows us to save a significant amount of time that's almost the half time while constructing high-rise structures. Monolithic casting of structural parts in a single pour saves time and improves the structure's strength and endurance. The advantages of mivan technology include increased material durability, consistent construction quality, reduced formwork system maintenance, and faster activity completion.

Keywords: Construction Method, Indian Building Construction Sector, Conventional Methods, Advanced Building, Equipment And, Methods, Materials, Planning Commission, Budget.

I. INTRODUCTION

Mivan Company Ltd. in Malaysia created the Mivan Technology System in the late 1990s as a system for mass house construction in poor countries. The units were to be made of cast-in-place concrete with an aluminium panel formwork. The technology ensured a quick and cost-effective construction process. The aluminium forms provide a concrete surface finish that enables for a high-quality wall surface without the need for significant plastering. This is one of the techniques that has been identified as being particularly well suited to Indian conditions for large construction, where excellent quality and speed may be attained.

Figure 1.1: Building Construction with Mivan Method

II. OBJECTIVE

1) Less Processes in Construction
2) Less Time of Construction
3) Reduce Wastage of Material in Construction
4) To achieve Economy in Construction

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III. PROBLEM STATEMENT

1) There are many stages and lengthy processes in Conventional Method.
2) More settling time in construction of Conventional members.
3) Wastage of Materials in Conventional construction.
4) Cracks due to shrinkage of concrete are likely to appear.
5) Due to less thickness of wall honey-combing is commonly seen problem.
6) Due to complexity and high density of reinforcement at corners segregation occurs.

IV. LITERATURE REVIEW & SURVEY

Review

In all the research papers the author have studied and compared the Mivan Technology with the Conventional Technology. In some of the research papers the author have found mivan technology is economical whereas in some of the research papers the author have found the mivan technology is quite expensive than the conventional, this depends on type and scale of project studied. But the common advantage of all the research papers is that the Mivan Technology provide more durability, strength and construction period is also less and somewhere almost the half than Conventional Method of Construction.

Survey

Rehan Baji, Mayank Gupta (2021), attempts were made to investigate numerous elements that may influence the selection of advanced equipment, techniques, and materials for accomplishing the following goals: Early completion of structure, cost-effective equipment, technique, or material purchases, lowering the project's direct costs, and producing fewer environmental pollutants in the project's surroundings as a waste product throughout its operation.

Aarti Nanasaheb Kote, Ahanti Nandeshwar (2020), the cost was discussed. Mivan technology is compared to traditional construction methods. In comparison to conventional technology, Mivan's technology is excellent in terms of cost, quality, and time savings.

Mrs Ashwini Namdeo Baviskar, et. al. (2020), construction time in Mivan vs. conventional construction Mivan will be delayed 14 to 15 days on each floor due to the fact that traditional construction takes longer. Mivan construction costs are lower than normal construction, and Mivan technology can cut project time in half. As a result, the Mivan technology is deemed unsuitable for modest projects.

Pramod Shinde. (2020), modern construction techniques, such as mivan technology, are one approach to address the demand for economical and efficient housing. The Mivan digital system is capable of providing higher-quality construction at unanticipated construction speeds while also being cost-effective.

Manik Moholkar, et. al. (2019), they compared traditional formwork to aluminium formwork, discovering that the cost of material per square meter required for mivan formwork is higher by 8500 rupees. Second, cost of project for 70 square meters is higher by 595000 rupees, and the number of repetitions possible for my one formwork is higher by 140 rupees. The labour cost of finishing work form is 3,03,37,500 rupees more. For conventional formwork, one limitation takes 10 to 15 days, however my one form work takes 4 to 5 days. In the end, they discovered that by employing my excellent work, they were able to saving up to 77500 rupee.

Azharuddin Ansari, Anwar Ahmad (2018), according to this study, the scrap value of aluminium formwork is 50%, which is more than the scrap value of other types of formworks. The biggest disadvantage of aluminium formwork is that it cannot be changed once it has been constructed. In this study, the building cost of my one formwork is more than that of traditional mivan formwork, but the time is nearly 25% less. The day conducts a comparison of standard aluminium and tunnel formwork in this investigation. This study reveals that the amount of waste generated in the construction of a building is substantial. When compared to traditional formwork, aluminium formwork produced less waste. By adopting aluminium formwork instead of traditional formwork, the entire project cost was lowered by around 40%. The overall time spent utilising aluminium formwork is about half that of traditional formwork. Aluminum formwork has roughly 200 to 250 different adaptations, which makes it more cost effective.

