

# Cost Evaluation of Project of Prefabricated Material Using MSP

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**Abstract-** Prefabricated buildings and structures are mounted from uniform prefabricated three-dimensional units, providing strength, preset thermal properties of structures, dynamic stability, and immutability of geometric dimensions of the prefabricated elements during their manufacture, transportation, and installation in special and difficult conditions. Prefabrication has been widely regarded as a sustainable construction method in terms of its impact on environmental protection. One important aspect of this perspective is the influence of prefabrication on construction waste reduction and the subsequent waste handling activities, including waste sorting, reuse, recycle, and disposal. Suggestions for improvement of the industry and study on cost effectiveness of precast concrete construction. In this project the replacement of non-structural component with prefabrication element is proposed. The cost benefit analysis will be studied including prefabrication element in conventional building.

## I. INTRODUCTION

Prefabrication has been widely regarded as a sustainable construction method in terms of its impact on environmental protection. One important aspect of this perspective is the influence of prefabrication on construction waste reduction and the subsequent waste handling activities, including waste sorting, reuse, recycle, and disposal. Never the less, it would appear that existing research with regard to this topic has failed to take into account its innate dynamic character of the process of construction waste minimization; integrating all essential waste handling activities has never been achieved thus far. This report proposes a dynamic model for quantitatively evaluating the possible impacts arising from the application of prefabrication technology on construction waste reduction and the subsequent waste handling activities.

## II. OBJECTIVES

- To study construction process of prefabrication systems.
- To compare prefabrication construction with conventional construction in terms of cost, work breakdown structure and feasibility.

- The object of this seminar is to identify new methodologies in the Construction Industry.
- To identify the cost benefit analysis to change parts of RCC building with prefabrication parts for instance doors and windows frame, prefabrication walls, W.C., bath and staircase.

## III. STUDY AREA OF THE PROJECT

With an expanding population and rapid growth of places, wiser approaches to handle complexities, increase efficiency, and improve quality of life have been apparent in recent years. This has necessitated the creation of cities that Monitor and integrate infrastructure in order to better optimise resources while providing the best possible service to their residents. The project considers the issues that the emergence of smart cities in network societies poses to urban planning. It mirrors, in particular, reductionist trends in current smart city planning. Rapid urbanisation in Pune and the surrounding city region puts a strain on infrastructure systems and services, as well as inhabitants and the environment, necessitating the creation of innovative, long-term solutions to urban development problems. The notion of a smart city is introduced, as well as the obstacles that come with a lack of infrastructure and basic utilities.

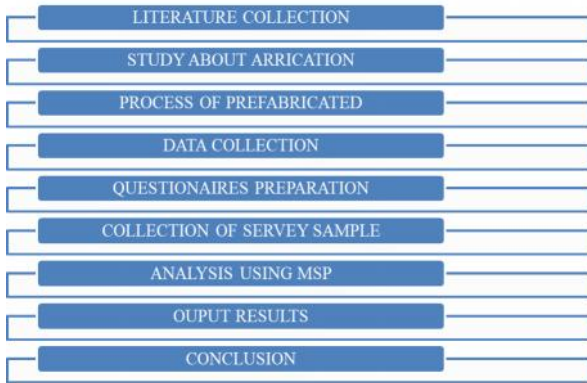
In this project we have selected the area near Hadapsar, which is reserved as ITP development area by PMC, PUNE. We have selected total 300 acres of land nearby the Ram Hill Industrial area to develop our township project.

### • Prefabrication In India

The Hindustan Housing Factory pioneered the production of pre-stressed concrete railway sleepers to replace dilapidated wooden sleepers on Indian Railways. The company changed its name shortly thereafter to reflect the diversity of its operations. It is now known as the Hindustan Prefab Limited or HPL. Located in Delhi, today the government turn company prefabricates primarily precast concrete for architectural and civil projects throughout greater India. With the integration of sustainability into building

systems and the alleviation of negative environmental impacts, building construction has become more than a simple move from the drawing board to the construction site. Building design involves a plethora of factors; the ability to make intelligent design decisions and select the most suitable among construction alternatives is beneficial, especially in today’s competitive construction market.

