



International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 9.935

Volume 15, Issue 5, May 2026

Implementation of Construction Management Strategies for Improving the Functionality of RMC Plants

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ABSTRACT: The rapid growth of infrastructure and urban development in India has increased the demand for concrete in construction activities. Conventional site-mixed concrete methods often face challenges such as inconsistent quality, labor shortages, space limitations, and execution delays. Ready Mix Concrete (RMC) plants provide an effective solution through controlled production, improved quality assurance, reduced wastage, and faster construction processes. However, many RMC plants still experience operational issues affecting productivity, quality, cost control, and efficiency. Effective construction management practices such as planning, supervision, quality assurance, inventory control, resource allocation, and process monitoring are essential for improving plant performance.

This research studies the operational functionality of RMC plants and identifies factors affecting their efficiency. The study was conducted through site visits, questionnaire surveys, and interactions with engineers, supervisors, project managers, and technical staff from RMC plants in the Pune region.

Based on the analysis, suitable remedial measures and management strategies were proposed to improve productivity and operational efficiency. The study concludes that proper planning, quality management, supervision, inventory control, and systematic monitoring can significantly enhance RMC plant performance, reduce wastage, improve customer satisfaction, and increase profitability in the construction industry.

I. INTRODUCTION

The construction industry plays an important role in the economic development of a country like India. With rapid urbanization, industrial growth, and increasing infrastructure projects, the demand for strong and quality construction materials has increased significantly. Among all construction materials, concrete is widely used because of its strength, durability, versatility, and cost-effectiveness. Earlier, concrete was mostly prepared manually or with small mixers at construction sites. However, site-mixed concrete often leads to problems such as uneven quality, higher labor dependency, poor supervision, and wastage of materials. In rapidly growing cities, limited space and traffic congestion also make on-site concrete production difficult.

To address these issues, Ready Mix Concrete (RMC) has become an important part of modern construction practices. RMC is produced in batching plants under controlled conditions and then transported to construction sites using transit mixers. This process helps maintain better quality, saves time, and ensures efficient use of materials. In India, the use of RMC began during major projects such as the Bhakra Nangal Dam and Koyna Dam, while its commercial growth increased rapidly during the 1990s with the rise of mechanized construction. Today, RMC plants are commonly used in projects like highways, flyovers, bridges, metro rail systems, residential buildings, industrial structures, and commercial complexes.

Even with modern technology, many RMC plants still face operational problems that affect their productivity and profitability. Smooth functioning of an RMC plant depends greatly on effective construction management practices such as proper planning, scheduling, quality control, supervision, inventory management, equipment maintenance,

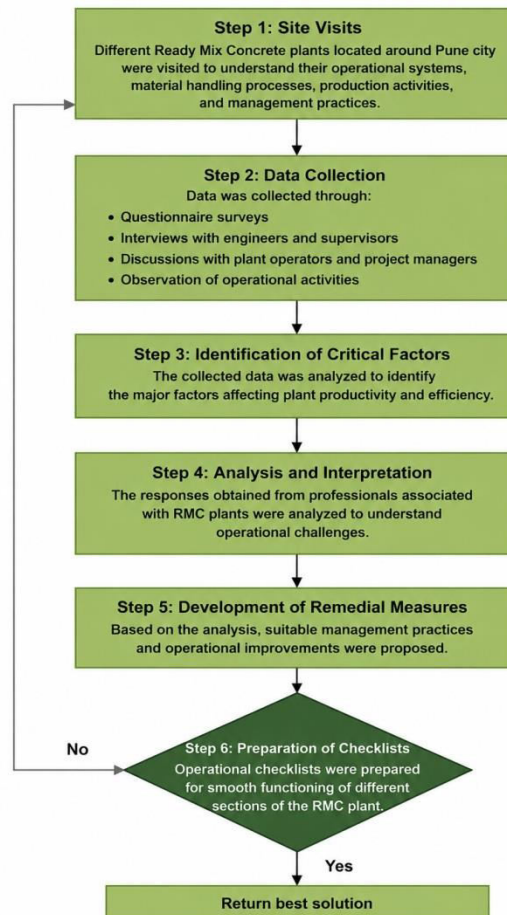
safety measures, and workforce coordination. When these management practices are implemented properly, they help improve operational efficiency, reduce material wastage, and maintain continuous production activities. Therefore, construction management plays a vital role in improving the overall functionality and performance of Ready Mix Concrete plants.

II. LITERATURE REVIEW

Several researchers and industry experts have studied the importance of Ready Mix Concrete plants and the role of management practices in improving operational efficiency.

