

Designing Framework to Mitigate the Limitations of Automation in Supply Chain Management

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Abstract

Introduction: In today's fast-paced world, supply chain management automation is a must-have, not a nice-to-have. This presentation shows you how to bridge gaps and build a resilient framework that boosts efficiency and adaptability.

Materials & Methods: A qualitative research design using a systematic literature review (SLR) was employed. Relevant studies were retrieved from Google Scholar, Scopus, and Science Direct, then evaluated and synthesized to draw evidence-based conclusions.

Results: The review highlighted that while IoT and AI have advanced supply chain automation, persistent challenges remain, including high costs, scalability, data quality, ethical concerns, and reliance on human oversight. A hybrid approach combining AI with traditional methods and human expertise is suggested to enhance efficiency.

Conclusion: Automation improves productivity, accuracy, and responsiveness but also poses risks such as unemployment and cybersecurity issues. Future research should emphasize integrating advanced AI tools like ANN and NLP with Industry 4.0 technologies to optimize supply chain performance.

Keywords: Designing; Framework; Mitigate; Automation; Supply chain management

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Introduction:

- In today's fast-paced world, automation in supply chain management is no longer optional. It is a necessity. This presentation explores how we can bridge the gaps and create a resilient framework that enhances efficiency and adaptability in supply chains.
- Automation has driven most manufacturing developments in the past century. Henry Ford's early 1900s assembly line automation of automotive engine manufacture was the first major attempt.
- Optimizing Supply Chain Efficiency is crucial in today's competitive landscape. This presentation outlines a framework to address automation limitations and enhance overall performance. By focusing on key strategies, organizations can improve their supply chain processes and achieve sustainable growth.
- Today's decision-support systems and communication tools can automate marketing, sales, and supplier relationships. All of these efforts aim to automate SC activities, from raw material procurement to product delivery. All of these efforts aim to better serve clients quickly and efficiently.

- Thus, manufacturing floor automation efforts extended across SC. These attempts began. Technology drives these improvements, which can cause industry upheavals and revolutions (Agrawal & Narain, 2018).
- Logistics is the study of the SC process that plans, implements, and controls the flow and storage of goods, services, and related data communications between the origin and the end of consumption to meet customer needs.
- The SC manages resources, information, and cash from the supplier to the manufacturer, wholesaler, retailer, and customer (Cimini et al., 2019).

Objectives of This Study:

The following are the primary objectives:

- To observe, study, and analyse the production processes in the SC beginning with the acquisition of raw materials and progressing through the packing of finished goods.
- To compile a list of the issues that firms encounter when re-establishing their business, how they have re-established their business in the past, and what obstacles and difficulties they have encountered.
- To document all of the procedures involved in leisure, as well as how they selected the most appropriate components for the task at hand.

Understanding Supply Chains Gaps:

- Identifying gaps in the supply chain is crucial. These gaps can lead to inefficiencies and increased costs. By recognizing these areas, we can implement targeted strategies to enhance automation and improve overall performance.
- Challenges in automation: While automation offers numerous benefits, it also presents challenges. From cost barriers to resistance to change, organizations must navigate these obstacles to fully realize the potential of automation in their supply chains.

Research Gap:

- According to literature, managing the SC involves several steps, and time, laboratories, procedures, and other resources are needed to achieve this strategy. This leads to more errors, expenses, poor performance, and reduced competitiveness.
- The business will aim to meet the least possible consumer demand as it continues on this course. Compiling, managing, implementing, and storing commodity location and transportation data can achieve this goal. SC administration is also complex.
- The SC strategy must stay aware of it and consider the ever-changing market. Encourage and support the numerous process management processes because they speed up the process while maintaining quality and accuracy.
- These methods should be promoted since they speed up the process while retaining quality and accuracy, even when their performance and productivity affect the connected challenges. Thus, the main goal of this research is to investigate the restrictions of using automation for SCM and propose a framework for fixing the challenges.

Problem Formulation:

- In this particular investigation, rather than focusing on the introduction of robots into a particular sector of the economy, this study gave a greater amount of consideration to the challenges and obstacles that are posed by automation, as well as the potential solutions to these problems.
- It is not enough to just analyze the obstacles that stand in the way of the deployment of robots in India; it is also vital to investigate the psychological and physiological effects that robotics has on workers.
- Because of this, this study decided to read through the reports that the occupational safety committee had produced in order to get a better understanding of the implications.

