

# Assessing Quality in Ready-Mix Concrete Production: A Case Study of B. L. Kashyap and Sons Ltd

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## Abstract

This case study focuses on B. L. Kashyap and Sons Ltd (BLK), a renowned construction company in India, which encountered quality issues in the manufacturing process of ready-mix concrete. A comprehensive analysis utilising quality tools was undertaken to identify the underlying causes of these issues. The study revealed that defects in test and inspection, along with high temperatures during the process, were significant concerns. To address these challenges, the study explores strategies and structural changes that actively involve suppliers, stakeholders, managers, work teams and customers in improving the production process. Emphasising the importance of clearly defining responsibilities, duties and fostering continuous process improvement, this case study provides valuable insights for organisations seeking to enhance quality control and cultivate a culture of continuous improvement.

## Keywords

Case study research, quality, quality management, total quality management

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## **Introduction**

In November 2022, Vinod Kashyap, Chairman, and Vineet Kashyap, Managing Director, of B. L. Kashyap and Sons Ltd (BLK), found themselves grappling with quality issues in the manufacturing process of ready-mix concrete (RMC). As leaders with a shared vision and unwavering determination, the Kashyap brothers successfully nurtured their business, establishing BLK as one of India's respected construction companies. With over three decades of experience in business development, they had spearheaded the marketing, finance and operations strategies of the organisation, resulting in remarkable growth and recognition in the field of construction.

The cornerstone of BLK's success lies in its people, who are considered the core strength of the organisation. BLK firmly believes in the collective potential of its team to foster innovation and deliver projects with exceptional efficiency. With a strong emphasis on quality standards and a steadfast commitment to environmental, health and safety practices, BLK strives to create an environment where colleagues are empowered to explore new technologies and processes. By embracing these advancements, they aim to provide comprehensive solutions that exceed client expectations.

BLK is currently experiencing a period of remarkable growth, with an impressive average annual growth rate ranging from 15% to 20%. Equipped with the necessary resources and expertise, they have the capability to successfully execute high-quality projects in diverse segments of the urban landscape and infrastructure development. Their overarching goal is to generate substantial value for their shareholders and all other stakeholders associated with the company. By fostering a culture of continuous improvement and upholding its unwavering commitment to excellence, the company remains dedicated to achieving remarkable outcomes for its clients while ensuring the utmost satisfaction of its valued colleagues.

## **Background of the Company**

Founded in 1989, BLK swiftly emerged as a prominent Construction, Infrastructure and Civil Engineering company with a nationwide presence. The company went public in 2006. Today, BLK is synonymous with delivering value in various aspects of engineering, construction, design, infrastructure, quality, safety, speed and timely project delivery. The company's vision is deeply rooted in work ethics aligned with its overarching goals, aimed at establishing a distinct position in the construction industry, characterised by uncompromising value. Over the years, BLK has created iconic structures across the nation and has been trusted by prestigious clients, such as The Escorts Group, Goetz India Ltd, Birla Group, Carraro India, Oberoi Hotels, Taj Group of Hotels, Shangri-La, Hilton, Four Seasons, IBIS Hotel, Novotel, JW Marriott, Park Hyatt, ITC, The Embassy Group, among others. Through their projects, BLK contributes to the long-term development and economic growth of the country.

## Competitors of B. L. Kashyap: A Comparative Analysis of Quality Perspectives

In the competitive landscape of the construction industry, BLK faces several formidable rivals, including Larsen & Toubro Ltd (L&T), GMR Airports Infrastructure Ltd, Shapoorji Pallonji Engineering and Construction, ITD Cementation India Ltd, Sobha Ltd and Ahluwalia Contracts (India) Ltd. Each competitor has adopted distinct quality tools and approaches tailored to their specific needs and requirements. Taking one of their key competitors, L&T, as an example, their quality perspective is characterised by a pragmatic and thoughtful approach.

L&T's commitment to performance excellence is underpinned by a shared objective and a culture of learning from past experiences. They have embraced various approaches such as risk-based thinking in their business process decisions, customer focus, the Plan-Do-Check-Act (PDCA) cycle, and a 'right the first time' mindset during project execution (L&T Construction, 2022). These initiatives have led them to prioritise continuous training, embrace new technologies and digitalisation, and provide cost-effective solutions without compromising on quality. L&T's quality practices encompass comprehensive systems, including quality management systems, project quality plans, standard operation procedures, method statements, quality assurance plans, inspection test plans and inspection checklists (L&T Construction, 2022). These rigorous control measures are in place to ensure that products and projects consistently meet or surpass customer expectations. Furthermore, L&T implements stringent evaluation, approval, inspection and monitoring protocols for outsourced processes and products, thereby guaranteeing compliance with established standards and specifications.

