



# A Study on The Application of Blockchain Technology in Supply Chain Management for Manufacturing Industries

Saurav Sunil Gadute

## How to Cite this Article:

Gadute, S. S. (2026). A Study on The Application of Blockchain Technology in Supply Chain Management for Manufacturing Industries. International Journal of Creative and Open Research in Engineering and Management, <i>02</i><i>(05)</i>.

<https://doi.org/10.55041/ijcope.v2i5.493>

## License:

This article is published under the terms of the Creative Commons Attribution 4.0 International License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author(s) and the source are credited.

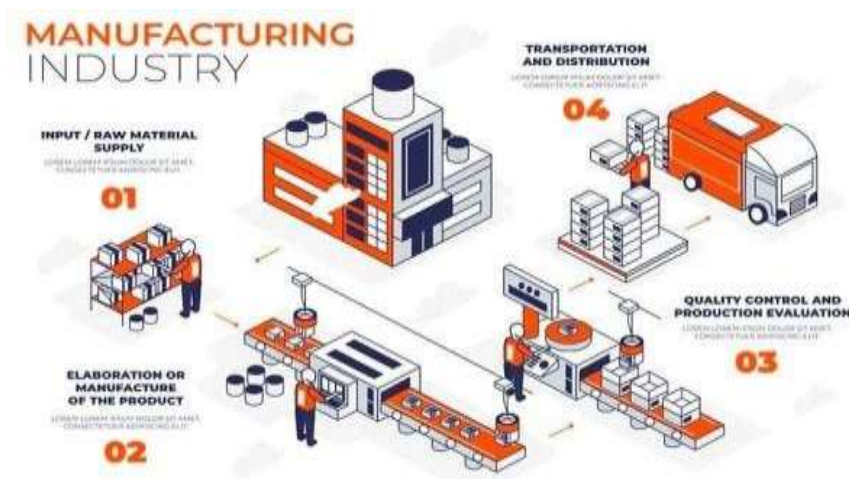
© The Author(s). Published by International Journal of Creative and Open Research in Engineering and Management.



<https://doi.org/10.55041/ijcope.v2i5.493>

## I. Introduction

The contemporary global economy is currently navigating a profound period of transition, characterized by the rapid integration of digital technologies and a shift toward "Industry 4.0" standards. In this landscape, the manufacturing sector serves as the fundamental backbone of India's economic development, playing a critical role in modernizing agriculture and reducing poverty through the creation of secondary and tertiary jobs. However, managing modern supply chains has become extraordinarily complicated. Traditional systems are often hindered by a reliance on paper-based trails and a significant lack of real-time transparency, which can lead to increased costs and compromised customer relationships. For an economy like India's, where manufacturing growth is a top priority, these inefficiencies represent a significant barrier to sustainable competitive advantage.

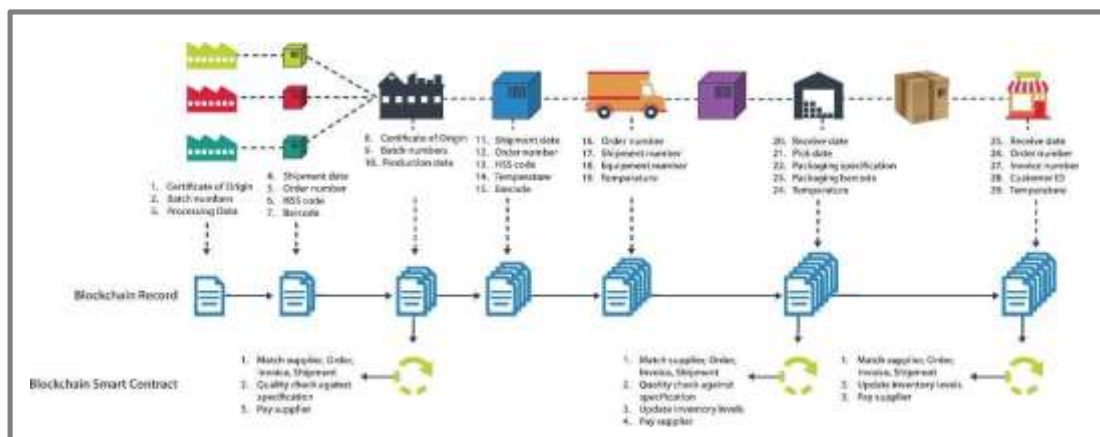


This research focuses on the transformative potential of Blockchain technology and the Internet of Things (IoT) within the manufacturing industries of Pune, India. Blockchain is defined as a decentralized system of recording information that makes it virtually impossible to change, hack, or cheat. By utilizing an immutable cryptographic signature called a hash, blockchain creates a shared, distributed ledger that ensures every participant has access to the same version of the truth.