- Aside from that, the research conducted on the effects of automation on employment in the countries of Europe yielded useful information that could be compared to the current job climate in India.
- This study has the potential to provide a foundational pillar for the automation installation process.

Significance of The Study:

- This study aimed to evaluate the difficulties a company encounters when switching from old to new technology in emerging countries and automating and re-creating its business.
- The goal was to use our research to help other businesses make informed decisions about how best to look into various issues before automating their processes.
- By doing this, the businesses may be able to prevent a negative effect on their financial resources and save a substantial amount of time.
- The work at hand was successfully completed by utilizing a case study that featured the development of an automated system and the hurdles encountered throughout the method of re-establishing the organization.

Materials & Methods

- The methodology of qualitative research was utilized in this study. In order to accomplish the goals of this study, a systematic literature approach is utilized for the purpose of data collection.
- A systematic literature review (SLR) is a tedious academic method that searches for and evaluates all relevant literature on a topic to draw informed conclusions about the research issue (Lame, 2019).
- This research evaluated the literature on improving SC systems and automating internal logistics.
- Academic literature was searched using multiple databases and online search engines for the literature review.
- Google Scholar was used for search and Scopus and Science Direct for database retrieval.

Understanding Supply Chain:

- A supply chain: encompasses all activities involved in producing and delivering a product. Understanding its components, from procurement to distribution, is essential for identifying areas that can benefit from automation and efficiency improvements.
- Challenges in Automation: Despite advancements, many organizations face challenges in automating supply chain processes. Common issues include integration difficulties, high costs, and resistance to change. Recognizing these barriers is critical to developing effective solutions
- Identifying limitations: To optimize supply chain efficiency, it is vital to identify automation limitations. This includes assessing current technologies, workforce capabilities, and operational processes. A thorough analysis can reveal opportunities for improvement and innovation.
- Staggered development: Based on the assessment, organizations can develop a tailored strategy that addresses identified limitations. This may include investing in new technologies, enhancing employee training, and fostering a culture of innovation within the supply chain.
- Implementation Tactics: Effective implementation tactics are essential for success. This includes phased rollouts, clear communication, and continuous monitoring of progress. Engaging stakeholders throughout the process ensures that everyone is aligned with the goals.
- Continue improvement: The final step in the framework is continuous improvement. Regularly reviewing processes and technologies allows organizations to adapt to changing market conditions and maintain a competitive edge in supply chain efficiency.

Results and Discussions:

- The majority of the studies evaluated in this analysis were published within the past three years, demonstrating SCM automation restrictions.

