

Digital supply chain revolution in Indian FMCG: Pathways to Viksit Bharat 2047

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Abstract

Digital supply chains are a vital enhancer of economic progress and national development, as the fast-moving consumer goods (FMCG) industry in India is rapidly changing due to the widespread acceptance of digital technologies. In light of the Viksit Bharat 2047 vision, this study investigates the degree of digital supply chain adoption in the Indian FMCG sector and evaluates its effects on operational effectiveness, cost reduction, transparency, and sustainability. Primary information was gathered from 150 professionals, including supply chain managers, logistics executives, procurement officers, and IT managers, using a descriptive and analytical study design. A five-point Likert scale-based structured questionnaire was used, and Microsoft Excel statistical tools like mean, standard deviation, regression, and correlation were used to analyze and interpret the data. The results show that adoption of digital technology and key performance metrics are strongly positively correlated, with digitalization accounting for a sizable share of supply chain performance. The study concludes that digital supply chains make FMCG companies more competitive by improving sustainability, responsiveness, and real-time visibility. In order to achieve India's long-term development goals, the research provides policymakers and industry stakeholders with insightful information about how to advance digital infrastructure, talent development, and supportive regulatory frameworks.

Keywords: Digital supply chain, FMCG Sector, digital transformation, artificial intelligence, supply chain performance, sustainability, Viksit Bharat 2047

Introduction

The emergence of digital technology has significantly changed the FMCG industry, which is an important part of the country's economy. E-commerce geared by consumer demand in Viksit Bharat for speedy demand by consumer, on rapid expansion, development of quick commerce, confined by delivery in minutes, with greater logistic challenges, supply chain demand, required by innovative solutions, on artificial intelligence, demand forecasting, delivery by drone, does play a important crucial role in meeting the demand in supply chain.

Smaller suppliers will be less necessary as a result of transactions and trade in the supply chain, but they must be safeguarded in Viksit Bharat because everything is changing in terms of scale, scope, and methods that may be unpredictable. Modernization of ports, roads, and rail is a top priority for Viksit Bharat. This ensures smooth transitions between various modes of transportation, integrating the systems used in road, rail, sea, and air to provide a value chain, cost, and sustainable ways to transport goods in supply chain.

With the establishment of an interactive, integrated, and effective supply chain, resilient, efficient Viksit Bharat is regarded as a crucial pillar in the transformation of economic development, being self-reliant on the various economic social accomplishments. Global supply chain leaders should be able to withstand the increasing economic conditions that may result from the ongoing policies of Viksit Bharat, despite their potential through optimization across the transcended (surpass) fragmented (break) approach with Gati Shakti, National Logistic policy, being into a robust, hub-and-spoke streamlined network adopting an efficient logistic system in supply chain.

E-commerce allows businesses in Viksit Bharat to differentiate their products, providing consumers more options and satisfying rapidly shifting demand patterns at reduced supply chain costs. Planning, policy, implementation, infrastructure, development of social norms, transformation by guaranteeing the supply chain, being responsive to budgeting strengthening, social protection, by fostering the labor market, which become important drivers of national growth, and ultimately reaching ambitious targets in economic activities in supply chain are all necessary to realize the vision of Viksit Bharat. The present digital revolution in the Indian FMCG industry is drastically changing how brands operate in terms of increasing productivity, interacting with customers, and breaking into new markets in order to create a sustainable future. In reaction to this changing environment, FMCG firms are increasingly implementing technologies like artificial intelligence (AI), big data, the Internet of Things (IoT), and automation to simplify their operations as customer behavior evolves towards e-commerce, personalization, and convenience.

The emergence of e-commerce and the D2C business model has fundamentally altered the conventional routes via which FMCG products were delivered to customers. D2C platforms like Amazon, Flipkart, BigBasket, and JioMart are major forces behind this digital transformation. Additionally, FMCG firms are leading the way in digital marketing, making for 42% of India's digital advertising spending (Roy and Kanupriya 217). Supply chains are becoming more flexible than ever thanks to innovations like blockchain-based inventory management, IoT-enabled smart warehouses, and AI-driven demand forecasting. Businesses like ITC, Nestlé India, and Hindustan Unilever are using automation in their distribution centers to boost productivity

and cut expenses. AI-powered chatbots, voice assistants, and augmented/virtual reality are also revolutionizing customer interactions by offering smooth product discovery and tailored recommendations

Literature Review

Investigated the wide-ranging effects of digital transformation in India's fast-moving consumer goods (FMCG) sector, looking into important topics such supply chain optimization, e-commerce, customer engagement, and operational efficiency. The report also looks into new trends including the emergence of Direct-to-Consumer (D2C) models, the use of IoT and AI in supply chain management, and the increasing dependence on customized marketing tactics. The report also highlights issues with data security, personnel upskilling, and infrastructure deficiencies and provides tactical suggestions for resolving these problems. This study demonstrates how, in a market that is changing quickly, digital technologies may enable FMCG companies to innovate, improve customer experiences, and achieve sustainable development. The study offers insights into how FMCG companies may use digital transformation to obtain a competitive edge and satisfy the needs of a broad and tech-savvy consumer base by carefully examining industry trends and government efforts.

