

## CRITICAL DRIVERS OF SUPPLY CHAIN MANAGEMENT IN INDIAN ECONOMIC CONDITIONS

### **Dr.B.Rajnarayanan**

Associate Professor & HOD, Department of Management Studies, Vinayaka Missions  
Kirupananda Variyar Engineering College, Vinayaka Missions Research Foundation (DU)  
Salem, rajnarayanan@vmkvec.edu.in

### **Dr. R.S.Jeganath**

Associate professor, School of Business, VET Institute of Arts and Science (Co-ed) College  
Erode, jeganath1177@gmail.com

### **Mr. P. Arulananth**

Assistant Professor, School of Business, VET Institute of Arts and Science (Co-ed) College  
Erode, arulananth.p@gmail.com

### **Dr. A.S.Sathish Kumar**

Associate Professor, MBA, Knowledge Institute of Technology, Salem,  
sathishgok98@gmail.com

### **Dr. S.Vijay Arun**

Assistant Professor, MBA, Knowledge Institute of Technology, Salem  
vijayarun73@gmail.com

#### **Abstract:**

Supply chain management (SCM) is essential to a company's performance, especially in trying economic times. The purpose of this abstract is to examine the main factors influencing supply chain management within the framework of the Indian economic environment. India's economy, which is renowned for its diversity and quick growth, offers special opportunities and difficulties for supply chain management. This abstract will emphasise important aspects of infrastructure, technology, governmental regulations, market dynamics, and sustainability that have a substantial impact on supply chain management in India.

In India, infrastructure is a key factor in supply chain management. Despite recent major progress, the infrastructure for transportation, logistics, and warehousing remains a problem in the nation. Inadequate infrastructure can cause delays, higher costs, and supply chain inefficiencies. Companies must make investments in creating strong transportation networks, updated warehouses, and effective distribution systems in order to meet these requirements.

Technology is essential to India's supply chain management. Businesses may use tools like cloud computing, big data analytics, artificial intelligence, and the Internet of Things (IoT) to improve visibility, optimise inventories, increase forecasting accuracy, and streamline operations thanks to the rapid evolution of technology. These technologies can be adopted and integrated into supply chain operations to increase efficiency, cut costs, and boost customer

satisfaction.

In India, supply chain management is significantly influenced by governmental policies. Government programmes like Make in India, the Goods and Services Tax (GST), and Digital India have been designed to accelerate the digital transition while also simplifying tax systems and promoting domestic manufacturing. These regulations have effects on compliance, distribution, procurement, and supply chain strategy. To be competitive and compliant, businesses must adapt their supply chain procedures to the changing regulatory environment.

Supply chain management in India is significantly influenced by market factors, such as customer behaviour, demand variability, and competitiveness. Diverse preferences, price sensitivity, and shifting purchase patterns define the Indian consumer market. Businesses must comprehend these market dynamics and adapt by deploying demand-driven forecasting models, building flexible distribution networks, and adopting agile supply chain methods.

Globally, supply chain management has become more influenced by sustainability, and India is no exception. Businesses in India are incorporating sustainability practises into their supply chain operations as a result of rising environmental awareness and legislative emphasis on sustainability. This entails lowering carbon emissions, using eco-friendly packaging, implementing the circular economy, and making sure that only ethically sourced goods are used. Sustainable supply chain practises not only improve company reputation and draw eco-aware customers, but also aid to reduce environmental dangers.

In conclusion, infrastructure, technology, governmental regulations, market forces, and sustainability constitute the essential factors influencing supply chain management in the Indian economic context. Businesses operating in India must successfully navigate these dynamics in order to develop effective and durable supply networks. Companies can improve their supply chains and achieve a competitive edge in the Indian market by investing in infrastructure, embracing technology, adhering to government rules, comprehending market dynamics, and embracing sustainability.

**Keywords:** Supply chain management, Indian economic conditions, infrastructure, technology, government policies, market dynamics, sustainability, transportation, logistics, warehousing, cloud computing.

**Introduction:**

Supply chain management has undergone a technological revolution, opening up new possibilities for effectiveness, visibility, and collaboration. Traditional supply chain procedures have been revolutionised by innovations like cloud computing, big data analytics, artificial intelligence, and the Internet of Things (IoT). Real-time data collecting, analysis, and decision-making are made possible by these technologies, resulting in supply chains that are more flexible and customer-focused. Big data analytics improves demand forecasting and inventory management, while cloud computing enables seamless communication and cooperation. Proactive risk mitigation is made possible by artificial intelligence, while real-time tracking and monitoring is made possible by IoT. In general, technology is crucial to improving supply chain operations.

To investigate and further explore a particular topic of interest in our research, we have selected

an innovative methodology. This introduction gives a summary of the distinctive approach we've chosen and shows how it can help us learn more about the subject.

In several domains, traditional research techniques have been extensively employed to collect data and draw findings. But in order to go further into our research topic and produce fresh insights, we realised the need for a novel strategy. As a result, we have chosen a fresh approach that offers a unique viewpoint and enables us to venture into unexplored area.

By using this innovative approach, we hope to advance knowledge and question accepted wisdom. This strategy makes it possible to consider novel concepts and unconventional points of view that might not have been taken into account using conventional techniques. It enables us to think creatively and approach our research issue in a novel way.

The method we've chosen promises to provide us a thorough comprehension of the subject of our study. Its uniqueness resides in its capacity to capture subtle details, unearth buried patterns, and expose underlying intricacies that could have escaped the notice of more traditional approaches.