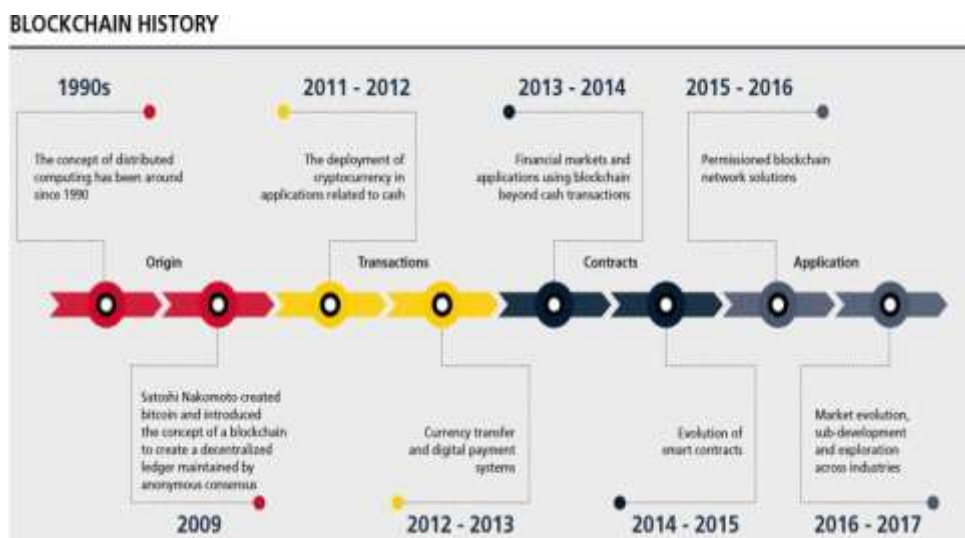
This technological framework is uniquely suited to address the "opacity gaps" in supply chains, offering features like consensus, traceability, and permanent record-keeping.

Despite the clear theoretical benefits, the actual implementation of these technologies in India faces a significant "planning gap". While 39.3% of organizations are in the active planning phase for blockchain, actual full-scale deployment stands at only 24.6%. Similarly, while awareness of IoT is established at 44.3%, only 13.9% of organizations are currently executing related projects. This study seeks to investigate the barriers stalling this digital transformation, such as the shortage of skilled experts and high infrastructure costs. By analyzing data from 122 industry professionals, this paper provides a strategic roadmap for moving from speculative interest to pragmatic, "touchless" business execution.



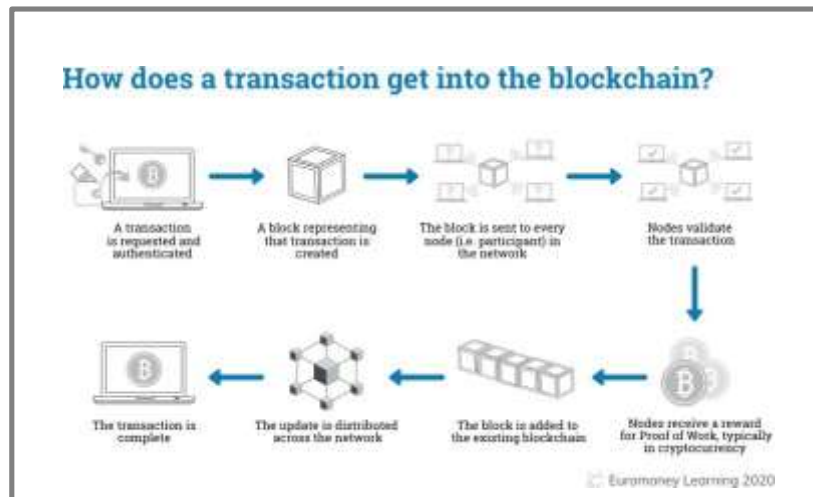
## II. Literature Review

The academic and industrial exploration of blockchain has evolved significantly since the technology was first described in 1991 by research scientists Stuart Haber and W. Scott Stornetta. Their initial goal was to create a computationally practical solution for time-stamping digital documents to prevent tampering. This concept was later revolutionized in 2008 by Satoshi Nakamoto, who conceptualized distributed blockchains to serve as the public ledger for cryptocurrencies like Bitcoin. Today, the literature reflects a consensus that blockchain is a foundational technology with the power to revamp existing processes across almost every sector of the economy.





