Impact of Prefabrication Technology & Equipment on Profitability

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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.

1.2 Objectives:

- To study construction process of prefabrication systems.
- To compare prefabrication construction with conventional construction in terms of cost, work breakdown structure and feasibility.
- This project proposes a dynamic model for quantitatively evaluating the possible impacts arising from the application of prefabrication technology on construction optimisation.
- The object of this project 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.

1.3 Scope of the Project:

- Project deals about the theoretical apparatus defining a classification of prefabrication in construction.
- It deals about the criteria that influence the decision on the deployment of prefabricated elements to the project.
- It also brings the results of survey focused on the application of prefabricated construction methods.

1.4 Need for Project

- Prefabrication is one of the key elements of industrialization in construction.
- Prefabricated construction methods are presenting a range of techniques to improve the building construction, quality and how to reduce the negative impact of building production on the environment. Prefabricated structures are used for sites which are not suitable for normal construction method such as hilly region and also when normal construction materials are not easily available.
- PFS facilities can also be created at near a site axis done to make concrete blocks used in plane of conventional knick.
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- Structures which are used repeatedly and can be standardized such as mass housing storage sheds, godowns, shelter, bus stand security cabins, site

offices, fool over bridges road bridges. Tubular structures, concrete building blocks etc., are prefabricated structures.

1.5 Market Demands

The above mentioned trends started during the 1980s and have been gradually taking shape ever since. Before getting into technical details, it might be interesting to describe the meaning of the most prominent factors behind these changes.

- **Structural efficiency:** The idea here is to design structures and develop systems so that the building offers maximum efficiency to the user. For example create maximum exploitation capacity of the available building space by using more slender building components like in slim floor structures etc. Competition between different construction materials and systems is more and more judged in terms of performances and costs. Systems offering more floor area inside the building volume are increasingly competitive.
- **Flexibility in use**: Certain types of buildings are frequently required to be adaptable to the user's needs. This is especially the case with offices, but housing might also need to be more adaptable in the future. The most suitable solution to this effect is to create a large free internal space without any restriction to possible subdivisions.
- **Optimum use of materials**: Each construction material possesses specific properties and optimum applications. Until recently, the structure of a building was mostly build in the same material
- **Quality consciousness:** Quality has a broad meaning. Not only do the quality of materials and execution have to respond to higher standards than before, but also the quality in the domain as regards user friendliness, comfort and aesthetics is becoming more important.
- **Adaptability**: In the future, building design will have to take into account not just the direct costs for construction and exploitation, but also the deferred cost for adaptation or demolition.

1.6 Uses of Prefabrication

1. The most widely used form of prefabrication building and civil engineering is the use of prefabrication concrete & prefabricated steel sections in structures where a particular part or form is repeated many times.
2. Prefabricating steel sections reduces on-site cutting and welding costs as well as the associated hazards.
3. The technique is also used in office blocks, warehouses and factory buildings.
4. Prefabricated bridge elements and systems offer bridge designers & contractors significant advantages in terms of construction time safety environmental impact constructability and cost.
5. Radio towers for mobile phone and other services often consist of multiple prefabricated sections.

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.

Principle: (Aims)

- To effect economy in cost
- To improve in quality as the components can be manufactured under controlled conditions.
- To speed up construction since no curing is necessary.
- To use locally available materials with required characteristics.
- To use the materials which possess their innate characteristics like light weight, easy workability, thermal insulation and combustibility etc.

