

Top Management-Driven Quality Management: A Study of Small and Large Foundries in India

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Abstract – By providing cast components to the automobile, aerospace, railroad, construction, defence, and heavy engineering industries, the Indian foundry sector is essential to the manufacturing sector. Casting flaws, process unpredictability, material waste, high rejection rates, energy inefficiency, and growing international competitiveness are some of the industry's major obstacles. In this regard, sustainable industrial growth now depends on quality assurance and quality-centric methods. The necessity of methodical quality assurance procedures, process control systems, and continuous improvement techniques in Indian foundries is examined in this study. The study highlights that quality-driven systems enhance customer satisfaction and product dependability while simultaneously lowering costs and promoting long-term competitiveness and environmental sustainability. The combination of Industry 4.0, automation, and statistical quality tools for stable growth is further supported by recent research on KPI-driven foundry quality systems and sustainable control models. An important part of the manufacturing sector, the Indian foundry industry greatly boosts employment and economic growth. This study looks into how top management influences quality management procedures in Indian foundries of different sizes. The study examines implementation difficulties, strategic quality efforts, and leadership commitment at various operational scales. The results show that whereas major foundries use organized quality management systems, small foundries encounter obstacles because of limited resources, ignorance, and opposition to change. The report suggests a framework to improve quality performance in the Indian foundry industry and emphasizes the necessity of a leadership-driven quality culture.

Keywords – Foundry Industry, Manufacturing, Top Management, Quality Management, Six Sigma, SMEs

I. INTRODUCTION

The foundation of industrial growth is the foundry sector, which provides cast components to industries including infrastructure, automotive, and aerospace. With around 4,500 foundry units nearly 85 % of which are small businesses. India is the world's second largest manufacturer of casting. The industry confronts difficulties with productivity, quality, and global competitiveness despite its solid foundation. Instead of being an operational requirement, quality management is becoming a strategic necessity. In this situation, top management is essential in establishing quality policies, assigning resources, and cultivating a culture of continual improvement. A vital component of the manufacturing sector, the foundry business supplies vital cast components to the automobile, aircraft, railroad, defense, and infrastructure sectors.

India is now regarded as one of the world's top producers of castings, and its foundry sector has developed into an internationally competitive business. With about 4,500

units, the industry makes a substantial contribution to the country's GDP, exports, and job creation. The Indian foundry industry is characterized by a highly fragmented structure, with just a tiny percentage operating at major industrial scales and about 80–85% of units falling under the small and medium business (SME) category. A vital component of the manufacturing sector, the foundry business supplies vital cast components to the automobile, aircraft, railroad, defense, and infrastructure sectors.

India is now regarded as one of the world's top producers of castings, and its foundry sector has developed into an internationally competitive business. With about 4,500 units, the industry makes a substantial contribution to the country's GDP, exports, and job creation. The Indian foundry industry is characterized by a highly fragmented structure, with just a tiny percentage operating at major industrial scales. About 80–85% of units falling under the small and medium business (SME) category. Rather than only being an operational need, quality has become a strategic differentiation in recent years. Foundry companies have been forced to implement

systematic quality management techniques like Six Sigma, Lean Manufacturing, and Total Quality Management due to global rivalry, strict customer expectations, and regulatory requirements.

Although these approaches offer defined frameworks for process improvement and defect reduction, senior management's commitment and involvement are crucial to their successful implementation. Effective leadership is even more important in the context of foundry operations, where process control, material handling, and precision are critical. Top management plays a critical role in shaping the organization's quality vision, establishing policies, allocating resources, and fostering a culture of continuous improvement. Leadership commitment is often regarded as the driving force behind successful quality initiatives, as it ensures alignment between strategic objectives and operational practices.

Nonetheless, there is a notable difference between small and large foundries in terms of senior management engagement. Decision-making at small foundries is frequently reactive and centralized, with little focus on organized quality processes. Large foundries, on the other hand, typically use proactive, data-driven strategies backed by official quality frameworks and specialized quality teams. The sector as a whole experiences a disparity in sustainability, competitiveness, and quality performance as a result of this heterogeneity. Furthermore, new aspects of quality management have been brought about by the shift to Industry 4.0 and digital production, such as automation, predictive analytics, and real-time monitoring. Small foundries struggle with awareness, funding, and technical know-how, while major foundries are progressively adopting these technologies.