Shapoorji Pallonji, another notable competitor, places a strong emphasis on meeting customer expectations through a well-designed and established service delivery system. They demonstrate a commitment to continuous technological advancement and value analysis, striving to enhance the effectiveness of their quality system. Shapoorji Pallonji has earned recognition as one of the most quality-conscious construction companies in the industry (Shapoorji.in, 2018). Noteworthy reflections of their commitment include being the first construction company to achieve ISO 9001 Certification, employing knowledge management as a strategic tool, boasting a 147-year legacy and being pioneers in venturing into the Middle East with projects like the Oman Palace in 1970 (Shapoorji.in, 2018).

In line with their rivals, BLK also emphasises the importance of integrated management systems to drive continual improvement in overall quality, environmental and occupational health and safety (OH&S) performance. However, what sets BLK apart from its competitors are three ISO standards they adhere to, which contribute to their unique approach to quality management. These standards serve as a testament to B. L. Kashyap's unwavering commitment to delivering superior results and maintaining a competitive edge in the market.

## **Quality at BLK**

Quality lies at the heart of BLK's operational ethos, serving as a driving force in their work processes. They prioritise the utilisation of cutting-edge equipment, highly skilled engineers, proficient workmen, top-tier materials and quality tools to ensure superior and consistent outcomes across all their projects. To further guarantee excellence, BLK deploys senior site supervisors who oversee every aspect of the processes, while also maintaining elaborate documentation and reporting systems. In-organisation quality audits, scheduled management visits and periodic reviews are conducted to ensure impeccable workmanship, meticulous detailing and timely project completion.

The satisfaction expressed by their clients through glowing testimonials, repeat business engagements and the expanding scope of their operations is a testament to BLK's unwavering commitment to quality and customer satisfaction. BLK follows a comprehensive set of quality policies to establish clear expectations for the organisation and its employees. These policies include aligning the quality management system with the organisation's strategy, adopting risk-based thinking and risk control measures, determining the organisational context for effective implementation of the quality management system, and emphasising efficient processes to achieve planned outcomes. Effective communication with customers, alignment with strategic direction, integration of the quality management system into the organisation's business processes, flexibility in documenting information, ensuring customer satisfaction, credibility and fostering customer retention and loyalty are also key components of BLK's quality policy. BLK has also adopted three essential ISO standards to further enhance its operations. These standards play a pivotal role in solidifying BLK's commitment to quality management, OH&S and environmental sustainability. The first standard, ISO 45001:2018, focuses on establishing a comprehensive framework for ensuring health and safety in the workplace. By adhering to this internationally recognised standard, BLK demonstrates its dedication to creating a safe and secure work environment for its employees, subcontractors and other stakeholders. BLK's commitment to environmental sustainability is reinforced by its adherence to ISO 14001:2015. This standard sets out the requirements for an effective environmental management system, enabling BLK to identify and address environmental impacts associated with its activities. By implementing this standard, BLK aims to minimise their ecological footprint and continually improve their environmental performance. Furthermore, BLK aligns with ISO 9001:2015, an internationally accepted standard that specifies the requirements for a robust quality management system. By complying with ISO 9001, BLK ensures that its processes, procedures and operations are designed to consistently meet or exceed customer expectations. This standard enables BLK to continually enhance customer satisfaction, drive efficiency and pursue excellence in its service delivery.

Through these unwavering commitments and adherence to quality standards, BLK continually reinforces its position as a reputable and trusted player in the construction industry, while consistently meeting and exceeding the expectations of its valued customers.