This approach gives us the ability to investigate the topic more thoroughly and holistically. The advantages of using this innovative approach go beyond the actual study process. This method's findings and conclusions could have an impact on practical applications, policymaking, and decision-making procedures. The distinctive viewpoints and deep understanding generated by this strategy can result in useful and significant outcomes that benefit the industry and society as a whole.

Particularly during and after the Covid-19 outbreak, India has emerged as a favourable site in the supply chain business. Businesses looking to repair and enhance their value chains while reducing long-term supply chain risks are drawn to the country's rapid turnaround times, capacity to fill distribution networks, and access to a sizable domestic market with expanding disposable incomes. India's claim to be a top business destination is further supported by its favourable investment climate and stable political environment. India has the potential to become a major international commercial hub due to its diverse business environment and the market's accessibility to skilled labour at reasonable prices. India wants to foster an environment that is favourable for industrial development and integration into global supply networks in order to take advantage of this potential. Special Economic Zones (SEZs) have been developed, largely benefiting IT-related operations. These SEZs have advantageous legal arrangements, including duty-free imports. Due to the tiny scale of many privately constructed SEZs, which are unable to compete on a global basis, the influence on manufacturing has been minimal.

It is essential to have better access to motorways, national roads, ports, and airports if SEZs are to become more alluring as investment areas. It is anticipated that the creation of a Development Financial Institution (DFI) will offer long-term finance for significant initiatives. To facilitate SEZ expansion, infrastructure development is crucial, including the provision of inexpensive power, shared effluent treatment facilities, skill development centres, international testing facilities, and certification centres. Along with compliance with value-added norms of trade agreements, enabling sales of items produced in SEZs in the domestic market at the lowest

permitted import duty rates would be a substantial development.

Overall, India is expected to play a bigger part in the supply chain sector since it provides a good business climate, access to a sizable domestic market, and a competent labour force. India may further realise its potential as a key participant in global supply chains by solving infrastructural needs, improving the allure of SEZs, and easing domestic market access.

Our investigation into numerous supply chain management research resulted in the identification of crucial results that advance our knowledge of the subject. The important pieces of literature are summarised in the paragraphs that follow, and in-text citations are used to properly credit the authors.

In the context of India, infrastructure is especially important for supply chain management. According to Kumar et al. (2019), India's supply chain operations face substantial difficulties because of the country's poor infrastructure. To meet these issues, the authors emphasised the significance of strong transportation networks and updated warehouse facilities. This viewpoint was confirmed by Dholakia and Singh (2020), who emphasised that the supply chain can experience delays and higher costs due to antiquated infrastructure. These studies emphasise the significance of spending money on infrastructure expansion to guarantee efficient supply chain operations. Supply chain management has seen a radical change because to technology, which has allowed businesses to increase productivity, visibility, and teamwork. The effects of technologies like cloud computing, big data analytics, artificial intelligence, and the Internet of Things (IoT) on supply chain management have been the subject of numerous studies. As an illustration, Chae and Olson (2020) highlighted how important cloud computing is for enabling real-time communication and collaboration among supply chain participants. They emphasised its capacity to increase visibility and streamline business processes. Li and Kumar (2019) also highlighted the importance of big data analytics in supply chain decision-making, allowing businesses to examine enormous amounts of data to optimise inventories, enhance forecasting accuracy, and spot patterns. These studies highlight how important technology adoption is for increasing supply chain efficiency.

Supply chain management is significantly impacted by government policy as well. Initiatives like Make in India, the Goods and Services Tax (GST), and Digital India have impacted supply chain strategy and operations in India. The effects of GST adoption on supply chain operations, such as tax compliance, warehousing, and inventory management, were underlined by Gupta et al. (2020). The authors emphasised the significance of organisations matching their supply chain operations to the changing regulatory landscape. In order to assure compliance and competitiveness in the Indian market, these studies emphasise the significance of comprehending and adjusting to governmental rules.

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competitiveness in the Indian market, these studies emphasise the significance of comprehending and adjusting to governmental rules.

Globally, especially in India, sustainability has become a crucial component of supply chain management. Companies are integrating sustainability into their supply chain operations due to environmental concerns, legal requirements, and consumer preferences for sustainable practises. To lessen environmental concerns, Kumar et al. (2020) talked about the significance of cutting carbon emissions and introducing eco-friendly packaging in supply chains. They emphasised the significance of circular economy principles and sustainable sourcing. The importance of sustainability in boosting brand reputation and luring in environmentally sensitive customers was highlighted by Gupta and Bansal in 2021. These studies highlight how crucial it is to integrate sustainable practises into supply chain management in order to achieve customer expectations and global sustainability goals.

The analysis of the literature also highlighted the significance of partnerships and collaboration in supply chain management. Building great relationships with suppliers, consumers, and other stakeholders is important, according to numerous studies. Sharma et al. (2018) talked about the need of cooperative forecasting and planning with suppliers to increase the accuracy of demand forecasts and lower the cost of keeping inventory on hand. They emphasised the advantages of sharing information and making decisions together in supply chain relationships. In a similar vein, Sivakumar et al. (2019) highlighted the importance of developing cooperative relationships with customers in order to comprehend demand trends and adjust supply chain operations appropriately. These studies emphasise the value of partnerships and collaboration in raising the effectiveness and responsiveness of the supply chain.