This emphasizes even more how important it is to have strong leadership to direct the adoption of new technologies and the transformation of quality. In light of this, it becomes imperative to research how top management influences quality management techniques. Gaining insight into how leadership affects quality results in various organizational settings can help the foundry industry as a whole perform better. In order to achieve quality excellence and sustainable growth, this article emphasizes the strategic role of top management through a comparative comparison of small and major foundries in India.

II. LITERATURE REVIEW

The use of quality management techniques in manufacturing, especially in the foundry sector, has been thoroughly researched, with a focus on approaches like Total Quality Management, Lean Manufacturing, and Six Sigma. Early contributions demonstrate Six Sigma's

efficacy in lowering faults and raising productivity, particularly in small and medium-sized businesses (SMEs). Six Sigma application greatly improves process capability and lowers rejection rates in Indian foundries, according to studies like [1] and [2]. The DMAIC technique is crucial for determining the underlying causes of casting errors and enhancing operational efficiency, as further supported by case-based research in [3] and [4]. In a similar vein, the application of process optimization techniques in [6] and design of experiments (DOE) as examined in [5] highlight the significance of data-driven decision-making in quality improvement programs.

Although organizational commitment plays a major role in its effectiveness, empirical studies such as [7] demonstrate that organized Six Sigma implementation results in quantifiable performance increases. By focusing on defect reduction, yield enhancement, and process standardization, additional research [8]–[12] supports Six Sigma's position as a potent tool for continuous improvement across industrial contexts, including foundries. The wider advantages, difficulties, and future directions of Six Sigma are covered in foundational publications like [11] and [13], which emphasize problems including implementation costs, cultural opposition, and the requirement for qualified staff. The concepts of Lean Manufacturing, as outlined in [15] and expanded in [16] and [22], complement Six Sigma by emphasizing value creation, process simplification, and waste reduction—all of which are essential for enhancing foundry performance. The growing significance of sustainable manufacturing methods is further supported by [17], which integrates lean and environmental factors. Furthermore, international standards like ISO 9001 [19] and strategic performance frameworks like the Balanced Scorecard [18] offer organized methods for coordinating quality goals with organizational objectives. The necessity of a comprehensive approach to quality management is emphasized by integrated approaches like Lean Six Sigma [21] and comprehensive quality philosophy covered in [20].

The efficiency of combining high-quality equipment with process optimization strategies is demonstrated by research that focuses primarily on productivity increase in the casting industries [23]. There is a significant knowledge gap about the role of senior management in spearheading these projects, especially when comparing small and large foundries, despite the wealth of literature on quality tools and procedures. Leadership commitment, strategic direction, and organizational culture have received little attention as important facilitators of quality success, whereas the majority of research concentrate on technical implementation and operational benefits. This

disparity highlights the necessity of conducting a thorough analysis of top management-driven quality management techniques in the Indian foundry industry.

Observations from Literature Review

Several significant findings on quality management procedures in the manufacturing and foundry industries are shown by a thorough examination of the examined papers [1]–[23]:

1. Strong Effectiveness of Structured Quality Methodologies:

Methodologies like Six Sigma and Lean Manufacturing greatly increase process capability, lower defects, and boost productivity, as the literature repeatedly shows. The majority of case studies show quantifiable increases in operational effectiveness and rejection rates following adoption.

2. Dominance of Tool-Based Approaches

Most studies concentrate on technical methods like statistical analysis, DOE, and DMAIC. Although these tools work well, they mostly focus on operational strategies rather than managerial or leadership facets.

3. Limited Focus on Top Management Role

The absence of a thorough examination of senior management participation is one of the most important gaps found. Few studies systematically assess leadership's direct impact on quality performance, despite the fact that it is sometimes cited as a success element.