Scholars like Anna Roy emphasize that blockchain's unique nature allows it to unlock new sources of efficiency and value that were unfathomable just a decade ago. In the logistics and supply chain domain, Matthias Heutger (2018) suggests that the industry must embrace new ways of rethinking old processes to remain viable in the digital era. The practical utility of these systems is further supported by industry giants; for example, Walmart uses blockchain to track pork meat from China, allowing investigators to quickly identify and remove sources of food-borne diseases. Other multinational companies like Nestlé and Unilever have adopted similar tracing functions to ensure the integrity of their global supply chains.



In the manufacturing context, the literature identifies two primary categories of cost reduction: verification costs and networking costs. Beyond cost savings, blockchain's real-time transparency allows for improved corporate governance, as it resolves information asymmetries between managers and investors. Studies by Abeyratne and Monfared (2016) specifically suggest that blockchain can enhance both the transparency of supply chains and the final quality of products. This theoretical foundation supports the shift observed in the Indian industrial landscape, where professionals are increasingly viewing blockchain not as a trend, but as a critical tool for operational optimization and market trust.

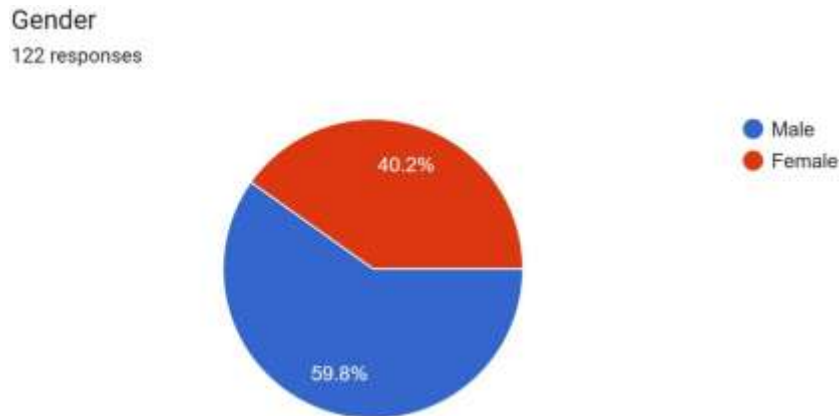
### III. Research Methodology

This study utilizes a research design that is primarily descriptive, followed by partially exploratory techniques. This approach was selected to provide a detailed and clear description of how blockchain technology works while grounding the findings in a mix of primary survey data and secondary data from reputable reports and academic journals. The focus of the study is the manufacturing hub of Pune, Maharashtra, which offers a representative cross-section of the Indian industrial workforce.

The primary data was collected through a structured questionnaire distributed to professionals working in various manufacturing industries. A convenience sampling method was employed, resulting in a total sample size of 122 respondents. The survey was conducted over a three-month period, from January 2026 to March 2026. The questionnaire structure included both open-ended questions, allowing respondents to answer as they wished, and closed-ended questions providing a specific list of options for quantitative comparison.

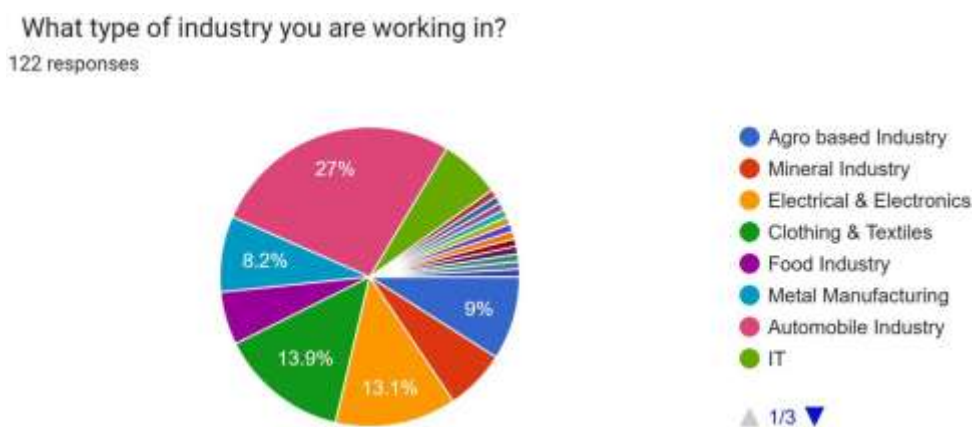


To ensure the statistical validity of the findings, several analytical tools were applied to the data. Percentage analysis was used to identify demographic trends and baseline awareness levels for IoT and blockchain. More advanced statistical methods, including the Chi-Square test and Spearman Correlation analysis, were used to test research hypotheses. For instance, a Chi-Square test was performed to check for a significant difference between company size and optimism regarding blockchain’s impact on Indian markets. These methodologies ensure that the research is not only grounded in empirical evidence but also validated through rigorous mathematical interpretation, providing a high degree of academic integrity.