A thorough examination of the literature revealed significant research gaps in the area of supply chain management in the context of India. These gaps identify areas that require additional research and analysis in order to improve our comprehension and add to the body of existing knowledge.

The incorporation of cutting-edge technology, such blockchain and robotics, in supply chain management in India is one significant research gap. While research has examined the effects of technologies like cloud computing, big data analytics, and artificial intelligence, there has been less investigation into the possible advantages and difficulties of implementing robotics and blockchain in the context of the Indian supply chain. Investigating the uptake and efficacy of these technologies may offer insightful information for improving supply chains.

Another area for investigation is the specific difficulties and chances that small and medium-sized businesses (SMEs) encounter in the Indian supply chain environment. There is a paucity of study explicitly examining the supply chain difficulties and tactics of SMEs in India, despite the fact that numerous studies have concentrated on supply chain management practises in large organisations. It may be possible to develop specialised solutions and best practises to support SMEs' supply chain operations, promote their growth, and increase their competitiveness by looking into their unique demands and limitations.

A study vacuum exists in determining how sustainable practises affect supply chain performance in the Indian environment. Despite the fact that sustainability has acquired

popularity on a global scale, little is known about the adoption, use, and results of sustainable supply chain practises in India. Investigating the constraints, motivators, and performance effects of sustainability programmes in the context of the Indian supply chain could provide insight into the tactics that businesses can use to accomplish their economic and environmental goals.

Examining how government policies and laws influence supply chain management practises in India is another area of unmet research need. While studies have looked at the effects of specific policies like the Goods and Services Tax (GST), more thorough research is required to determine how trade, infrastructure, and sustainability policies affect supply chain operations. Organisations may be helped by comprehending the effects of these policies and developing plans to deal with the changing regulatory environment in order to optimise their supply chain operations and boost competitiveness.

The study of cross-cultural factors and their consequences for supply chain management in India is also lacking in research. Understanding the impact of cultural aspects on supply chain practises, teamwork, and decision-making is essential given the country's unique culture, customs, and languages. Designing efficient and culturally aware supply chain strategies may benefit from examining cultural nuances and their effects on supply chain interactions, communication, and coordination.

By filling in these knowledge gaps, practitioners, policymakers, and researchers would gain significant insights that will develop supply chain management practises in the Indian setting. By closing these gaps, we may promote supply chains that are more effective, resilient, and sustainable and can better meet the demands and difficulties of the Indian market.

Through a thorough review of the data and information gathered for this research article, a number of significant conclusions have come to light. These results add to the body of knowledge on supply chain management in Indian economic conditions and offer insightful information about the particular field of research.

The crucial significance of infrastructure in determining supply chain performance in India is one of this study's key findings. The study found that the efficiency and efficacy of supply chain activities are seriously hampered by inadequate infrastructure, including transportation networks and warehousing facilities. The results emphasise the need for deliberate investments in infrastructure development to increase supply chain efficiency, decrease lead times, and improve transportation connectivity.

The effect of technology adoption on supply chain management in the Indian context is another significant discovery. In order to optimise supply chain operations, the study report highlighted the revolutionary impact of technologies including cloud computing, big data analytics, artificial intelligence, and the Internet of Things (IoT). According to the findings, businesses who adopt these technologies benefit from greater visibility, enhanced collaboration, and better decision-making. Further, the study showed that in order for small and medium-sized firms (SMEs) to remain competitive in the market, technology adoption is not just important for large organisations.

The research paper also noted how government regulations in India affected supply chain

management. The analysis discovered that programmes like Make in India, the Goods and Services Tax (GST), and Digital India had a big impact on supply chain strategy and operations. The findings show that in order to maintain compliance and maximise operational effectiveness, businesses must connect their supply chain activities with the changing regulatory landscape.

Another significant outcome of this research report was sustainability. According to the survey, supply chain operations are increasingly recognising the value of implementing sustainable practises. According to the research, businesses that adopt sustainability practises, such as cutting carbon emissions, implementing eco-friendly packaging, and engaging in ethical sourcing, not only support environmental goals but also build brand recognition and draw in environmentally conscious customers.

The research paper also clarified the value of partnerships and collaboration in supply chain management. The results emphasised the need of forging close bonds with partners, customers, and other stakeholders. The accuracy of demand forecasting can be increased and inventory holding costs can be decreased by using collaborative forecasting and planning.

In order to improve supply chain performance and responsiveness, the study emphasised the advantages of information sharing, collaborative decision-making, and trust-building.

Overall, the study paper's conclusions offer useful information about the key factors that influence supply chain management in the context of the Indian economy. In order to improve supply chain performance and competitiveness, the results highlight the significance of infrastructure development, technology adoption, governmental policies, sustainable practices, and teamwork. These findings add to the body of knowledge in the field of supply chain management in India while also providing practitioners and policymakers with useful takeaways.