Methodology

Figure.1 shows Methodology adopted in this study

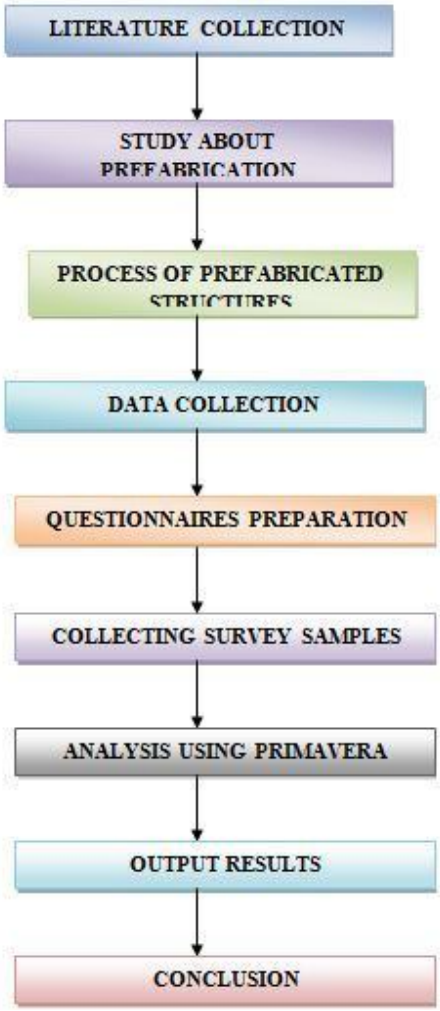

Fig.3.1 Methodology

II. LITERATURE REVIEW

Macroeconomic labour productivity and its impact on firm's profitability. Choi, K., Haque, M., Lee, H. W., Cho, Y. K., & Kwak, Y. H. (2013) , *64*(8), 1258-1268. In this paper it describes the construction industry is one of the largest sectors in the U.S. economy, yet little is known about the key macroeconomic parameters that affect its industry's structure and performance. The main objectives of this research are 1) to analyze the macroeconomic performance of construction industry as a whole and at fourteen of its sub-sectors in terms of labor productivity, gross margin, and worker's wages; and 2) to develop a quantitative model that predicts a firm's profitability by analyzing various levels of labor productivity. The results of a non-linear regression analysis based on the comprehensive U.S. Economic Census data show that the construction industry's sub-sectors with the highest productivity are the most profitable with regard to the gross margins that they are able to generate. This study and its model will help decision makers better assess macroeconomic performance and conduct trend analysis of the construction industry to serve as a basis for developing strategic roadmap for the future.

Following are the main findings from above:

- The main objective is to analyze economical performance of construction industry.
- To develop a model which increase profitability?

This paper studies the details on topic A Study of Cost Comparison of Precast Concrete Vs Cast-In-Place Concrete' Vaishali Turai Volume – 2, Issue – 2, June – 2016 The growth of Indian construction is going to become a fast to fulfill (meet) the need of future generation, time effective and achieving advance technique. The paper based on time comparison of precast concrete vs. cast-in-place (i.e. traditional) concrete. How total time of construction by precast concrete system is less than the time by use of cast-in-place concrete. Time of any construction is directly varied with cost of construction. The time required for steel binding, shuttering, concreting then time required for curing will be minimize (7 days).The Precast is manufactured in factory (i.e. in controlled environment) with required quality, easily mix, and cure till achieved good quantity with desired strength. Precast concrete is manufactured in factory and transport to site. The strength of precast concrete is achieved in greater extent by using high technology, controlled system. For precast construction less manpower is required, labors are required only to joint precast members. That means time required for excavation, PCC, steel binding, shuttering and deshuttering is eliminated. Precast members are cured in factory till gate desired strength so no need to cure on site result into save in time of currying. There for the time (in days) is saving in construction site. Precast construction technique enhanced the quality of work, save time, reduced the cost of construction required for maintenance of work.
Following are the main findings from above:

- The paper based on time comparison of precast concrete vs. cast-in-place (i.e. traditional) concrete.
- The strength of precast concrete is achieved in greater extent by using high technology, controlled system.

Factors Affecting the Cost of Building Work – An Overview 'Tony Cunningham' 2013-10-09

The issue of the cost of construction work is one that is rarely far from the minds of construction clients, design teams, constructors and, of course, quantity surveyors. The cost of constructing a building project is a primary concern for

the vast majority of construction clients. Indeed one of the most common initial questions a client has is what is it going to cost me?" often followed closely by „can we do it any cheaper?"Providing answers to such questions is a key objective of quantity surveyors, whose task it is to predict the likely cost of building work and to manage the evolving project design to ensure that the clients approved budget is not exceeded. This is a challenging task, which frequently involves one-off, unique, purpose made buildings and the QS typically operates within a design team brought together specifically for that particular project. Clients are often somewhat aware of what their building should cost. Indicative cost ranges for various types of development are regularly published by the larger quantity surveying practices and are also found in construction price-books. It is only natural for a client to question why their development cannot be budgeted at the lower end of the indicative cost range. Priorities directly influence the choice of procurement strategy and associated contractual arrangements, which regulate how the contract is to be operated and how risks are to be allocated between the contracting parties. These, in turn, impact on how the work is planned and carried out on site and influence the eventual level of productivity2achieved

Following are the main findings from above:

- Providing answers to costing of work is a key objective of quantity surveyors.
- The aim of the quantity surveyor in this process will be to maximize the value for money of the client

III. CONCLUSION

- As we get to know through various research work and field visits that the macroeconomics affects the structures and different performance parameters of industry , This investigation and its model will help chiefs better survey macroeconomic execution and direct pattern examination of the development business to fill in as a reason for creating key guide for what's to come. Research work suggests there should be quantitative model that predicts a company's gainfulness by examining different dimensions of work profitability, to use time comparison system, to provide answers to costing of work is a key objective of quantity surveyors . So far based on various researches we have come up with some aim that is as follows :
- To improve in quality as the components can be manufactured under controlled conditions.
- To speed up construction since no curing is necessary.
- To use locally available materials with required characteristics.
- To use the materials which possess their innate characteristics like light weight, easy workability, thermal insulation and combustibility etc.

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