## The Quality Assessment at Company

India's thriving construction market positions it to become the world's third largest in the next 2–3 years, with an estimated average growth rate of 7% annually until 2025 (Rani et al., 2022; Writer, 2023). This favourable outlook, coupled with rapid urbanisation and significant infrastructure investments, presents a compelling opportunity for the company. Recognising these industry trends and their potential to drive growth, Shipra Goel, the General Manager—Projects at BLK, proactively initiated a meeting to evaluate the performance of various departments. To ensure a comprehensive assessment, Vineet and Vinod Kashyap, along with key personnel, convened for this crucial discussion. During the meeting, the Kashyap brothers and the key personnel identified persistent quality issues that were impeding the production process of RMC. Despite previous efforts, these issues had proven difficult to pinpoint and resolve. Even after following all these standards and other parameters, they were still facing quality issues in the production of RMC. Undeterred by the challenges, the Kashyap brothers demonstrated their unwavering commitment to quality and their determination to find a solution. In order to gain fresh perspectives and guidance, they made the decision to engage the services of professionals who could offer valuable insights and recommendations to enhance the company's quality processes and ultimately improve RMC production. Two consulting interns, Ankita and Aviral Jha, were called to analyse the setbacks and provide valuable insights and recommendations.

## Unveiling Quality Challenges: Analysing Issues Using TQM Tools

Ankita and Aviral utilised a range of statistical tools from the field of total quality management (TQM) to delve into the core issues faced by the company. Their approach began with the use of flowcharts, which are illustrative diagrams that help depict the typical solutions to problems. These flowcharts aid in understanding and managing processes across various fields (Anderson et al., 2016). Figure 1 presents the flowchart of the process, providing a comprehensive view of how different entities and systems interrelate within the context of the project or situation.

In addition to flowcharts, Ankita and Aviral employed an Ishikawa diagram to identify all potential reasons associated with the poor quality of RMC and to further explore the root causes within BLK. Figure 2 illustrates the Ishikawa diagram, which serves as a valuable tool in visualising the different factors contributing to the problem.

To systematically record the occurrences of problems at the RMC plant, the interns also utilised a check sheet, as shown in Table 1. This check sheet was maintained for a period of 30 days and captured various problem categories. From the table, it is evident that defects in testing and inspection emerged as the most significant occurrence. The check sheet also assessed the issue of high temperature as a potential defect, which hinders the efficiency of the processes. Recognising the significance of temperature as a critical-to-quality factor in RMC production

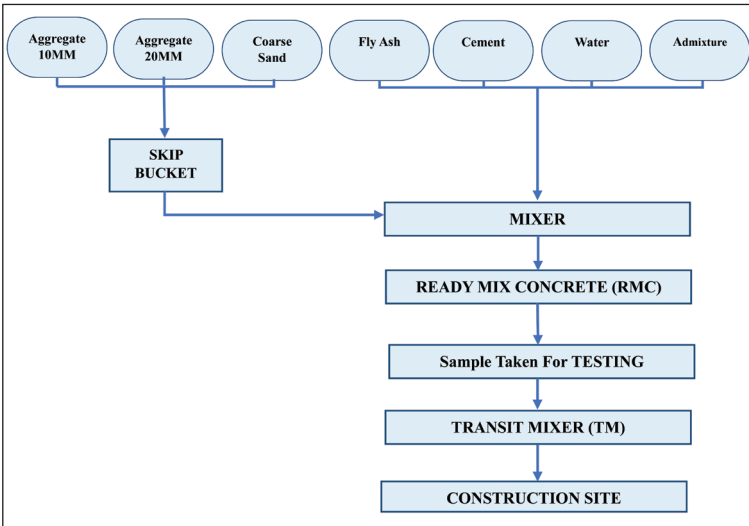


Figure 1. Flowchart of the Process.

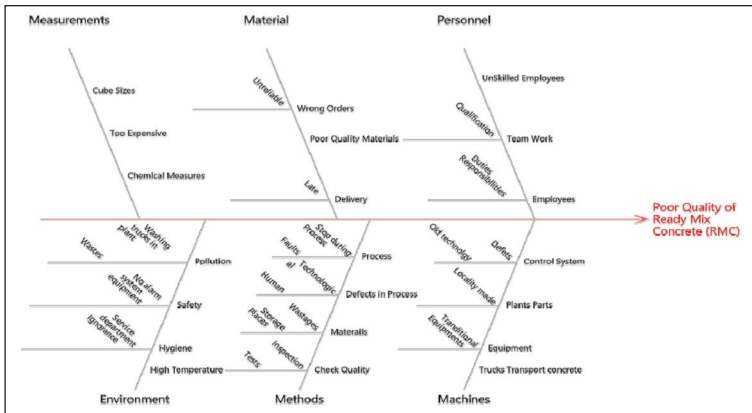


Figure 2. Ishikawa Diagram to Identify Potential Reasons Associated with the Quality of RMC.