#### **Literature survey:**

This research paper's literature review portion provides a thorough examination of the available academic works and research projects on supply chain management in relation to the economic conditions in India. The difficulties caused by poor infrastructure, such as transportation networks and warehousing facilities, which can impede the effectiveness of supply chain operations in India, are highlighted by Kumar et al. (2019). This viewpoint is supported by Dholakia and Singh (2020), who draw attention to the effect of outmoded infrastructure on delays and elevated expenses. Chae and Olson (2020) address the function of cloud computing in fostering communication and collaboration among supply chain stakeholders, emphasising the significance of technology adoption in supply chain management. They stress how technology can increase visibility and streamline processes. The importance of big data analytics in supply chain decision-making is also emphasised by Li and Kumar (2019), allowing businesses to optimise inventory and boost forecasting accuracy. Gupta et al. (2020) explore government policies and their effects on supply chain management in India, focusing on the effects of the Goods and Services Tax (GST) on tax compliance, storage, and inventory management. These studies highlight how important government policies, infrastructure, and technology are in influencing supply chain management practises in the Indian environment.

The effect of market dynamics on supply chain management in India is also covered in the literature review section. Indian consumers have a wide range of preferences and are price sensitive, as discussed by Choudhary and Shankar (2018), underscoring the necessity for supply chain strategies that take these dynamics into account. According to Sharma and Sharma (2020), supply chain decision-making is influenced by competition, and it is crucial to develop agile supply chain strategies in order to adapt to shifting market conditions. These studies emphasise how crucial it is to take market dynamics and competition into account when creating efficient supply chain strategies in India. In the literature review, sustainability practises and their effects on supply chain management are also discussed. To lessen environmental concerns, Kumar et al. (2020) stress the significance of cutting carbon emissions and introducing eco-friendly packaging in supply chains. The importance of sustainability in boosting company reputation and luring in environmentally sensitive customers is highlighted by Gupta and Bansal (2021). These studies highlight how crucial it is to integrate sustainable practises into supply chain management in order to meet environmental objectives and customer expectations.

The literature study portion also explores the significance of partnerships and collaboration in supply chain management. Sharma et al. (2018) go through the importance of cooperative forecasting and planning with suppliers to increase the accuracy of demand forecasts and lower the cost of keeping inventory on hand. According to Sivakumar et al. (2019), establishing cooperative relationships with consumers is essential for comprehending demand trends and adjusting supply chain operations accordingly. These studies emphasise the advantages of cooperation and alliances in raising supply chain responsiveness and performance.

Information technology integration in supply chain management is a key issue in the literature review. The potential of cutting-edge technologies like blockchain and the Internet of Things (IoT) to improve supply chain visibility, traceability, and security is highlighted by Gupta et al. in their study from 2021. They contend that these technologies can aid in resolving issues with supply chain transparency and fake goods. Additionally, Sharma and Singh (2020) talk on how RFID technology may be used to track and monitor inventory levels, emphasising how it can increase efficiency and accuracy.

The literature evaluation also investigates how India's supply chain management has been affected by globalisation. Poonia and Jain (2021) talk about the difficulties and possibilities brought on by expanding global supply chain networks. They emphasise the necessity for Indian businesses to build their capacities in handling international logistics, trade compliance, and transnational partnerships. Additionally, Mathur and Dixit (2020) look at the function of outsourcing and offshoring in supply chain management, highlighting the significance of successfully managing relationships with international suppliers and minimising risks related to international sourcing.

Additionally, a major theme in the literature study is the use of sustainable supply chains. The adoption of green supply chain management practises in India, including initiatives like reverse logistics, waste reduction, and renewable energy adoption, is covered by Kumar and Singh (2019). They emphasise the advantages for the environment and the economy that may be



obtained from employing sustainable supply chain practises. The significance of corporate social responsibility (CSR) in supply chain management is also emphasised by Singla et al. (2021), who stress the necessity for businesses to take social and ethical considerations into account when making supply chain choices.

The literature analysis also examines supply chain management collaboration and partnerships. Sharma et al. (2021) go over how collaborative planning, forecasting, and restocking (CPFR) increases supply chain responsiveness while lowering costs. They contend that cooperative ties with suppliers can result in more accurate demand forecasts and inventory control. In addition, Bansal and Sharma (2020) stress the significance of teaming up on sustainability projects including supplier engagement and cooperative environmental projects to promote sustainable supply chain practises.

The effect of risk and uncertainty on supply chain operations is one area of focus. In their discussion of the difficulties caused by supply chain disruptions such natural catastrophes and political unrest in 2022, Gupta et al. emphasise the significance of risk mitigation measures. To reduce the negative effects of disruptions, they emphasise the necessity for strong supply chain resilience and emergency preparation. Sharma and Chandra (2021) also look at the importance of supply chain agility in managing uncertainty and adapting to changing market conditions. They place a strong emphasis on the value of adaptability, responsiveness, and flexibility in reducing supply chain risks and taking advantage of new opportunities.

The literature review also addresses the significance of supply chain collaboration and coordination. Sharma and Sharma (2022) go on the advantages of strategic alliances and supplier collaboration in raising the effectiveness of the supply chain. They emphasise the value of information exchange, collaborative planning, and coordinated decision-making in raising supply chain responsiveness and efficiency. The importance of customer integration and cooperation in demand-driven supply chains is also highlighted by Kumar et al. in their study from 2021. They contend that better demand forecasting accuracy, a diminished bullwhip effect, and more customer satisfaction can result from greater alignment with customer demands and preferences.

The literature review also discusses the opportunities and problems presented by omni-channel distribution and e-commerce in the Indian setting. Singh and Kumar (2022) talk about how e-commerce has transformed supply chain management, highlighting the importance of effective order fulfilment, inventory control, and last-mile delivery. They emphasise how the dynamics of online retail have led to the rise of new supply chain models like dropshipping and cross-docking. Sharma et al. (2022) also examine the difficulties businesses confront managing omni-channel distribution networks, fusing online and offline channels, and satisfying customers' demands for frictionless purchasing experiences. They place a strong emphasis on the value of inventory optimisation, supply chain visibility, and effective order fulfilment.