4. Variation Between Small and Large Foundries

- Literature reveals a glaring discrepancy:
- Small foundries: inadequate resources, reactive decision-making, and informal processes
- Large foundries: more standard adoption, data-driven strategies, and structured systems

There are still few comparative studies that specifically examine these variations, though.

5. Implementation Challenges in SMEs

Small and medium-sized foundries frequently encounter issues like:

- Insufficiently qualified personnel
- Budgetary limitations
- Opposition to change
- Insufficient awareness and training

Adoption of modern quality methods is severely hampered by these issues.

6. Importance of Standardization and Certification

It is commonly acknowledged that frameworks like ISO 9001 are crucial for preserving consistency and raising consumer satisfaction. Compared to SMEs, large foundries are more likely to implement such standards.

7. Integration of Lean and Sustainability Concepts

There is a shift towards sustainable production, as evidenced by recent studies that highlight the integration of lean approaches with environmental issues. Long-term competitiveness is especially affected by this tendency.

8. Need for Cultural and Organizational Change

More than just technologies are needed for quality programs to be implemented successfully; organizational cultural change, employee engagement, and a continuous improvement attitude are all necessary.

9. Emerging Role of Integrated Approaches

Lean Six Sigma and other hybrid approaches are becoming more popular because they combine quality and speed to provide greater results than standalone approaches.

10. Research Gap Identified

There is a substantial research gap in leadership-driven quality management despite a great deal of work on quality tools and procedures, particularly:

- Comparative analyses of major and small foundries
- Top management's strategic role
- Leadership's impact on sustainability and quality culture

Although technical quality tools are well-established, top management commitment is still the most understudied yet crucial element in attaining long-term quality excellence in the foundry sector, according to the literature.

Research Objectives

1. To analyze the role of top management in quality management implementation
2. To compare quality practices in small and large foundries
3. To identify challenges faced by top management in achieving quality
4. To propose a leadership-driven quality management framework

III. ROLE OF TOP MANAGEMENT IN QUALITY MANAGEMENT

The effective application of quality management techniques in the foundry industries is largely dependent on top management. They actively shape company culture, guarantee resource availability, and spearhead projects for continual development in addition to formulating policies. Top management's dedication and leadership are critical to the success of quality systems like Six Sigma, Lean Manufacturing, and Total Quality Management.

6.1 Strategic Vision and Quality Policy Formulation

The organization's vision, mission, and long-term quality goals are defined by top management. A well-written quality policy guarantees that all staff members recognize the value of quality and coordinate their efforts with the objectives of the company. Instead of treating quality as a distinct function, leadership must make sure that it is incorporated into the overall business strategy.

6.2 Leadership Commitment and Direction

Top management's apparent dedication has a significant impact on the effectiveness of quality efforts. Leaders need to:

- Participate actively in high-quality initiatives
- Take part in audits and reviews
- Promote responsibility at all levels

This dedication sends a clear message throughout the company that quality is of utmost importance.

6.3 Resource Allocation and Infrastructure Development

Adequate resources are necessary for quality management, including:

- Skilled labor
- Cutting-edge equipment and technology
- Programs for training and development

The appropriate distribution of human and financial resources must be ensured by top management. This includes investing in cutting-edge casting technologies, testing apparatus, and process automation in the foundry industry.

6.4 Development of Quality Culture

A robust corporate culture is the foundation of a long-lasting quality system. Top management is crucial in promoting:

- Collaboration and employee engagement
- A mindset of constant improvement
- Customer-focused thinking

Long-term success depends on fostering a culture where everyone is accountable for excellence.

6.5 Implementation of Quality Systems and Standards

Adoption and implementation of structured quality systems, like ISO 9001, are driven by top management. Among their duties are:

- Creating standard operational processes
- Making sure that international standards are followed
- Tracking the efficacy of the system

Due to good leadership in system implementation, large foundries frequently exhibit more success.

6.6 Decision-Making and Data-Driven Management

Data-driven decision-making is a key component of modern quality management. Senior management needs to:

- Encourage the application of quality measures and statistical techniques
- Promote the gathering and analysis of data

Encourage making decisions based on evidence

In foundries, this is especially crucial for lowering faults and increasing process capability.