at BLK, the quality control team conducted an internal process capability study. After the study, the quality manager of BLK informed the interns that the process capability fell below the two-sigma threshold. Intrigued with the internal assessment of the quality manager of BLK, Ankita and Aviral continued their quest for quality assessment further by employing control charts, a valuable tool for monitoring process variables over time and detecting variations. In order to analyse the variation in temperature, a total of 67 temperature samples were collected, with each subgroup consisting of 4 samples. These samples were taken for both the high-grade (M-90) RMC and low-grade (M-40) RMC. Ankita and Aviral utilised

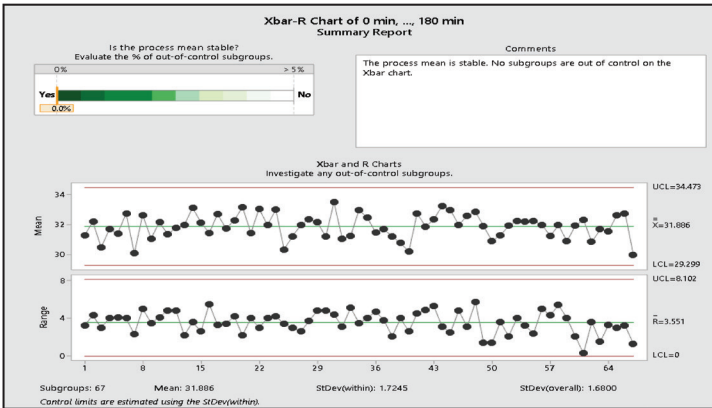
**Table I.** 30-Day Check Sheet Analysis for Comprehensive Process Monitoring.

No.	Defect Type	7 Days	28 Days	Total
1	Late delivery of material			3
2	Additional cost			1
3	Wrong order due to bad communication			2
4	Provided poor quality of materials			3
5	The faults and stop the plant during production			3
6	Waste of material			2
7	Defects in test and inspection			5
8	Conveyor defects			0
9	Lack of awareness of management			1
10	Loss skilled employees			0
11	Services			1
12	High temperature			4
13	Environmental issues due to wastes			3

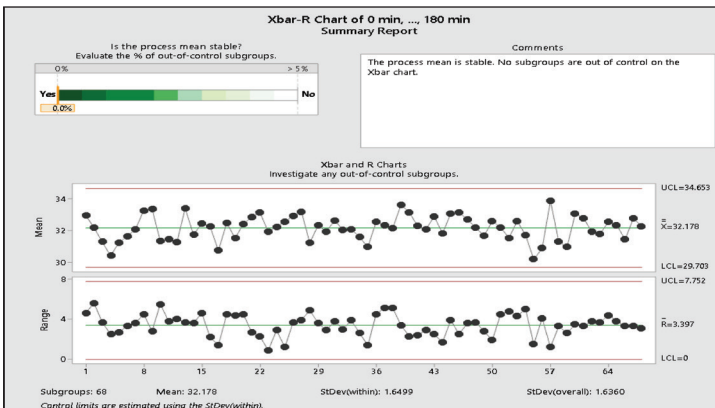
the X-bar R Chart, a control chart, to gain insights into temperature variations. The X-bar R Chart comprises two components: the X-bar chart and the R (range) chart. The X-bar chart illustrates the average or mean of a process characteristic, enabling the tracking of the central tendency and identification of any shifts or changes in the average value. On the other hand, the R chart measures the range or spread of the process data within each subgroup, providing information about the dispersion or variability within the process. Interestingly, the results of the X-bar R control charts, as shown in Figures 3 and 4, indicated that the process mean was stable, and no subgroups were found to be out of control for both the high-grade and low-grade RMCs.

Through the analysis of check sheet data and the company's internal quality assessment, they discovered that defects in test and inspection, as well as high temperatures during the process, were major quality issues.