examined the ways in which digital initiatives have enhanced efficiency and financial resilience, emphasizing the growth of net cash flow, net profit margin, ROCE, inventory turnover, and gross profit margin. Businesses that use AI, predictive analytics, and digital-first tactics make more money and are better able to adapt to changes in the market. However, depending on market positioning, implementation, and investment, the results vary. Businesses that take a data-driven approach have an advantage over their competitors, while those who take their time implementing a digital strategy must deal with shifting market conditions. Investments in scalable digital infrastructure, innovation, and worker upskilling are necessary for long-term digital success. Policymakers should implement strict data protection, carry out research, and provide incentives for the usage of digital technology. In order to develop best practices, future study might concentrate on monitoring digital performance, evaluating the effects of sustainability-driven digital strategies, and comparing across industries.

claim that a lot of study has been done on using the Theory of Constraints (TOC) to improve job-shop scheduling. In order to assess the efficacy of the Drum-Buffer-Rope (DBR) approach, this article looks at a real-world automobile case study. The study examines how the heuristic scheduling principles of TOC affect resource utilization, throughput, and master production scheduling (MPS) in complex job-shop settings. The authors propose changes to existing TOC algorithms for real-world application and perform simulations inside a multi-bottleneck framework.

In a two-echelon supply chain, consider the effects of a vendor joining an e-commerce channel in a dual-channel distribution system as opposed to a single-channel distribution system. According to their findings, manufacturers may not always gain from going into e-commerce, particularly if the e-channel is not very effective. Physical shops may benefit from this circumstance since it lowers wholesale pricing. Customer acceptance and the effectiveness of each channel determine how common e-

commerce is in comparison to traditional channels. The article uses a game-theoretic method to simulate the interactions between manufacturers and retailers in order to develop a framework that promotes the study of pricing and channel management strategies within the framework of manufacturer-retailer dynamics.

suggests data regarding the connection between company performance as measured by various financial metrics and digital transformation. In the short term, digital transformation (DM) has a negative effect on both return on equity (ROE) and return on assets (ROA). The main cause of this loss is large investments in information technology (IT), which raise expenses and reduce return on assets (ROA) until the benefits of these investments are fully realized, which may take years. On the other hand, Tobin's Q, which compares market value to asset value, benefits over the long run from DM. The market's expectations of future advantages and improved performance as a result of digital transformation projects are reflected in this favorable influence.

The asset liability ratio, capital adequacy ratio, return on equity (ROE), and nonperforming loan ratio are a few of the factors that are used to create and comprehend a Digital Transformation Index. The ROE ratio gauges the bank's capacity to use its own capital, the capital adequacy ratio determines the bank's capacity to withstand risk, and the asset liability ratio aids in evaluating the capital structure of banks. It provides returns on capital invested by stockholders. The danger of bank loans and the size of banks are measured by the non-performing loan ratio. It's also critical to comprehend the connections.

Research Objectives

- To examine the current status of digital supply chain adoption in the Indian FMCG sector.
- To identify key digital technologies (AI, IoT, Blockchain, Big Data, ERP) used in FMCG supply chains.
- To analyze the impact of digital supply chains on operational efficiency and cost reduction.
- To assess how digital supply chains contribute to the vision of Viksit Bharat 2047.

Research Methodology

1. **Research Design:** Descriptive and analytical research design is used in the present research.
2. **Data Collection:** Both primary and secondary data was collected for the research purpose.
 - **Primary data:** Questionnaire from supply chain managers, logistics executives, FMCG professionals.
 - **Secondary data:** Journals, reports (NITI Aayog, Deloitte, McKinsey, PwC, IBEF).

Sample Size: 150 respondents from Indian FMCG firms.

Tools

- Likert scale questionnaire
- Data analysis using Microsoft Excel
- Techniques: Mean, standard deviation, correlation, regression

Data Analysis and Interpretation

Microsoft Excel was used to evaluate the information gathered from 150 respondents who worked for Indian

FMCG companies. A five-point Likert scale, with 1 denoting "strongly disagree" and 5 denoting "strongly agree," was used to create the questionnaire. The impact of digital supply chain techniques on operational performance and organizational outcomes was investigated through the use of descriptive and inferential statistical methods like mean, standard deviation, regression, and correlation.

Table 1: Demographic Profile of Respondents

Category	Frequency	Percentage
Supply Chain Managers	45	30%
Logistics Executives	55	37%
Procurement Officers	30	20%
IT & Digital Managers	20	13%
Total	150	100%

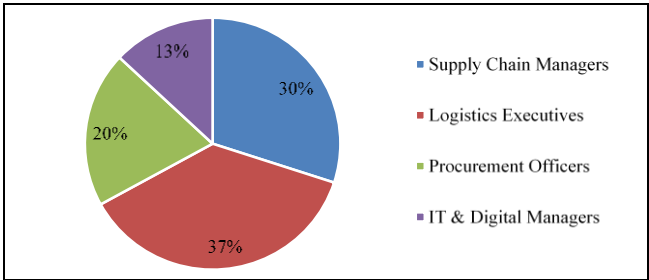


Fig 1: Demographic Profile of Respondents

Interpretation

Since most respondents (67%) work in logistics and supply chain, the data gathered is trustworthy and pertinent for comprehending digital supply chain processes in FMCG companies.