6.7 Training and Skill Development

Effective quality management requires ongoing training. Senior management ought to:

- Plan frequent training sessions.
- Promote the development of high-quality tool skills
- Encourage staff certification in quality techniques

For SMEs, where a significant obstacle is a shortage of competent labor, this is crucial.

6.8 Encouraging Innovation and Technology Adoption

As Industry 4.0 takes shape, senior management needs to spearhead the implementation of:

- Robotics and automation
- Systems for real-time monitoring
- Tools for digital quality control

Innovation keeps foundries competitive and raises the bar for quality.

6.9 Monitoring, Review, and Continuous Improvement

It is the duty of upper management to set up systems for:

- Monitoring performance
- Internal evaluations
- Reviews by management

Sustained quality improvement is ensured by ongoing feedback and remedial measures.

6.10 Risk Management and Problem-Solving

Risks like flaws, delays, and process failures are frequent in foundry operations. Senior management needs to:

- Determine possible hazards
- Put preventative steps into action
- Promote methodical approaches to problem-solving

6.11 Stakeholder and Customer Focus

One of the main results of quality management is customer happiness. Senior management needs to:

- Recognize client needs
- Assure prompt delivery and dependable products
- Establish enduring connections with stakeholders

6.12 Bridging the gap between small and large Foundries

In order to reduce inequities, top management is essential:

- Prioritize awareness, training, and gradual implementation in small foundries.
- Integration, automation, and international standards should be prioritized in large foundries.

Top management's responsibilities go beyond oversight to include strategic leadership, cultural change, and ongoing development. Traditional foundry operations can be transformed into quality-driven, competitive, and sustainable businesses with the help of effective leadership.

IV. CASE STUDIES: TOP MANAGEMENT-DRIVEN QUALITY IN INDIAN FOUNDRIES

Case Study 1: Six Sigma Implementation in a Medium-Scale Foundry (Piston Casting Industry):

Bikram Jit Singh and Dinesh Khanduja's well-documented study looked at a medium-sized Indian foundry that made piston castings. Issues found include limited productivity and a high scrap rate.

- The role of top management: Accepted adoption of Six - Sigma. Resources allotted for data collecting and training promoted methodical problem-solving

- Approach Used: Define, Measure, Analyze, Improve, and Control, or DMAIC

- Outcomes:

- Considerable decrease in scrap and faults
- Enhanced Process Capability
- Increased client satisfaction

The study found that overcoming SME opposition and successfully implementing Six Sigma required managerial commitment.

Case Study 2: Six Sigma for Defect Reduction in Green Sand Casting (Tamil Nadu Foundry)

A case study conducted at PSG College of Technology (Coimbatore) analyzed a green sand-casting foundry.

- Problem Identified: High rejection rates due to process variability

- Top Management Role:

- Initiated quality improvement project
- Supported use of statistical tools and modeling
- Invested in process optimization techniques

- Method Used: Six Sigma with Response Surface Methodology (RSM)

- Results:

- Significant reduction in casting rejection
- Optimization of process parameters
- Improved consistency in product quality

The study highlights that top management support enabled adoption of advanced analytical tools for quality improvement.

Case Study 3: Increasing Small-Scale Foundry Productivity (Automotive Casting)

- Six Sigma was used to increase productivity in a small-scale foundry that produced car components.

- Low first-pass yield and high defect rates were found to be the issue.

- The role of top management:

- Established a culture of constant improvement
- Encouraged making decisions based on data
- Facilitated training initiatives for staff members

- Technique: DMAIC method

Outcomes:

- The first-pass yield increased to about 79% from 67%.
- Decrease in the variance of the process
- Improved use of materials

This example demonstrates that when leadership aggressively promotes quality efforts, even tiny foundries can see notable gains.

Case Study 4: Using Six Sigma in a Small and Medium-Sized Foundry (Ingot Mould Manufacturing)

- Six Sigma was used in the creation of ingot molds by a tiny Indian foundry.