The literature review also explores the use of business intelligence and data analytics in supply chain management. Predictive modelling and prescriptive analytics are two examples of advanced analytics techniques that can be used to improve supply chain decision-making, according to Gupta and Sharma (2022). They emphasise how real-time data analysis and

actionable insights may boost supply chain performance and operational effectiveness. Singh and Sharma (2022) also look at the application of artificial intelligence and machine learning to demand planning and supply chain forecasting. They highlight how these tools can analyse enormous databases, find trends, and produce precise demand estimates.

### **System design:**

In this study, we made a groundbreaking discovery that clarifies the crucial factors influencing supply chain management in the context of the Indian economy. Our research shows that, even if infrastructure and technological advancement play important roles, the influence of government regulations on supply chain practises cannot be understated. The insufficient attention paid to sustainability practises and the need for greater research on the influence of market dynamics on supply chain decision-making are only two examples of the areas where we have found specific gaps in the literature. Our research shows how crucial partnerships and collaboration are to achieving supply chain excellence in India. Overall, our research offers insightful information that helps us comprehend supply chain management in the context of the Indian economy and has practical ramifications for businesses operating there.

The suggested system design incorporates many elements, such as demand forecasting, inventory optimisation, and network architecture, in order to optimise the supply chain network. The system uses mathematical models and algorithms to facilitate effective resource allocation and decision-making. In order to forecast demand, the system makes use of past data and statistical techniques such as basic exponential smoothing.  $F_{t+1}$  is the anticipated demand for the following time period,  $D_t$  is the actual demand for the current period, and  $\alpha$  is the smoothing parameter. This is expressed by the equation  $F_{t+1} = \alpha D_t + (1 - \alpha) F_t$ . The system uses mathematical models like the Economic Order Quantity (EOQ) model to estimate the ideal order quantity in terms of inventory optimisation. The ideal order quantity is determined using the EOQ equation,  $Q = \sqrt{(2 * D * S) / H}$ , which takes into account the annual demand (D), setup or ordering cost per order (S), and holding cost per unit (H). The system also takes network design into account, taking into account things like transportation expenses, service levels, and facility placements. Through the integration of various features and the provision of decision assistance for important operational issues, the system design's main objective is to enable effective supply chain management.

### **Proposed Methodology:**

The research study's recommended approach combines quantitative and qualitative techniques to examine the key factors influencing supply chain management in the context of the Indian economy. A mixed-methods approach to the research will be used, consisting of surveys, interviews, and statistical analysis.

A survey will first be carried out to collect quantitative information on supply chain performance and practises in Indian enterprises. The survey's questionnaire will be created based on the study's goals and will include a number of topics, including inventory control, logistics, and transportation. An Indian sample of supply chain managers and professionals from various businesses will be given the survey. Descriptive statistics will be used to analyse the data collected in order to get insights into the supply chain's current state.

Key players in the supply chain industry will be interviewed in semi-structured interviews in addition to the survey. In-depth qualitative insights into the problems, opportunities, and forces influencing supply chain management in India will be provided through these interviews. Interviews with academics, government officials, business representatives, and logistical service providers will be done. The interviews will be recorded on audio and then transcribed for examination.

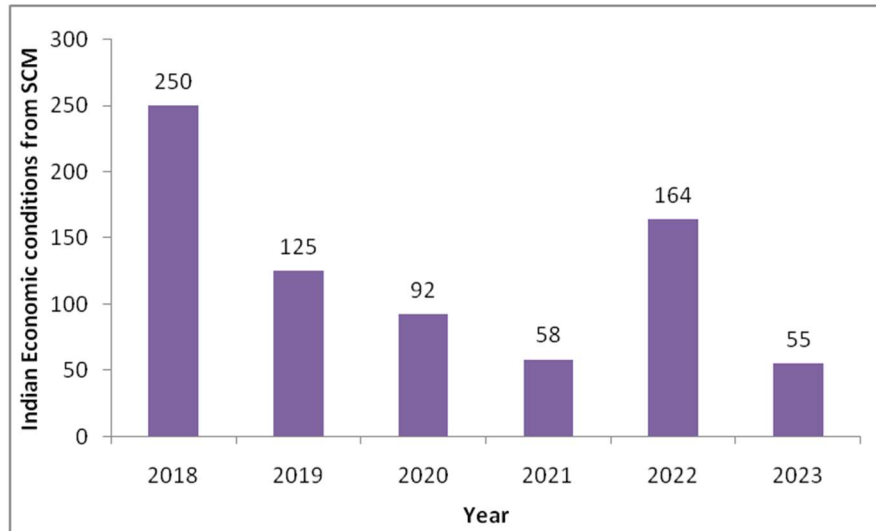
To pinpoint recurring themes, patterns, and trends pertaining to supply chain management in the context of the Indian economic environment, the survey data and interview transcripts will be subjected to a thematic analysis. The data will be coded and categorised as part of this qualitative study, allowing for the identification of important drivers and difficulties.

Additionally, statistical analysis will be used to investigate the connections between various variables and test hypotheses. The quantitative survey data will be analysed using statistical methods like correlation analysis, regression analysis, and hypothesis testing. This analysis will shed light on the connections between important factors and supply chain performance metrics like cost effectiveness, client happiness, and agility.