1. Dr. S.K. Dave and his co-authors explained the challenges and opportunities of Ready Mix Concrete in India. Their study highlighted the increasing acceptance of RMC in large construction projects due to quality assurance and faster execution.
2. M. Takeyama discussed the future prospects of Ready Mix Concrete technology and emphasized the importance of mechanization and automation in improving productivity.
3. Arjita Biswas and P.R. Adavi studied the analysis of sludge formed in RMC plants and its environmental impact. Their research focused on waste management and sustainable practices in concrete production.
4. Prof. Jyoti Trivedi and Dr. Chakradhar Iyanni analyzed the use of Failure Mode Effect Analysis (FMEA) techniques for quality control in RMC production systems. Other researchers have studied labor productivity, supervision methods, quality control systems, inventory management, and construction management techniques for improving the efficiency of construction activities. The literature review indicates that effective management systems are essential for the successful operation of Ready Mix Concrete plants.

III. METHODOLOGY



Step 1: Site Visits

Different Ready Mix Concrete plants located around Pune city were visited to understand their operational systems, material handling processes, production activities, and management practices.

Step 2: Data Collection Data was collected through:

- Questionnaire surveys
- Interviews with engineers and supervisors
- Discussions with plant operators and project managers
- Observation of operational activities

Step 3: Identification of Critical Factors

The collected data was analyzed to identify the major factors affecting plant productivity and efficiency.

Step 4: Analysis and Interpretation

The responses obtained from professionals associated with RMC plants were analyzed to understand operational challenges.

Step 5: Development of Remedial Measures

Based on the analysis, suitable management practices and operational improvements were proposed.

Step 6: Preparation of Checklists

Operational checklists were prepared for smooth functioning of different sections of the RMC plant.

Case Study**1. UltraTech RMC Plant**

During the site visit, it was observed that the plant was actively supplying concrete for residential and infrastructure projects across Pune. The plant maintained proper laboratory testing records and calibration schedules, which helped in achieving better consistency in concrete quality and reducing rejection rates. However, delays during peak dispatch hours were noticed due to coordination gaps between batching operations and transit mixer scheduling.

2. RDC Concrete Plant

The RDC plant experienced a temporary production stoppage of nearly two hours due to shortage of aggregate stock. Plant operators explained that improper inventory monitoring and delayed communication with suppliers were the main reasons behind the interruption. The visit also highlighted operational delays during peak dispatch periods caused by inefficient transit mixer coordination.

3. ACC Concrete Plant

The ACC Concrete Plant demonstrated improved batching efficiency through the use of automatic admixture dosing systems. Compared to manual operations, the automated system significantly reduced human errors and enhanced batching accuracy. The plant also maintained better quality consistency through systematic operational practices.

4. Prism Johnson RMC Plant

The plant was observed supplying concrete for commercial and infrastructure projects in Pune. Operational activities were functioning efficiently; however, peak-hour dispatch management remained a common challenge similar to other plants visited during the study. literature review indicates that effective management systems are essential for the successful operation of Ready Mix Concrete plants.

IV. FINDINGS

Most RMC plants faced operational delays during peak dispatch hours due to improper coordination between batching operations and transit mixer scheduling.

Inventory management was identified as a major issue, especially at the RDC Concrete Plant, where aggregate shortage caused production stoppage.

Plants maintaining proper laboratory testing records and equipment calibration schedules achieved better concrete quality consistency and lower rejection rates.

Smaller plants relied more on manual supervision and operator experience, which increased the possibility of operational inconsistencies.

Automatic admixture dosing systems, as observed at ACC Concrete Plant, helped reduce manual errors and improved batching accuracy.

Effective quality monitoring systems directly contributed to higher operational efficiency and reduced wastage in RMC production.

V. CONCLUSION

Ready Mix Concrete plants play a major role in modern construction activities by providing quality concrete and improving construction speed. However, several operational challenges reduce the efficiency and productivity of RMC plants.

This study analyzed the major factors affecting the functionality of Ready Mix Concrete plants and highlighted the importance of construction management practices in improving operational performance.

The study concludes that the implementation of construction management strategies related to quality control, supervision, inventory management, purchasing procedures, scheduling, workforce coordination, and operational planning can significantly improve plant productivity, operational functionality, and profitability.

The implementation of systematic checklists, automation systems, and proper supervision can reduce material wastage, improve customer satisfaction, and ensure better quality concrete production.

Therefore, construction management principles are essential for achieving efficient, economical, and sustainable operation of Ready Mix Concrete plants.

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