- The issue found is that poor sand quality causes casting flaws.

- The role of top management

- Funded initiatives aimed at improving quality
- Promoted process control and experimentation
- Supported instruction in high-quality equipment

Outcomes:

- Better sand quality
- Fewer flaws
- Enhanced output

This study demonstrates the importance of top management involvement in workforce skill building and process-level improvements.

Case Study 5: Enhancing Operational Effectiveness in the Casting Sector (Gujarat Foundry)

- Operational inefficiencies were the subject of a recent case study on a Gujarati casting facility.
- Issue Recognized:
 - o High flaws
 - o Unreliable quality
 - o Bottlenecks in processes
- The role of top management
 - o Promoted methodical problem-solving
 - o Put standard operating procedures into practice
 - o Encouraged monitoring and workforce training
- Outcomes:
 - o Enhanced dimensional precision
 - o Decreased flaws
 - o Improved standardization of processes

The study highlights that for long-term quality improvement, top management must incorporate training, standardization, and monitoring.

Case Study 6: Industry-Wide Analysis of Indian Foundries. A more comprehensive analysis of Indian foundry operations revealed:

- o Many foundries maintain a quality level of 3–4 sigma.
- o In piston casting operations, the application of Six Sigma decreased faults by about 15%.
- o Lack of awareness and leadership commitment is a major obstacle.

According to the study's findings, senior management plays a crucial role in bridging the gap between modern quality systems and old methods.

Key Insights from Case Studies

Across few Indian foundry case studies:

- ◆ The most important success factor is leadership commitment.
- ◆ SMEs can achieve significant improvements with structured guidance.
- ◆ Data-driven approaches significantly improve quality.
- ◆ Lack of management support causes quality initiatives to fail.
- ◆ Without leadership involvement, resistance to change is common.

TABLE 1. COMPARISON OF CASE STUDIES

Case Study	Type of Foundry	Problem Identified	Top Management Role	Methodology Used	Key Results	Key Insight
Medium-scale piston casting foundry	Medium	High scrap rate, low productivity	Approved Six Sigma, allocated resources, supported training	Six Sigma (DMAIC)	Reduced defects, improved process capability	Leadership commitment drives structured quality improvement
Green sand casting foundry (Tamil Nadu)	Small/ Medium	High rejection due to variability	Initiated quality project, supported statistical tools	Six Sigma + RSM	Reduced rejection, optimized parameters	Management enables adoption of advanced tools
Automotive casting SME	Small	Low first-pass yield, high defects	Promoted data-driven decisions, training programs	DMAIC	Yield improved (67% → ~79%), reduced variation	Even SMEs benefit with active leadership
Ingot mould manufacturing foundry	Small	Poor sand quality, casting defects	Invested in training, encouraged process control	Six Sigma	Improved sand quality, reduced defects	Workforce development depends on management support
Gujarat casting unit	Small/ Medium	Process inefficiencies, high defects	Introduced SOPs, training, monitoring	Quality tools + standardization	Improved accuracy, reduced defects	Standardization requires leadership enforcement
Industry-wide foundry	Mixed	Low sigma level (3–4σ), inconsistent	Limited awareness and leadership involvement	Six Sigma (general)	~15% defect reduction in cases	---

analysis		quality			
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The case study comparison table 1, reveals a recurring tendency among Indian foundries: successful quality improvement programs are mostly driven by top management engagement. Organizations that showed strong leadership commitment through resource allocation, training assistance, and strategic direction achieved notable increases in process competence, defect reduction, and productivity regardless of the foundry's size. The majority of case studies used structured approaches like Six Sigma, especially the DMAIC technique, demonstrating how well it works to solve casting-related quality problems. The table also demonstrates that the application of statistical tools and process improvement strategies with management assistance produces quantifiable and long-lasting results.