Akshay Gulghane et. al. (2018), aluminum formwork was examined in the construction of a high-rise structure. This research examines the current formwork system in use in mass house development in Tamil

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Nadu. The study was based on the duration of the project, the cost of the project, and the effect of the kind of formwork used on the quality of the work. A comparison of conventional and aluminium formwork has been completed. In this investigation, the circulation cycle of aluminium formwork is 7 to 10 days. Because aluminium formwork is made entirely of recyclable materials, it helps the environment by minimizing tree chopping. When comparing the cost of construction between Pavan City aluminium formwork and conventional formwork, it is found that when aluminium formwork is used 50 times, the cost of construction is 2% higher than conventional formwork, but when aluminium formwork is used 160 times, the cost of construction is 20% lower. In Pawan city, it takes 64 days to create a single block, whereas conventional formwork takes 24 2 days. Aluminum formwork has a 50% scrap value, which is greater than regular and iron formwork.

Yadav P.D, Associate Prof. Konnur B.A. (2018), when compared to the traditional method, the cost of building with MIVAN prefabrication increases by nearly 25%-30%. When compared to conventional method, the cost of building per square foot in MIVAN is up to 33% higher. In MIVAN, the gap in per. sq.ft building costs rises by over 392 Rs/sq.ft. MIVAN construction takes roughly a quarter of the time of traditional methods.

Prof. R. B. Bajare, et. al. (2017), honeycombing, concrete shrinkage cracks, and segregation are examples of problems. To address these flaws, advancements in concrete characteristics have been made to reduce construction concerns by using aluminium formwork or Mivan Techniques. Cost of capital: $20,85,000 43,47,500 in total savings Profit: 22,62,500 dollars.

Deep Jayesh Mistry, et. al. (2016), the unique on-site shape technology was examined and found to be more useful than the prior shape method. Modern structures can be exceedingly complicated in scale and size, or suited for modern building facilities or other requirements, in a number of ways, whether it is on a high-level or horizontal dispersed basis. Key aspects like as price, building speed, quality obtained, cycle time, and others are considered while choosing an efficient form technique.

Aaqib Majid Khan, Chitranjan Kumar (2015), they analyzed the cost of the usual approach to my one method and discovered that using aluminium formwork saved them Rs 54,843. They discovered that the structure is brown and liquid, with a specific gravity of 1.02 and a PH of 6.9. The compressive testing results show that the traditional strength is 414 kN as well as the mivan value is 453 kN for the first test, which lasted seven days. The second test is for 14 days, and the conventional intensity is 577 kN, while the Mivan power is 610 kN, and the third test is for 28 days, and the traditional strength is 798 kN as well as the Mivan power is 910 kN. My one is a system for organizing and executing the work of different concrete construction trades, including Complete insertion of steel reinforcement and electrical insert the shutdown of panels starts the work cycle. It takes between 12 and 15 hours.

Mr. Shankar Bimal Banerjee et. al. (2015), they calculated the costs for a total land area of 22.12 3 acre and a total built-up area of 25.5 5 million square feet. The cost analysis includes the cost of the column quantity, which totals 7346 1.77 rupees. The slab quantity is 7306 2.5 5 Rupees, charges are 1875 1.50 Rupees, and the beam bottom quantity is 1628 1.3 3 Rupees, for a total quantity of 29271 5.40 Rupees. So, the one-time cost is 18 30642 1.10 Indian rupees, and we can use about 200 patients, so the total cost is 9153 2.10 Indian rupees.

V. METHODOLOGY

❖ Method of Cubic Contents

The Cubic Contents Method is especially useful for determining the total volume of construction activity. The length, width, and depths of the building components are multiplied to give the total amount of that particular piece in this precise technique. In the case of surface plastering and other surfacing work, the total surface area is computed by multiplying the lengths by the breadth of the area to be worked on. The amount necessary to complete the work is calculated by multiplying the rate in terms of construction work by the entire quantity of work.

This technology is more commonly utilized in the construction of multi-story buildings. It is more exact than the other two techniques of computation, the plinth area technique and the unit base approach. The total cubical contents, i.e., the volume of the building multiplied by the applicable Local Cubic Rate, are used to calculate the cost of a building facility. The volume of a structure is calculated by multiplying its length by its breadth, depth, and height. The entire length and breadth of the structure are calculated out to the out of walls, except the plinth offset. The entire cost of the rope course, cornice, and corbelling, among other things, is overlooked.