In addition, Ankita and Aviral also conducted interviews as part of an internal survey to gain valuable insights into the quality perspective. The process for selecting target respondents involved several steps to ensure a comprehensive and representative sample. First, the target population for the survey was identified. This included employees from various departments involved in the RMC production process, as well as key stakeholders, such as managers and interdomain supervisors. By including multiple perspectives, the survey aimed to capture a holistic view of the organisation's quality challenges and opportunities. To select the respondents, a stratified sampling approach was utilised. This involved dividing the target population into distinct groups based on job roles, departments and levels of seniority. Within each stratum, a random sampling technique was employed to ensure equal representation and minimise bias. This approach allowed for a diverse range of respondents, including operators, supervisors, managers and other relevant personnel. To ensure the participation of the selected respondents, Ankita and Aviral implemented a well-structured communication



**Figure 3.** X-Bar R Chart for Temperature Variation Monitoring for Low-Grade (M-40) RMC.



**Figure 4.** X-Bar R Chart for Temperature Variation Monitoring for High-Grade (M-0) RMC.

plan. They clearly explained the purpose and importance of the interview, highlighting how the collected data would contribute to process improvements and quality enhancement. They assured the respondents of confidentiality and anonymity, fostering an environment of trust and encouraging open and honest feedback. The interview questions themselves were carefully designed to gather the necessary information related to quality perspectives. The questions were aligned and focused on key areas such as quality issues, process efficiency and suggestions for improvement.

Through the interview, they discovered that implementing improvements in the production process necessitated significant changes in the company’s structure, involving the active participation of suppliers, stakeholders, managers, work



teams and customers. Clearly defining responsibilities, duties and consistently improving the process were deemed crucial in ensuring product quality and achieving customer satisfaction.

During the analysis, a key finding emerged, shedding light on the primary causes of defects in the quality system. These causes included a lack of management experience in process monitoring, communication issues and a general lack of interest in quality control matters.

## Conclusion

The scope of the study conducted by Ankita and Aviral encompassed a comprehensive analysis of quality issues in RMC production at BLK, focusing on identifying root causes, devising targeted measures for process efficiency enhancement, and addressing key factors contributing to defects, with the aim of ensuring product quality and customer satisfaction. Ankita and Aviral employed a range of quality tools, including process flow diagrams, Ishikawa diagrams, check sheets and control charts, to conduct a comprehensive analysis of quality issues in RMC production at BLK. Their objective was not only to identify the root causes but also to devise targeted measures for enhancing process efficiency. The analysis of check sheet data and internal quality assessments revealed significant quality issues related to test and inspection defects, as well as high temperatures during the production process. It was determined that the process had a low capability, measuring less than two sigma. Furthermore, the interviews conducted by Ankita and Aviral shed light on the need for extensive structural changes within the company to implement process improvements successfully. Active involvement from stakeholders, including suppliers, managers, work teams and customers, was identified as essential. A clear definition of responsibilities and a continuous improvement approach emerged as crucial factors for ensuring product quality and customer satisfaction. The analysis also highlighted key factors contributing to defects, such as inadequate process monitoring, communication challenges and a lack of emphasis on quality control. On the basis of the analysis conducted by them, they have suggested the following to enhance the company's quality processes and improve RMC production:

- Given the significant defects observed in the test and inspection phase, BLK should focus on strengthening these processes. This can be achieved by implementing stricter quality control measures, providing adequate training to employees involved in testing, and enhancing equipment maintenance to ensure accurate and reliable results.
- High temperatures during the production process were identified as a major quality issue. BLK should analyse the root causes of these temperature fluctuations and take measures to control and stabilise them within acceptable ranges. This may involve optimising equipment settings, conducting regular temperature monitoring and implementing effective cooling systems.

- BLK should focus on improving process capability by implementing robust process controls, conducting regular process audits, and employing statistical process control techniques. This will help ensure that the production process operates within defined limits and meets the required quality standards consistently.
- BLK should actively involve suppliers, stakeholders, managers, work teams and customers in decision-making processes and encourage open communication channels. Clearly defining responsibilities, duties and promoting a culture of collaboration will foster an environment where everyone is aligned towards achieving quality objectives.
- BLK should adopt a continuous improvement mindset by implementing quality management systems such as Six Sigma or TQM.
- BLK should establish robust quality control mechanisms, including regular inspections, quality checks and process audits. This will help identify and rectify potential issues at an early stage, ensuring that the production process consistently meets quality standards.

However, even after the investigation, certain observations were made. For instance, if the control charts indicated process stability, what factors contributed to the occurrence of quality issues? Why were there quality issues despite the company following all quality standards? These questions highlighted additional areas of inquiry and exploration.

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