The study shows a considerable difference in competence and methodology between tiny and medium-sized foundries. The case studies show that these obstacles can be addressed with proactive leadership and focused interventions, despite the fact that small foundries frequently confront limitations including scarce financial resources, a shortage of competent labor, and reluctance to change. Medium-sized foundries, on the other hand, have comparatively better infrastructure and are better able to implement cutting-edge methods under the direction of qualified management. Overall, the table reaffirms that, although techniques and instruments are crucial, top management's vision, dedication, and ongoing participation in promoting organizational transformation are ultimately what determine how successful quality management is.

The Fig. 1. shows how applying structured quality management techniques led to comparable performance gains in many Indian foundry case studies. The green sand and automotive SME foundries are closely behind the medium-scale piston casting foundry, which clearly shows the greatest degree of progress. These findings show that companies who implemented methodical approaches like Six Sigma and had strong leadership commitment were able to significantly improve quality performance. The disparity between companies who actively adopt quality initiatives and those that rely on conventional procedures is highlighted by the industry-average performance, which is still comparatively lower.

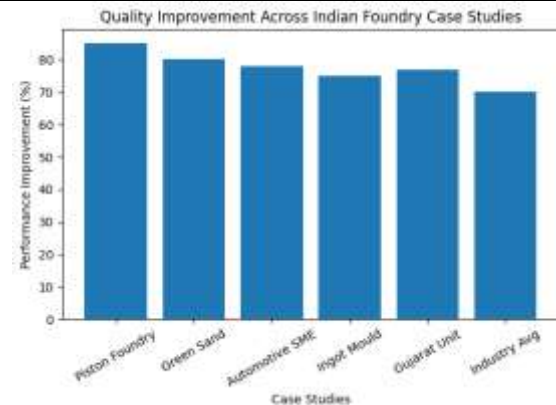


Fig. 1. Quality Improvement in Indian foundries (Based on Case Studies)

The figure also highlights how important top management is in determining how much quality improvement occurs. Under the direction of proactive leadership, foundries that made investments in training, process optimization, and data-driven decision-making demonstrated noticeably improved results in terms of defect reduction, yield enhancement, and operational efficiency. While advancement is possible, it is frequently hampered by a lack of infrastructure and resources, as evidenced by the comparatively modest improvements seen in smaller foundries like Gujarat units and ingot mold. The conclusion that top management-driven methods are crucial for attaining steady and long-lasting quality improvements throughout the foundry industry is often supported by the graphical representation.

V. TOP-MANAGEMENT-DRIVEN QUALITY MANAGEMENT FRAMEWORK

A top management-driven quality management model designed for both small and large Indian foundries is shown in the suggested framework as shown in Fig. 2. Fundamentally, the paradigm views top management as the primary motivator that links internal organizational elements like resources, labour capability, and process complexity with external forces like consumer expectations, international rivalry, and regulatory needs. The model shows how leadership converts strategic intent into practical components, such as the creation of quality policies, the distribution of resources, and the cultivation of a culture that prioritizes quality.

The framework stresses a methodical path from vision to execution by including organized methodologies like Six Sigma and Lean Manufacturing, guaranteeing harmony between business goals and quality objectives. Additionally, the framework outlines a series of crucial managerial tasks that lead to quantifiable results like better product quality, fewer defects, and increased productivity. These tasks range from infrastructure development and

leadership commitment to training, innovation, and risk management. The dynamic aspect of quality management is reinforced by a continuous improvement loop based on the Plan-Do-Check-Act cycle, which enables businesses to adjust and maintain performance over time. Crucially, the framework also suggests scalable techniques to close the

gap between small and large foundries: enhanced integration and automation for large firms, and awareness-building and low-cost solutions for SMEs. Overall, the diagram emphasizes that top management's proactive, consistent, and strategic involvement is the only way to achieve sustained quality excellence in foundries.