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❖ **Formwork Preparation**

The entire prefabrication planning process is divided into three sections. All necessary information and reduction in the levels must be effectively obtained and adequately defined in the first stage. When working on similar building projects, a properly designed checklist can be quite useful in gathering all of the information needed to produce a thorough pre-plan. During the second stage, the formwork system that will be employed in the construction of the facility can be carefully chosen. In addition to the total costs of materials that must be used, the planning team's experience will impact the selection of the most efficient solution. A comprehensive database that captures all of the data gathered over a period of time can aid in the selection of a cost-effective system. All engineering-related designing tasks are included in the third stage. This is the most time-consuming element of the procedure. One of the most significant aspects of the system's operation at different phases of the project is adaptability. The focus should be on maximizing the reuse of existing materials and purchasing the bare minimum of materials that are Just-In-Time.

❖ **Aluminum Formwork System**

It is a type of aluminium formwork that is used to create the aluminium solution is a quick, easy, versatile, and cost-effective option. Aluform is an advanced formwork method that allows for the efficient construction of a cast-in-place concrete facility. The system is so quick that it only takes 7 to 10 days to complete a slab cycle, it's easy to use, versatile, and cost-effective because the overall number of reuses is higher, around 150-200 under varied conditions. Single unified RCC load bearing building facilities can be constructed by continuously pouring the concrete inside the wall and slabs during the same construction activity. The Aluform formwork technology provides an excellent seismic resistant building facility with significantly higher efficiency and a noticeably smooth finish. As a result, each floor of the facility has consistent and beautiful concrete shapes and finishes.

VI. ANALYSIS OF COST

Table 6.1: Grand Total (Conventional Method)

Particulars	Cost (INR)	Remark
1) Reinforcement	₹ 85,88,19,946.00	
2) Concreting	₹ 4,25,11,560.00	
3) Brickwork	₹ 2,73,37,752.00	
4) Plastering	₹ 4,53,12,822.00	(Material+ Labour Charges)
5) Formwork	₹ 4,65,992.00	(10 Repetition)
	Total = ₹ 97,44,48,072	

Table 6.2: Grand Total (Mivan Method)

Particulars	Cost (INR)	Remark
1) Reinforcement	₹ 8,87,06,29,146.00	
2) Concreting	₹ 10,50,62,672.00	
3) Brickwork	₹ 0.00	
4) Plastering	₹ 0.00	
5) Formwork	₹ 41,500.00	(250 Repetition)
	Total = ₹ 97,57,33,318	

❖ **Using Conventional Method**

Cost of the G+26 Floor Building (Single Floor Area=873.44 sq. m.) = Rs 97,44,48,072 /-

❖ **Using Mivan Method**

Cost of the G+26 Floor Building (Single Floor Area=873.44 sq. m.) = Rs. 97,57,33,318 /-

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VII. COMPARISON

Table 7.1: Comparison of Items

Sr. No.	Content	Conventional	Mivan
1	Concrete Grade	M35	M35
2	Thickness of Wall	160mm, 230mm	140mm, 160mm
3	Steel	32mm, 25mm, 16mm 10mm, 8mm	32mm, 25mm, 16mm 10mm, 8mm
4	Slab	150mm	125mm, 150mm, 180mm
5	No. of Floors	G+26	G+26
6	Floor Area	873.44 sq. m	873.44 sq. m

Table 7.2: (Cost Comparison between Conventional & Mivan Method)

Sr. No.	Particular	Conventional Method	Mivan Method	Cost Difference
1	Reinforcement	₹ 85,88,19,946.00	₹ 87,06,29,146.00	-₹ 1,18,09,200.00
2	Concreting	₹ 4,25,11,560.00	₹ 10,50,62,672.00	-₹ 6,25,51,112.00
3	Brickwork	₹ 2,73,37,752.00	0	₹ 2,73,37,752.00
4	Plaster	₹ 4,53,12,822.00	0	₹ 4,53,12,822.00
5	Formwork	₹ 4,65,992.00	₹ 41,500.00	₹ 4,24,492.00
	Formwork	(10 Repetitions)	(250 Repetition)	
Total =				**= -1285246**
				0.132% Uneconomical by Mivan

(Duration Comparison between Conventional & Mivan Method)

Table 7.3: Conventional Method

Conventional Method		
Sr. No.	**Activity**	**No. of Days**
1	Column Shuttering	48
2	Column Steel-Reinforcement	48
3	Buffer	8
4	Beam & Slab Shuttering	60
5	Beam & Slab Steel Placing	48
6	Levelling	12
7	Concrete Placing	24
8	Removal of Formwork	60
9	Brickwork	120
10	Plastering	120
11	Finishing	120
Total =		**668**

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❖ **Using the Conventional Method,**

The total duration required for completion of G+26 storey building is 668 days.