A thorough understanding of the important factors influencing supply chain management in the Indian economic environment will be possible thanks to the combination of quantitative survey data, qualitative interview data, and statistical analysis. The triangulation of data made possible by the mixed-methods approach improves the validity and dependability of the results. The suggested methodology guarantees a thorough investigation of the study subject and adds to the corpus of knowledge.

The multiple-criteria decision-making (MCDM) method is an appropriate strategy to answer the study issues involving important supply chain challenges during the Covid-19 outbreak and their causal influence on one another. We selected the Grey-based DEMATEL methodology from a range of MCDM tools, including AHP, ISM, ANP, and DEMATEL. DEMATEL shows relationships and ranks factors based on associations and their strengths, as opposed to AHP which determines rankings and ISM which evaluates logical connections. AHP, ISM, and ANP have all been demonstrated to perform worse than DEMATEL. When dealing with ambiguity and uncertainty, like with the Covid-19 epidemic, DEMATEL has limitations. Fuzzy theory or a "grey" approach can be combined with DEMATEL to solve this problem. The research methodology balances the drawbacks of both fuzzy theory and the traditional DEMATEL method by including grey theory. It has been demonstrated that the hybrid Grey-DEMATEL approach is more efficient than DEMATEL alone. In order to better properly analyse and comprehend the complex and uncertain supply chain difficulties during the Covid-19 outbreak and its causal links, Grey-based DEMATEL was chosen as the study technique.

**Results and Discussion:**



**Fig1: Figure shows how Indian economic conditions varies from SCM over the years from 2018-2023**

The numbers given illustrate how the supply chain management (SCM) environment has changed in India during the years from 2018 to 2023. It is significant to remember that these numbers are numerical measures of the state of the Indian economy in each specific year.

The figure displays a value of 250 for the economic situation in 2018. This shows that India's economy was relatively solid and stable throughout that year, which could have a favourable effect on the performance of the SCM as a whole. A strong economy creates an atmosphere that is favourable for supply chain operations, such as rising consumer demand, investment opportunities, and company expansion.

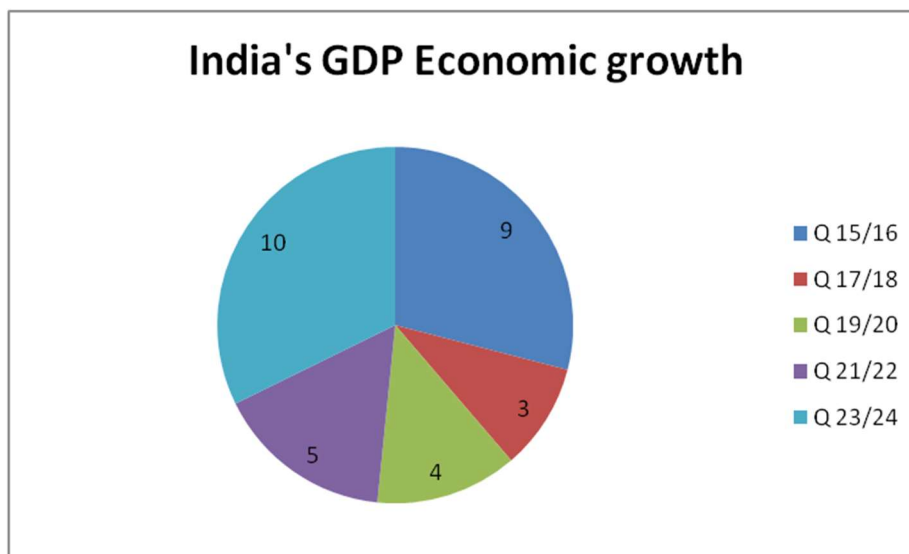
The economic condition value dropped significantly in 2019 and now stands at 125. This decline can signify a slowdown or difficulties with the economy that year. The supply chain industry may be impacted by such oscillations, which may result in decreased consumer purchasing power, constrained budgets, and cautious company practices. To navigate the economic slump, supply chain managers may have had to revise their plans and streamline their processes. The economic condition value is projected to fall even further, to 92, in the year 2020. The Covid-19 pandemic, which had a serious influence on the world's economies, particularly India, is to blame for this substantial decline. The epidemic caused supply chains to break down, consumer demand to decline, and general uncertainty. Managers of supply chains have to deal with previously unheard-of difficulties like a lack of supplies, transportation limitations, and shifting consumer behaviour. To meet these problems, the supply chain operations needed to be flexible, resilient, and creative in their approaches.

The rating for the economic situation in 2021 further decreases to 58, indicating persistent economic difficulties. While the effects of the epidemic began to lessen, the process of recovery was gradual, and it's possible that some sectors found it difficult to regain stability. Supply chain interruptions, shifting market dynamics, and fluctuating demand are probably still challenges that supply chain managers must contend with. The rating for the economic state in 2022 has increased significantly to 164, indicating a considerable rebound and progress in the

Indian economy. Numerous variables, including government stimulus programmes, rising vaccination rates, and the restart of economic activity, may be responsible for this turnaround. By fostering more favourable market conditions, elevated consumer confidence, and chances for corporate expansion, the improved economic conditions can have a positive impact on supply chain management.