Table 2: Mean and Standard Deviation of Key Variables

Variable	Mean	Standard Deviation
Use of Digital Technologies	4.12	0.61
Supply Chain Efficiency	4.05	0.58
Cost Reduction	3.89	0.65
Transparency & Traceability	4.18	0.54
Customer Satisfaction	4.01	0.60
Sustainability Practices	3.76	0.70

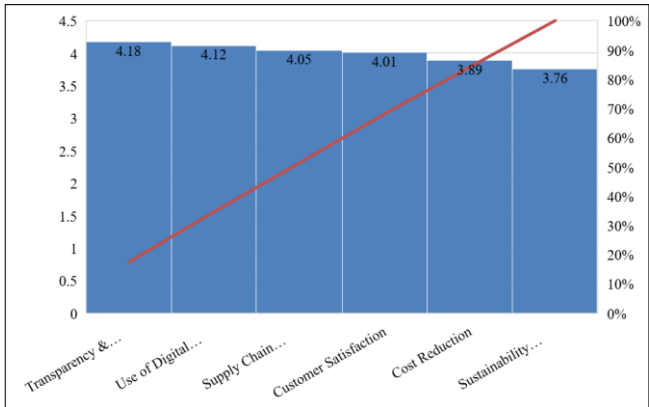


Fig 2: Mean and Standard Deviation of Key Variables

Interpretation

The mean values show a high degree of agreement among respondents about how digital technology can improve customer satisfaction, supply chain efficiency, and transparency. The comparatively low standard deviation indicates that responses are consistent, suggesting that the

majority of FMCG companies see comparable advantages from digital transformation.

Table 3: Correlation Analysis

Variables	Digital Tech Adoption
Supply Chain Efficiency	0.72
Cost Reduction	0.65
Transparency	0.75
Customer Satisfaction	0.68
Sustainability	0.60

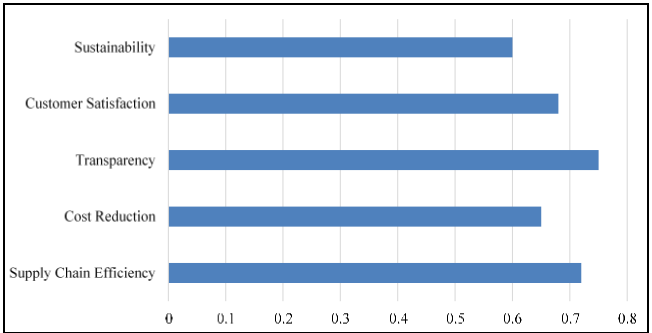


Fig 3: Correlation Analysis

Interpretation

Adoption of digital technology and key performance metrics are strongly positively correlated, according to the correlation data. Transparency has the strongest association ($r = 0.75$), suggesting that digital solutions greatly improve supply chain traceability and visibility.

Dependent Variable: Overall Supply Chain Performance
Independent Variable: Digital Supply Chain Adoption

Table 4: Regression Analysis

Model	R	R ²	F-value	Significance (p)
1	0.78	0.61	92.45	0.000

Interpretation

According to the regression model, 61% of the variation in total supply chain performance may be explained by the use of digital supply chains. The research hypothesis that digitalization improves supply chain performance is supported by the significance value ($p < 0.05$), which verifies that the association is statistically significant. The data clearly shows that supply chain performance in the Indian FMCG industry is significantly and favorably impacted by the implementation of digital technologies. The majority of respondents firmly believe that digital tools increase productivity, lower operating expenses, and promote transparency. Regression analysis also demonstrates that digital supply chain strategies are a key factor in determining an organization's performance. Given that digital supply chains boost the economic expansion, sustainability, and international competitiveness of Indian industry, these results firmly support the Viksit Bharat 2047 objective.

Conclusion and Policy Implications

According to the current study, the digital transformation of supply chains has emerged as a key factor in the Indian FMCG sector's efficiency, transparency, competitiveness, and sustainability, thereby contributing significantly to the

country's Viksit Bharat 2047 goal. The results show that FMCG companies have been able to achieve real-time visibility, quicker decision-making, cost optimization, and increased customer satisfaction through the use of digital technologies like artificial intelligence, the Internet of Things, big data analytics, blockchain, and cloud computing. These technologies have also encouraged environmentally friendly logistics practices.

The findings suggest that the government should improve digital infrastructure, offer tax breaks and financial incentives to promote the adoption of new technologies, develop skills through focused training programs, create standardized frameworks for data and digital governance, and incorporate sustainability into supply chain regulations. When taken as a whole, these policy approaches can hasten the FMCG sector's digital maturity and make a substantial contribution to industrial resilience, inclusive economic growth, and India's transition by 2047 into a developed and digitally empowered country.

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