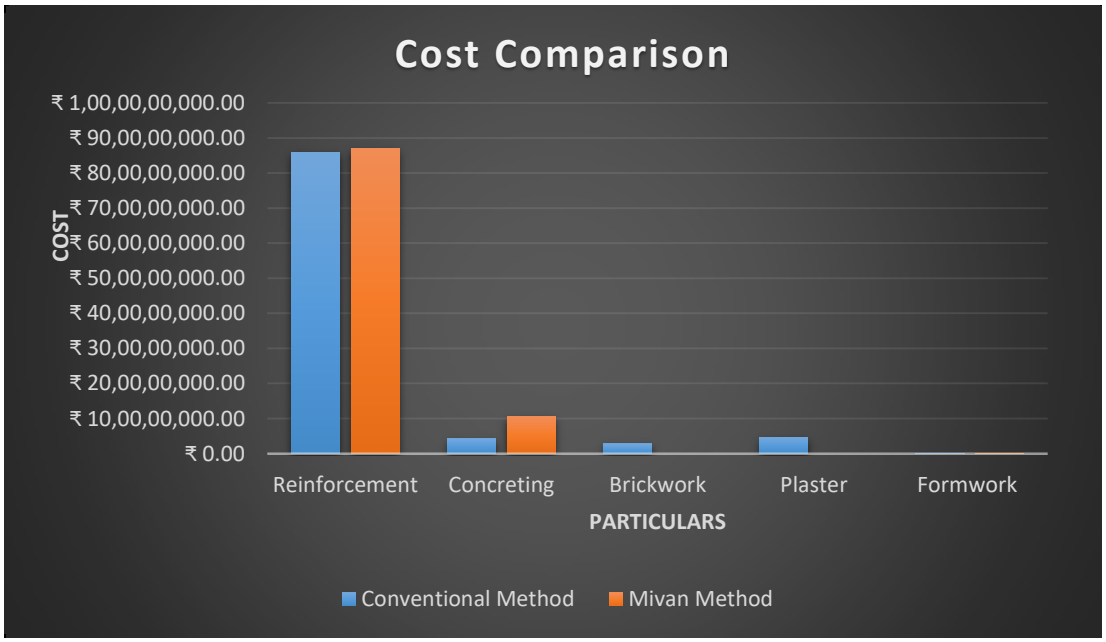
Table 7.4: Mivan Method

Mivan Method		
Sr. No.	**Activity**	**No. of Days**
1	All Shuttering	72
2	Conceal Electrification & Plumbing	72
3	Steel Reinforcement	24
4	Alignment Checking	12
5	Buffer Time	8
6	Concrete Placing	12
7	Removal of Vertical Formwork	8
8	Removal of Other Formwork	56
9	Lifting of Wall Panel	8
10	Painting & Etc.	80
Total =		**352**

❖ **Using the Mivan Method**

The total duration required for completion of G+26 storey building is 352 days.

VIII. RESULT



Graph 8.1: Cost Comparison

Using the conventional technology, the total cost of G+26 story building is Rs. 97,44,48,072 /- and by using mivan techniques the total cost of G+26 story building is Rs. 97,57,33,318 /- So, the total cost increase by mivan method is Rs. 12,85,246 /- (i. e. 0.132%).

Using the conventional technology, the total duration for completion of G+26 story building is 668 days and by using mivan techniques the total duration for completion of G+26 story building is 352 days. So, the total number of days saved is 316.

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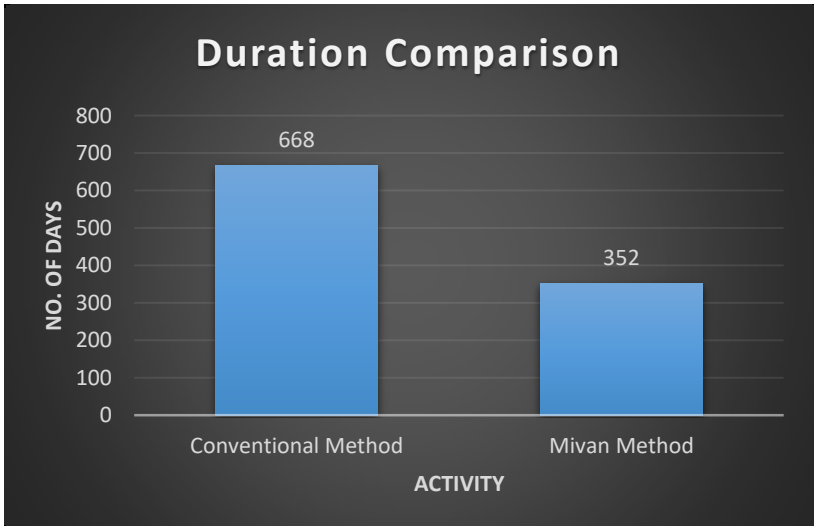