**IV. METHODOLOGY**



**Fig.1. Methodology.**

**4.1. Prefabrication in housing construction:**

It is very clear that automation brings great value to businesses. It allows them to achieve higher capacities, improved quality and a wider product range, as well as allowing more options to be offered at significantly higher productivity. Companies that run automated prefabrication thus appear to be very satisfied. As to the question of whether the machine technology pays off, we are seeing a consistently positive image. It is important to think through and plan the transition process precisely. Ideally, experts should be involved at an early stage in the process in order to get the best possible result. By taking a step towards automation, businesses are set up for the future.

Microsoft Project is really a computer database that uses two main tables of data to keep track of your project. Project uses one table to store information about the tasks of your project and the other for resource information. By using the many views available in Project, you can display your project data from these tables in many different ways.

The Microsoft Project screen will vary depending upon the view, table, and filter that is currently active. However, you will need to become familiar with the basic components of the screen as shown below. Understanding the layout of the screen, and its components and terminology will help you in using Microsoft Project.



**Fig 2 prefabrication In Housing Construction**

**Benefits of Prefabricated Construction**

**Eco-Friendly** Modular construction is often commended for energy efficiency and sustainable construction. Traditional construction methods require extra materials that lead to increased waste. However, since prefabricated sub-assemblies are constructed in a factory, extra materials can be recycled in-house

**Financial Savings** One of the greatest advantages of prefabricated construction would be financial savings. Although the perception of custom-made pieces may seem expensive, with prefabricated or modular construction, this is not the case. Modular construction targets all budgets and price points, creating an affordable option Flexibility Modular construction can be easily be disassembled and relocated to different sites. This significantly reduces the demand for raw materials, minimizes expended energy and decreases time overall

**Consistent Quality** Since prefabricated construction occurs in a controlled manufacturing environment and follows specified standards, the sub-assemblies of the structure will be built to a uniform quality. Construction site-built structures are dependent upon varying skill levels and the schedules of independent contractors. These all contribute to the craftsmanship and overall quality of given structure **Reduced Site Disruption** Since many components of a building are completed in the factory, there is significantly less truck traffic, equipment and material suppliers around the final construction site

**Shorter Construction Time** Portable construction takes significantly less time to build than on-site construction. In many instances, prefabrication takes less than half the time when compared to traditional construction. This is due to better upfront planning, elimination of on-site weather factors, subcontractor scheduling delays and quicker fabrication as multiple pieces can be constructed simultaneously.

**Safety** Since sub-assemblies are created in a factory-controlled environment utilizing dry materials, there is less

risk for problems associated with moisture, environmental hazards and dirt. This ensures that those on the construction site, as well as a project's eventual tenants are less likely to be exposed to weather-related health risks.

#### 4.2. Cost Benefit of Prefabrication in Construction.

The method of making construction components in a manufacturing plant, shipping whole components or semicomponents to construction sites, and eventually assembling the components to make structures is referred to as prefabricated construction. Offsite construction, offsite prefabrication, precast concrete building, contemporary techniques of construction, and industrialised building are other words and acronyms related with prefabricated construction. Precast materials have lately been popular in the construction industry because to their benefits in environmental protection, quality and safety management, and construction scheme optimization. Based on the degree of prefabrication done on the product, prefabricated construction may be divided into four levels: component manufacture and subassembly, which are always performed in a plant and are not considered for onsite production, non-volumetric pre-assembly, which refers to pre-assembled components that do not enclose useable space, such as wood roof trusses, volumetric pre-assembly, which refers to pre-assembled units that do.

#### 4.3 Data Collection:

Data will be collected from two case studies one study will be done on the site where construction is done by the conventional method and another study will be considered of the site where prefabrication is used. The difference between both the approaches will be made

#### 4.4. Analysis

A comparative survey data analysis will be done from the data collected from both the sites with the help of MSP software. It is primarily a visualization tool, which has improved the ability to exchange complex ideas among project participants. It has become easy to generate and reuse the information for construction projects. This is a 'CIEPM' (Computer Integrated Enterprise Project Management) concept which allows the meaningful extraction of project management data, information and knowledge from the participants beyond their imagination.