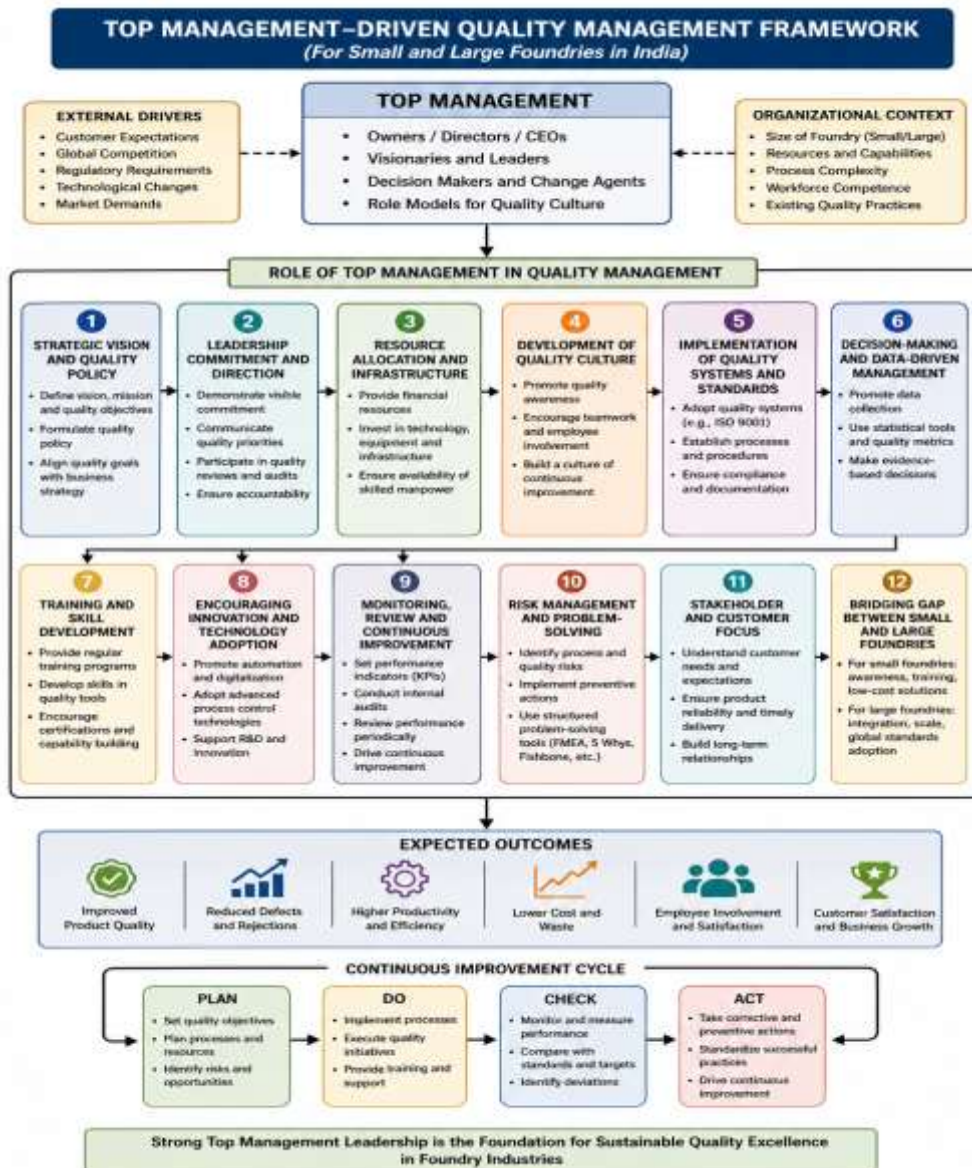


Fig. 2. Top Management-Driven Quality Management Framework

The multi-parameter chart as shown in Fig. 3, provides a comprehensive comparison of quality performance across selected Indian foundry case studies using four critical indicators: defect reduction, yield improvement, cost reduction, and productivity enhancement. The piston casting foundry consistently demonstrates the highest performance across all parameters, followed by green sand and automotive SME foundries. This indicates that

organizations implementing structured methodologies such as Six Sigma with strong managerial support achieve superior outcomes in multiple dimensions of operational performance.

Smaller foundries, as Gujarat units and ingot molds, on the other hand, exhibit only modest gains, and the industry average continues to be the lowest in every category. The consistent pattern across all four indicators emphasizes

how changes are interdependent rather than separate, underscoring the significance of an integrated approach to quality management. The graph makes it abundantly evident that measures spearheaded by upper management result in concurrent increases in productivity, cost effectiveness, and quality, which boosts the foundry industry's overall competitiveness.