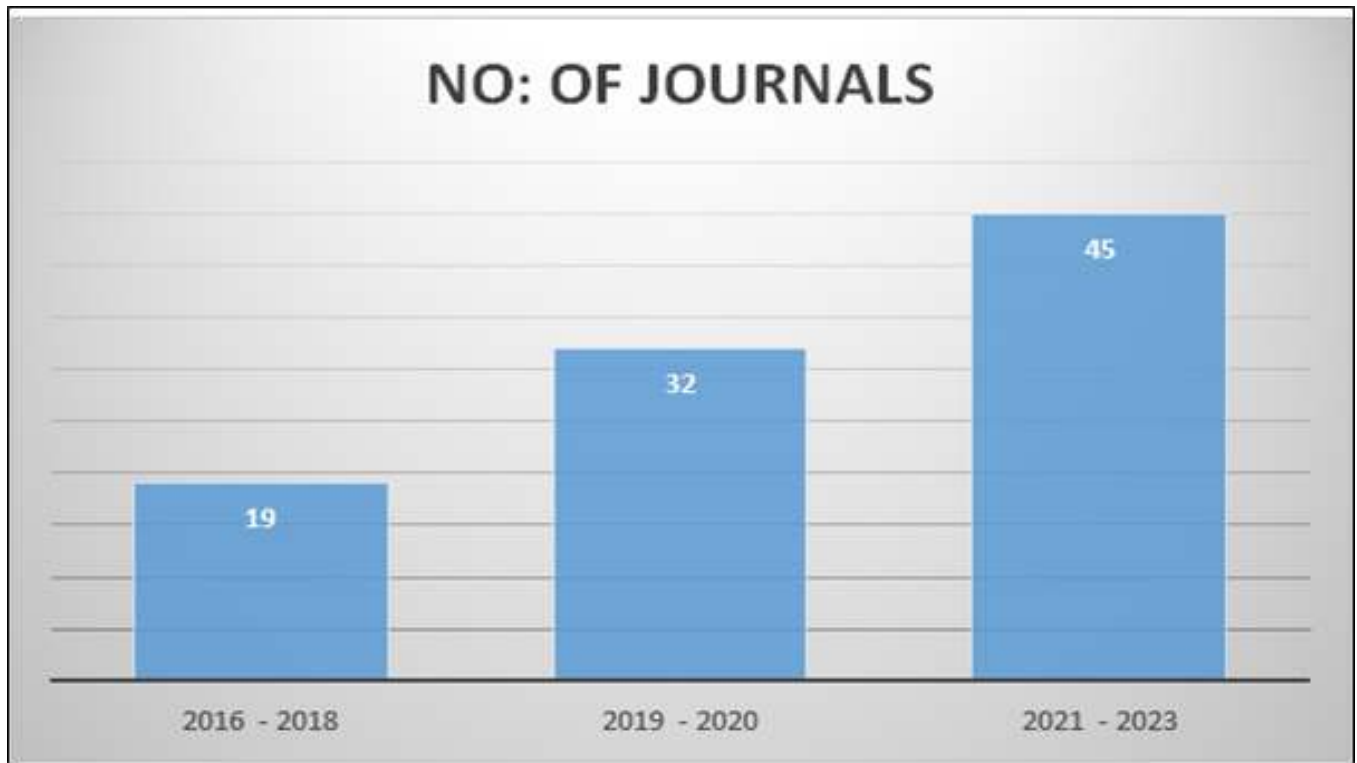
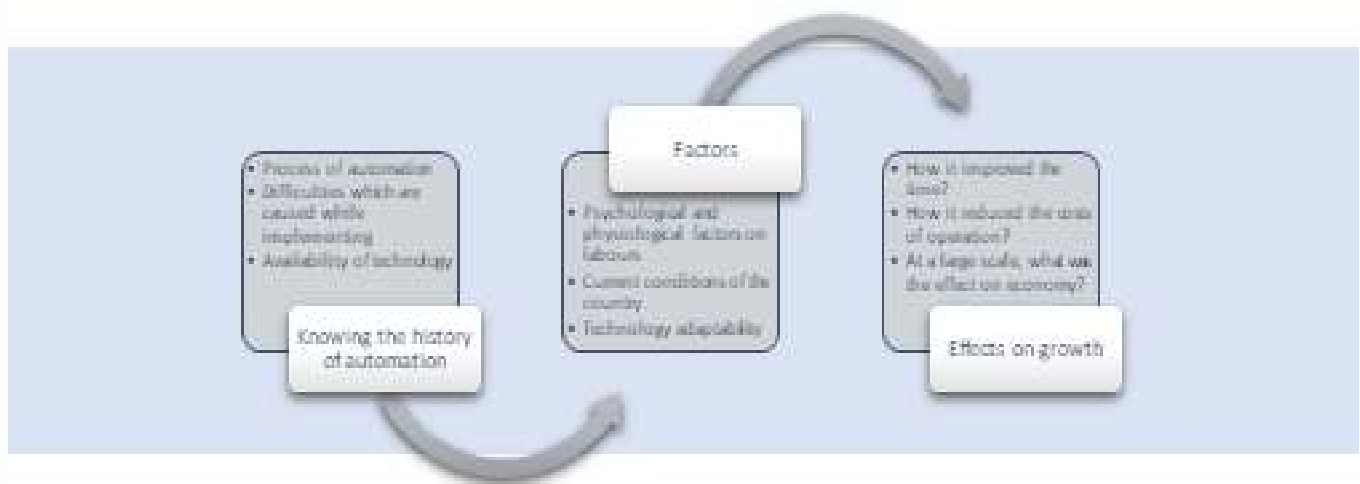


Figure 2: Number of peer-reviewed journal articles by year of publication in the SLR.