#### 4.5. Application

- Prefabricated components speed up construction time, resulting in lower labour costs;
- prefabrication allows for year-round construction;
- Work is not affected by weather delays (related to excessive cold, heat, rain, snow, etc.);
- The mechanization used in prefabricated construction ensures precise conformity to building code standards and greater quality assurance;
- There are less wasted materials than in site-built construction;
- There is less theft of material/equipment (and less property damage due to vandalism);
- Materials are protected from exposure to the elements during construction;
- Worker safety and comfort level are higher than in site-built construction;
- On-site construction and congestion is minimized.
- Bad weather or hazardous environments at the construction site is minimized.

#### 4.6 Prefabrication's impact on Cost of the Construction

Prefabrication can significantly reduce the timeline on construction schedules. This reduced timeline lowers labor costs, keeps on-site overhead costs (such as security considerations and managing weather-related issues) in check, and allows stakeholders to move on to their next project — and their next paycheck — more quickly.

**Reduced Labor Force:-** In a prefab build, up to 80% of the traditional labor activity can be moved off-site to a controlled manufacturing facility. This labor relocation eliminates the need for many of the subcontractors who would usually be on a job site, as well as the margins they include in their quotes. Instead, some of the most skill-intensive and expensive types of work, from plumbing to mechanical, and even electrical, can be handled by in-house manufacturing workers, which reduces the overall costs of the project.

**Increased Efficiency on the Job Site:-** A standardized, automated, and controlled factory environment greatly reduces downtime on the job site and has the potential to double productivity above what can be achieved with traditional builds. This is even before you consider the productivity benefits of establishing simplified, repetitive processes or utilizing advanced automation equipment.

**Long-Term Savings:-** When looking at the cost of any project, it's important to focus on the full-life cost, not just the construction costs. The increased precision of construction that happens in a prefab build within a factory environment

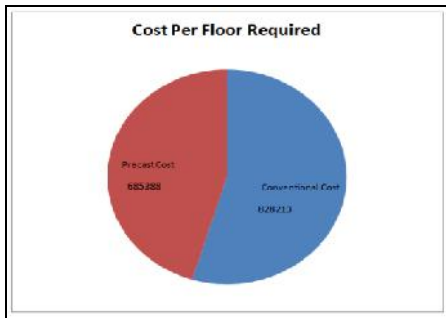
can have a significant impact on the performance of the building itself. In fact, one client quoted in the McKinsey research reported lower energy bills in its buildings by 25% after the transition to modular construction.

**The Future Cost Benefits of Prefab Construction:-**

Prefabrication is a relatively new concept and isn't yet fully understood by the financing industry in some parts of the world, today's lending rates for projects utilizing off-site construction tend to be higher. However, this will change over time as more research is conducted, track records are developed, and scale is achieved. In design and construction, time equals money. Prefab building comes with countless opportunities to increase efficiency every step of the way — a benefit the traditional construction industry can't afford to ignore.



**Fig 3:- The graph shows that the combination of cost saves per floor and time saving. From that the total time saving is 26% and the average components cost saving is 17.24%**



**Fig 4:- This pie chart shows cost between conventional and precast/ prefabricated construction.**

**V. EXPECTED CONCLUSIONS**

- The study of prefabrication process is done which finds that prefabrication reduces activities related with repetitive body movements, ergonomic challenges & ergonomic problems & 92% workers reported that use of prefabrication preassembly reduce hazards related to material handling on site & that reduction of scaffoldings through use of prefabricated preassembly or precast components would lead to less fall on site.

- The comparative survey of conventional construction with prefabricated construction found that conventional construction requires 1.96 Cr rupees & 485 days to complete construction while 1.90 Cr rupees & 415 days required for prefabrication construction which shows that prefabrication process reduces time and cost required to construction for completion.
- In this way we found that prefabricated material reduces time as well as cost required to project for completion.
- By changing parts of RCC building with prefabricated parts like prefabricated walls, w/c, bath, staircase, doors & window frames we come to conclusion that prefabrication construction reduces time as well as cost required to project for completion.

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