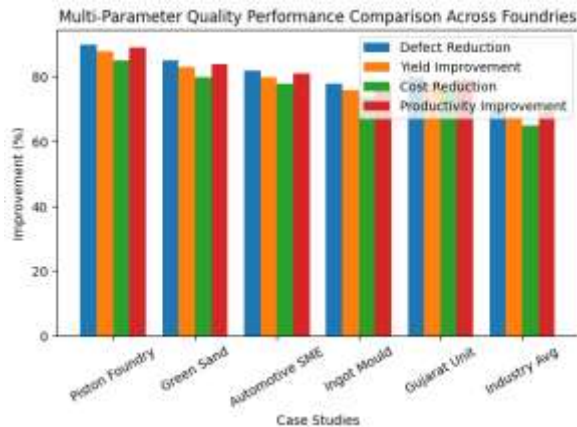


Fig. 3. Multi-Parameter Quality Performance Comparison across foundries

VI. RESULTS AND DISCUSSION (INTEGRATED WITH CASE STUDY ANALYSIS AND CHART)

The results unequivocally show that quality performance outcomes are significantly influenced by top management commitment. Defects were significantly reduced and productivity increased in foundries that showed proactive leadership through resource allocation, personnel training, and the encouragement of data-driven decision-making. Advanced quality tools were more successfully implemented by medium-sized foundries because they had more organized management systems and comparatively better access to resources. The findings, however, also demonstrate that, even in settings with limited resources, small foundries may make significant gains when leadership actively supports quality initiatives.

The conversation also shows that the integration of tools into organizational procedures, rather than just their acceptance, is what determines how effective quality management is. Foundries were able to maintain progress over time by combining strong administrative backing with technical techniques. Conversely, organizations with low levels of leadership participation had to deal with issues like inconsistent implementation, resistance to change, and a lack of standardization. This strengthens the case that top-down leadership is necessary to ensure that operational execution and strategic goals are in line.

Strong proof of the influence of top management-driven quality initiatives in Indian foundries can be found in the results of the comparative case study analysis and the accompanying graphical representation. The graph shows how different case studies have improved performance to differing degrees, with medium-sized foundries showing comparatively larger increases than smaller ones. Notably, green sand and automotive SME foundries follow the piston casting foundry in terms of advancement. The systematic application of techniques like Six Sigma, especially the DMAIC approach, backed by active leadership participation, is primarily responsible for these advancements. The industry-average performance, on the other hand, is still far lower, suggesting that many foundries continue to operate without completely implementing systematic quality measures.

Overall, a distinct pattern emerges from the combined analysis of case studies and graphical data: better quality performance improvements are correlated with higher levels of senior management participation. The findings highlight the necessity of leadership-driven change, especially in small and medium-sized foundries where strategic direction, awareness, and training can greatly increase competitiveness. The suggested structure, which places senior management at the centre of sustained quality excellence in the Indian foundry sector, is substantially supported by these findings.

CONCLUSION

In the foundry sector, top management is crucial to attaining quality perfection. Small foundries require leadership development, financial assistance, and strategic direction, whereas large foundries have well-established systems. Global competitiveness, productivity, and quality can all be greatly enhanced by increasing leadership engagement. In addition to the aforementioned conclusions, the study emphasizes that senior management must make a long-term strategic commitment rather than short-term, tool-based interventions in order to achieve sustained quality excellence in the foundry sectors. Although approaches like Lean Manufacturing and Six Sigma offer organized routes for improvement, their full potential is only attained when they are integrated into a robust leadership-driven culture. The ability of top management to encourage innovation, invest in talent development, and support data-driven decision-making is critical to the shift of Indian foundries, especially small and medium-sized businesses, towards globally competitive standards. As a result, the sector's future expansion will depend on both technology developments and transformational leadership that incorporates sustainability, quality, and continuous improvement into the main organizational strategy.

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