Results and discussion:

- Globalization dominates the industrialized world's economy, causing strong commercial competition. Due to globalization and competition, trade flows through SCs or, more recently, collaborative networks. Because today's businesses aren't self-sufficient.
- Because of this, the businesses that make up these chains or networks must integrate and coordinate their processes to become more efficient and competitive, which will enable them to achieve their overall goals and objectives (Pal, 2019).
- Since the Supply Chain operations reference (SCOR) model divides SC processes into plan, source, make, deliver, return, and enable categories, this section shows how IoT is used in particular specific business process research activities.
- Some IoT supporting technologies have four major layers (Wurm et al., 2016): First, RFID and sensors are used for data gathering; second, stable and mobile networks are used for transmission; third, service; and fourth, interface.

- With regards Indian transformation AI has significantly improved Flipkart's warehouse management system., it is essential to address the limitations of AI to maximize its effectiveness.
- a. Human Oversight: Despite advancements in AI technology, human oversight is crucial to ensure accuracy and reliability. By combining human expertise with AI capabilities, Flipkart can validate AI-generated insights, correct errors, and make informed decisions based on a combination of human judgment and AI recommendations
- b. Continuous Training: AI models require regular updates and retraining to adapt to changing data patterns and improve performance. Flipkart should invest in ongoing training programs for AI algorithms, incorporate new data sources, and fine-tune models to enhance accuracy and relevance in warehouse operations.
- c. Data Quality Assurance: The effectiveness of AI algorithms heavily relies on the quality of input data. Flipkart must prioritize data quality assurance processes, including data cleansing, normalization, and validation, to ensure that AI models receive accurate and reliable data inputs for decision-making.
- d. Interpretability and Transparency: AI models often operate as "black boxes," making it challenging to understand how they arrive at specific decisions. Flipkart should focus on developing interpretable AI models that provide explanations for their recommendations, enabling users to understand the reasoning behind AI-generated insights and build trust in the system.
- e. Ethical Considerations: As AI becomes more pervasive in warehouse management, Flipkart must address ethical considerations, such as bias in algorithms, data privacy, and algorithmic accountability. Implementing ethical guidelines, diversity in data sources, and transparent decision-making can help mitigate ethical risks associated with AI implementation.
- f. Hybrid Approach: Combining AI capabilities with traditional optimization techniques and expert knowledge can enhance the robustness of warehouse management systems. Flipkart can leverage a hybrid approach that integrates AI algorithms with heuristic methods, rules-based systems, and domain expertise to address complex warehouse challenges effectively.
- g. Scalability and Integration: To overcome limitations related to scalability and integration, Flipkart should design AI solutions that are scalable across its warehouse network, compatible with existing systems and technologies, and capable of seamless integration with other business processes. Adopting standardized APIs, modular architectures, and cloud-based solutions can facilitate scalability

Conclusion and Future Recommendations:

- According to the first objective of this research, automation is the use of technology in numerous commercial business divisions to boost productivity and efficiency. Automation in any SC operation improves accuracy and saves time, increasing product value. Automation gives the organization a competitive edge and reduces losses by improving its ability to operate and respond to unexpected events.
- According to the second objective, while the company's chosen tech may reduce its workload and improve operations, SCM automation has some limitations. These limitations result from many sources, including: Dependent on humans, Response to any unprecedented situation, expensive, No feelings, and hackable.
- As per the Objective three, automation has many implications on the SC. They are described below: Helps in raising the production, Accuracy and precision, Minimum wastage of resources, Unemployment, Capitalism.
- This study also suggested using the following AI technologies to close the knowledge gap in future research. ANN & NLP is a fascinating and promising field that could transform SCM literature and practice by integrating with Industry 4.0 technologies like the IoT and block chain.

Conclusion and Future Trends in Chain, Recommendations:

- In conclusion, bridging the gaps in supply chain management through enhanced automation is an

ongoing journey. By adopting a creative and resilient approach, organizations can thrive in an ever-evolving landscape, ensuring long-term success

- Supply chain management is a dynamic field, continuously adapting to new technological advancements and customer demands. The successful management of supply chains is a critical factor in the growth and profitability of online retailers. As e-commerce continues to shape the retail industry, supply chain management will remain at the forefront of innovation and efficiency, ensuring customers receive their orders on time and in perfect condition, all at the click of a button.
- Looking ahead, we can expect innovative trends in supply chain automation. Emerging technologies like block chain and advanced AI will redefine how we manage and optimize our supply chains for greater effectiveness.

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