### Data Analysis and Interpretation

The analysis of the 122 respondents reveals a workforce dominated by males (59.8%) and younger professionals, with 48.4% belonging to the 25-35 age group. The industrial profile is led by the Automobile sector (27%), with significant representation from the IT (13.9%) and Electrical & Electronics (13.1%) sectors. The distribution across company sizes was relatively even, though the largest single group came from maximum-sized industries with over 250 employees.

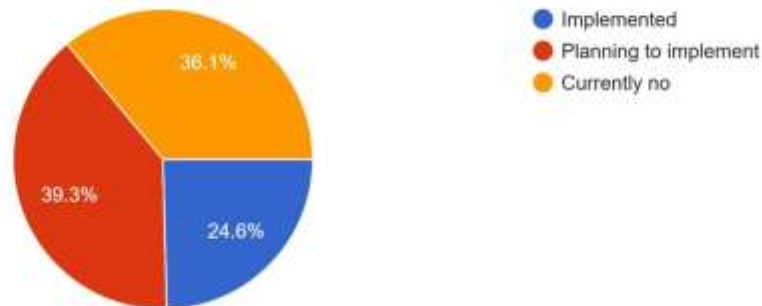


The data highlights a significant "familiarity gap" regarding blockchain technology. While 49.2% of respondents have heard of cryptocurrencies, only 34.4% claim to deeply understand how the underlying technology works. Interestingly, the workplace has emerged as the primary educational hub, with 44.2% of respondents gaining their knowledge of blockchain through professional exposure. In terms of perceived



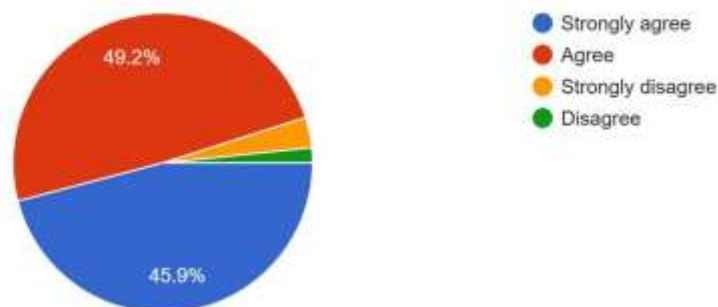
benefits, the most significant advantage identified by respondents was "Improved Business Efficiency" (73.8%), followed closely by "Time Saving" (63.1%).

Is your organization currently implementing or does it plan to implement Blockchain technology?  
122 responses



Statistical testing provided deeper insights into these perceptions. A Chi-Square test (Calculated value: 0.4816) was used to compare organizational size with the belief that blockchain can improve Indian markets. Since this value was significantly lower than the table value (12.592), the Null Hypothesis was accepted, indicating that optimism for the technology is universally high across companies of all sizes. Furthermore, a Spearman Correlation analysis (p-value of 0.11) showed that the specific type of industry—whether Automobile, IT, or Metal Manufacturing—does not significantly influence a respondent's positive outlook. These findings suggest that the desire for digital transformation is shared across the entire industrial landscape, contingent on overcoming implementation hurdles.

Blockchain Technology can improve Indian markets?  
122 responses



## Discussion and Conclusion

The findings of this study indicate that IoT and Blockchain are successfully transitioning from speculative concepts to strategic industrial priorities within India. The data reveals that the primary motivators for businesses to invest in these technologies are pragmatic outcomes: "Increased Efficiencies" (67.5%) and "Cost Savings" (61.7%). This suggests that the industry views digital tools primarily as assets for operational optimization rather than mere experimental trends. However, the "planning gap" remains a critical challenge, with nearly 40% of organizations still in the planning stages for blockchain compared to only 24.6% that have already deployed it.



The research identifies two primary barriers stalling this progress: the fact that blockchains are still viewed as an "emerging technology" and a critical lack of skilled experts capable of managing these complex systems. Despite these hurdles, there is overwhelming positive sentiment; 95.1% of respondents agree that blockchain will improve Indian markets, and 42.6% believe the technology will dramatically disrupt the industry. This high level of internal buy-in provides a strong foundation for future initiatives, provided that firms can address the expertise-related hurdles currently stalling full- scale transformation.

In conclusion, for the Indian manufacturing sector to bridge the gap between planning and execution, a focus on targeted upskilling and infrastructure investment is essential. The move toward more transparent, efficient, and "touchless" business processes is no longer optional in a globalized economy. By capitalizing on the high awareness and positive outlook of the workforce—particularly within the dominant Automobile and IT sectors—manufacturing firms can leverage blockchain to reduce dependencies on intermediaries and achieve radical transparency. Ultimately, successfully addressing the identified barriers will enable these industries to move toward a more reliable, secure, and competitive digital future.