Graph 8.2: Duration Comparison

IX. CONCLUSION

It has been determined that building facilities produced utilizing mivan formwork technology are quite expensive (i.e., 0.132%) than those built using the conventional method. This technology allows us to save a significant amount of time that's almost the half time while constructing high-rise structures. Monolithic casting of structural parts in a single pour saves time and improves the structure's strength and endurance. The advantages of mivan technology include increased material durability, consistent construction quality, reduced formwork system maintenance, and faster activity completion. The disadvantages include a high initial cost, the demand of skilled labour at every stage of construction & it's not suitable for small structures.

X. REFERENCES

[1] Rehan Baji, Mayank Gupta. (2021): "Advance Equipment's, Techniques and Materials Used in Construction Industry "International Journal of Engineering Research in Current Trends (IJERCT) ISSN: 2582-5488, Volume-3 Issue-4, July 2021

[2] Aarti Nanasaheb Kote, Aahuti Ramesh Nandeshwar. (2020): "Duration Comparison of Mivan Formwork over the Conventional Formwork" International Journal for Research in Engineering Application & Management (IJREAM) ISSN: 2454-9150

[3] Mrs Ashwini Namdeo Baviskar, Mr. P N Patil, Mr P S Pawar. (2020): "EVALUATION OF L.O.B. IN MIVAN TECHNOLOGY USING SOFTWARE" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 07 Issue: 08 | Aug 2020 www.irjet.net p-ISSN: 2395-0072

[4] Pramod Shinde. (2020): "A REVIEW PAPER ON FEASIBILITY OF MIVAN FORMWORK TECHNOLOGY OVER CONVENTIONAL FORMWORK" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 07 Issue: 05 | May 2020 www.irjet.net p-ISSN: 2395-0072

[5] Miss Manik Moholkar, Prof. Dr. (Mrs.) Vidya, Nitin Patil. (2019): "Productivity Analysis of Building Construction Using Mivan Formwork" INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN TECHNOLOGY

[6] Azharuddin Ansari, Anwar Ahmad. (2018): "A Review Paper on Aluminium Formwork and It's Utilization in Affordable Housing" JETIR December 2018, Volume 5, Issue 12 www.jetir.org (ISSN-2349-5162)

[7] Akshay Gulghane, Nikhil Pitale, Sanket Sanghai. (2018): "Time and Cost Optimization of Construction Project Using Mivan Technology" Journal of Engineering Research and Application www.ijeracomISSN: 2248-9622, Vol. 8, Issue 8 (Part -II) Aug 2018, pp 70-74

[8] Yadav P. D, Associate Prof. Konnur B.A. (2018): "Review Paper on Conventional and Mivan Formwork used for Construction" International Research Journal of Advance Research in Science and Engineering.Vol no.7, Special Issue No. 04, April 2018

[9] Prof. R B. Bajare, Shubham Deshmukh, Ashwin Mahajan, Roohi Karnataki, Indrayani V. Patil. (2017): "A

Review Paper on Remedies to the Common Deficiencies Faced in Mivan Technology" IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) e-ISSN: 2278-1684, p-ISSN: 2320-334X, Volume 14, Issue 2 Ver. IV (Mar. - Apr. 2017), PP 24-26 www.iosrjournals.org

[10] Deep Jayesh Mistry, Prof. Amit D. Raval, Dr. J. R. Pitroda. (2016): "Emerging Trends in Advancement of Formwork" International Journal for Research in Applied Science & Engineering Technology (IJRASET) ISSN: 2321-9653;

[11] Aaqib Majid Khan, Chitranjan Kumar. (2015): "Impact of Mivan Formwork over Conventional Formwork" International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064

[12] Mr. Shankar Bimal Banerjee, Mr. Pawan Dilip Barhate, Mr. Vipul Pradip Jaiswal. (2015): 'MIVAN TECHNOLOGY" INTERNATIONAL JOURNAL OF INNOVATIONS IN ENGINEERING RESEARCH AND TECHNOLOGY [IJIERT] ISSN: 2394-3696 VOLUME 2, ISSUE 3.