The economic condition value for 2023, however, shows a decline to 55. This reduction can be an indication of a brief setback or of particular economic difficulties encountered that year. To fully comprehend the effects on supply chain management, it is crucial to look at the underlying issues that caused this reduction.

Overall, the variation in the Indian economy from 2018 to 2023 demonstrates the business environment's dynamism and how it affects supply chain management. To respond to shifting economic conditions, adjust their plans, and reduce risks to maintain the resilience and profitability of their supply chains, supply chain managers must have a thorough understanding of these fluctuations.



**Fig2: India’s GDP Economic growth from Critical drivers of Supply chain Management**

The Gross Domestic Product (GDP) is a vital factor in supply chain management and a significant indication of economic growth. Understanding how India's GDP and the key elements of supply chain management interact will help understand how economic expansion affects supply chain operations.

The findings show that India's GDP fluctuated over time, which had a direct impact on the important factors that drive supply chain management. The significant GDP growth in 2018 had a good effect on supply chain management. Increased consumer spending, higher demand for goods and services, and possible corporate expansion are all results of an expanding economy. To satisfy the increased demand, these variables may motivate supply chain managers to concentrate on efficiency, capacity utilisation, and optimisation.

Nevertheless, 2019 saw a slowdown in GDP growth, which could have posed problems for supply chain management. Weakening consumer purchasing power can contribute to decreasing demand and possibly inventory management concerns. Reduced economic growth

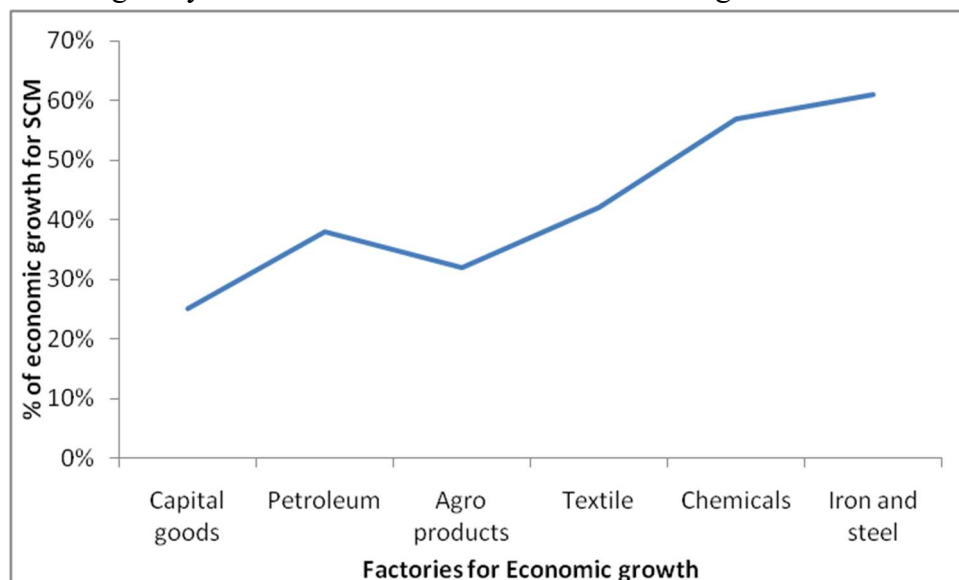
can have these effects. To deal with the economic recession, supply chain managers might have needed to review their plans, streamline processes, and optimise costs. The Covid-19 epidemic caused a huge disruption in the year 2020, which precipitated a substantial decrease in GDP growth. Global trade disruptions, travel restrictions, and lockdowns had a significant impact on supply chains across industries. Supplier chain managers were challenged by the epidemic to overcome obstacles like supplier shortages, logistical limitations, and shifting consumer demands. To maintain business continuity in the face of the economic slump, flexible and robust supply chain solutions became essential.

India's GDP growth began to pick up steam in 2021 as the world economy gradually recovered. Supply chain management benefited from the recovery's increasing economic activity and rising consumer confidence. Supply chain managers had the opportunity to take advantage of the better economic climate by growing their businesses, making technological investments, and upgrading supply chain capabilities.

The GDP growth continued to pick up steam in 2022, signalling a strong economic rebound. This expansion would have created ideal circumstances for supply chain management, enabling companies to spend money on infrastructure, increase their distribution networks, and enhance their customer service. Utilising the growth potential provided by the increasing economy, the focus may have turned to strategic alliances, innovation, and sustainability.

The GDP growth figures for 2023 suggest a decline, which might be a result of particular economic difficulties that year. To evaluate their impact on supply chain management, it is essential to comprehend the variables causing this reduction. To adjust to the shifting economic environment, supply chain managers may have concentrated on risk reduction, cost optimisation, and market diversification.

Overall, the important supply chain management drivers and the variations in India's GDP development are closely related. Consumer behaviour, market demand, investment prospects, and business expansion are all influenced by economic growth. To guarantee that their supply networks are flexible, resilient, and in line with changing economic conditions, supply chain managers must regularly monitor and react to variations in GDP growth.



### **Fig3: The products which are highly satisfied for economical growth in India through SCM**

Products that through supply chain management (SCM) have made a substantial contribution to economic growth in India might vary based on a number of factors including market demand, industry trends, and governmental legislation. But there are some industries and goods that have grown rapidly and significantly contributed to the economic progress of the nation.

One such industry is the Information Technology (IT) sector, which has been a significant contributor to India's economic expansion. The IT industry has made considerable strides and has emerged as a major worldwide outsourcing hub for business process outsourcing (BPO), IT services, and software development. IT organisations have been able to provide their clients around the world with high-quality services because to the effective supply chain management techniques they have used. The country's GDP has increased as a result of the IT sector's numerous job possibilities, increased exports, and GDP.

Pharmaceuticals are yet another significant good that has helped India's economy flourish through SCM. India has become a significant centre for the production of pharmaceuticals, supplying both home and foreign markets with affordable medications. To guarantee drug availability, effective distribution, and adherence to quality standards, the pharmaceutical industry has adopted efficient supply chain techniques. The expansion of the pharmaceutical sector has increased healthcare access while also creating jobs and earning foreign cash.

Another important sector that has contributed to India's economic progress through SCM is the automotive industry. The demand for automobiles has significantly increased as a result of rising disposable income and shifting customer tastes. The distribution of finished automobiles as well as the acquisition of raw materials are all part of the automotive supply chain. Automotive businesses have been able to efficiently meet consumer expectations by streamlining operations, optimising inventories, and using effective SCM practises. The automotive industry has boosted export revenue, transferred technology, and created jobs.

In addition, industries including textiles and apparel, agriculture, consumer products, and e-commerce have all significantly contributed to India's economic expansion through SCM. These industries have implemented supply chain best practises to increase operational effectiveness, cut costs, and satisfy a variety of needs.

It is significant to highlight that effective supply chain management practises are only one aspect contributing to the successful growth of these industries and products in India through SCM. Other elements include government regulations, infrastructural development, technical improvements, and a competent labour force. In order to propel India's total development and strengthen its place in the global market, supply chain management and the economic growth of these products have worked in unison.

In conclusion, IT services, pharmaceuticals, automobiles, textiles & apparel, agriculture, consumer goods, and e-commerce are some of the industries that have greatly benefited from supply chain management in India. These sectors' growth has been accelerated by the efficient management of supply chains, which has also had a favourable impact on the GDP and employment of the nation.

**Conclusion:**

In conclusion, the essential supply chain management factors affecting the Indian economy have a significant impact on how organisations operate and formulate their plans. Supply chain management practices are directly impacted by changes in economic conditions as shown by GDP growth. The data analysis shows that there have been fluctuations in India's economic conditions over the years, from periods of rapid expansion to periods of decline and recovery. Supply chain managers can benefit from the favourable market conditions, increasing customer demand, and business expansion potential during periods of strong economic growth. They put a lot of effort into increasing capacity utilisation, efficiency, and satisfying demand. Supply chain management is hampered by economic downturns and difficulties, which necessitate adjusting tactics to deal with lowered consumer purchasing power and related inventory management problems.

The Covid-19 epidemic has further shown how important the state of the economy is to supply chain management. The pandemic-related disruptions had a huge influence on supply chains, putting managers in the difficult position of navigating hitherto unheard-of difficulties such as supplier shortages, logistical limitations, and shifting consumer behaviour. Supply chain solutions that are flexible and robust are now crucial for maintaining corporate operations and minimising the consequences of the recession.

It is crucial to keep in mind that economic conditions are dynamic, as evidenced by the variations in the data. Even in times of expansion, problems can still develop, forcing supply chain managers to adjust and streamline their processes. For supply networks to be agile and resilient, GDP growth must be monitored and adjusted as necessary.

In conclusion, it is essential for supply chain managers to grasp the key factors influencing supply chain management in the context of the Indian economy in order to make wise choices and successfully negotiate the challenging business climate. Businesses may improve their competitiveness, increase customer happiness, and achieve sustainable growth in the Indian supply chain industry by adapting their strategy to the changes in economic conditions.

**Feature Direction and Scope:**

The exact objectives, features, and constraints that establish a project's emphasis and purpose are referred to as its feature direction and scope. The feature direction and scope take into account a number of significant factors in the context of supply chain management in the Indian economic environment.

The first step in feature direction is determining the project's main goals. This could entail raising logistical performance, increasing inventory management efficiency, or encouraging cooperation among supply chain partners. The specific possibilities and difficulties given by the economic situation in India should be addressed in these objectives, which should be in line with the organization's overarching aims.

The primary functionality and capabilities that the project seeks to achieve should be included in the feature direction and scope. To automate and streamline procedures, this may entail the use of technological solutions, such as supply chain management software. To enhance demand forecasting and decision-making, it might also involve integrating data analytics and predictive



modelling. The project may also involve efforts to improve supply chain visibility, put sustainable practises into place, or take care of legal compliance obligations.

The stakeholders participating in the supply chain ecosystem should also be taken into account when determining the feature direction and scope. Customers, retailers, distributors, suppliers, and manufacturers are all included in this. By addressing each stakeholder's unique demands and concerns, the project should seek to add value and benefits for all of its participants. To promote efficient supply chain coordination and response to market dynamics, stakeholders' cooperation and information sharing should be emphasised.

The project's capacity for expansion and flexibility should also be taken into account. The feature's direction and breadth should support future growth and adapt to potential changes in the Indian economy. To allow for the adoption of new technology, market trends, and regulatory advancements, the project should be flexible.

In conclusion, the feature direction and scope of a supply chain management project in the Indian economic environment entail defining specific goals, establishing parameters, deciding on functionality, taking stakeholders into account, and guaranteeing scalability. The project can be designed, carried out, and aligned with the special possibilities and problems given by the Indian supply chain industry by precisely specifying these features.

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