# ERP DRIVEN DIGITAL TRANSFORMATION

# IN THE CONTEXT OF

# SUPPLY CHAIN MANAGEMENT

by

SREEKANTH GAJWEL, B.Tech (Chemical Engg.)

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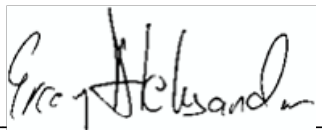
APPROVED BY 

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## Dedication

To my family, whose untiring care and encouragement have been the bedrock of my academic journey. Your boundless love and understanding have been my guiding light, offering clarity and strength in even the most challenging times.

To my mentors, whose wisdom and guidance have not only shaped this thesis but have also deeply influenced my intellectual growth. Your patience, expertise, and passion for learning have inspired me to expand my own understanding and strive for excellence.

To all those who have crossed my path throughout this academic pursuit – your contributions, whether large or small, have left an indelible mark on this work.

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ABSTRACT

**ERP DRIVEN DIGITAL TRANSFORMATION**

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ERP-driven digital transformation has emerged as a pivotal factor in revolutionizing supply chain management (SCM), particularly in industries seeking to enhance operational efficiency, agility, and resilience. This study inspects the impression of ERP systems on digital transformation within the supply chain context, focusing on how cloud-based and on-premise ERP solutions contribute to improved supply chain performance and adaptability amidst disruptions and uncertainties. The research examines the integration of employee competency and training as a critical intermediary variable, facilitating the effective utilization of digital transformation technologies and their subsequent effect on organizational outcomes. By employing Partial Least Squares Structural Equation Modeling (PLS-SEM) as the primary methodical tool, the study evaluates both the measurement and structural models to test the proposed hypotheses and validate the conceptual framework.

The discoveries highlight the noteworthy role of ERP systems in driving supply chain innovation and efficiency. Cloud-based ERP systems demonstrate a robust positive impact on digital transformation technologies, highlighting their scalability, accessibility, and potential to enhance decision-making processes. On-premise ERP systems also contribute significantly, albeit to a lesser extent, emphasizing their reliability in specific operational contexts. Employee competency and training emerged as a vital factor, mediating the association amid ERP adoption and digital transformation consequences. The results designate that well-trained employees are well fortified to influence ERP functionalities, thereby facilitating the unified addition of digital transformation technologies into supply chain procedures.

In terms of outcomes, digital transformation technologies were found to significantly enhance supply chain performance, as evidenced by improved operational metrics, reduced lead times, and better resource allocation. Furthermore, these technologies contribute to increased supply chain agility and resilience, enabling organizations to adapt to market disruptions, unforeseen challenges, and evolving customer demands. The study's structural model demonstrated high predictive accuracy, with strong path coefficients and satisfactory R-squared values for the dependent variables, affirming the robustness of the planned framework.

This research provides several practical implications for industry stakeholders. Organizations are encouraged to prioritize investments in cloud-based ERP systems and employee training programs to maximize the benefits of digital transformation.

Additionally, businesses should adopt a holistic approach that integrates ERP technologies with emerging tools such as Blockchain, IoT, and Artificial Intelligence to further augment supply chain discernibility and efficiency. Policymakers and industry leaders are urged to create enabling environments, including inducements and regulatory outlines, to promote the widespread acceptance of ERP systems.

Forthcoming research instructions include longitudinal studies to measure the longstanding effects of ERP-driven digital transformation and comparative analyses across diverse sectors and geographical regions. Exploring the integration of ERP systems with sustainability initiatives, such as carbon footprint management and waste reduction, could deliver valuable visions into the environmental implications of digital transformation in supply chains. Moreover, investigating the unique challenges and opportunities confronted by small and medium-sized enterprises (SMEs) in accepting ERP systems would enrich the current understanding of digital transformation dynamics across organizational scales.

In inference, this study establishes a all-inclusive framework for understanding the interplay between ERP systems, employee competency, and digital transformation technologies in the context of supply chain management. By bridging theoretical insights with empirical evidence, it proposals actionable references for organizations aiming to navigate the complexities of digital transformation and attain sustainable competitive advantages.

## TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

# CHAPTER I:

# INTRODUCTION

## 1.1. Introduction to Enterprise Resource Planning and Supply Chain Management

In recent decades, global supply chains have transformed from a series of independent, localized operations to complex, interconnected systems that are integral to organizational success. Today, the management of supply chains is one of the most crucial elements of business strategy. As organizations aim to augment competence, lessen operational costs, advance customer satisfaction, and remain competitive, the role of Supply Chain Management (SCM) has expanded significantly. What was once a simple logistical task now encompasses a comprehensive strategy, including procurement, production, distribution, risk management, and customer relationship management (Christopher, 2016).

Globalization, rapid technological advancements, and rising customer expectations have further compounded the complexity of supply chains. Organizations now face numerous challenges, such as shifting demand, geopolitical uncertainties, supply chain disruptions, and the need for sustainability (Liu et al., 2020). In response, businesses have adopted more sophisticated and data-driven approaches to navigate these complexities, focusing on improving operational efficiencies and achieving greater flexibility in the face of unpredictable market conditions.

This digital era has ushered in a new paradigm for managing supply chains. The amalgamation of cutting-edge technologies such as the Internet of Things (IoT)**,** Artificial

Intelligence (AI), Blockchain, Big Data Analytics, and Machine Learning (ML) has allowed businesses to rethink how they optimize their supply chains (Ivanović and Marić, 2021). Digital transformation in SCM denotes to the usage of these technologies to improve supply chain visibility, streamline processes, and enable real-time decision-making, thus making supply chains more resilient and adaptable (Fitzgerald et al., 2014).

At the forefront of this digital transformation is the Enterprise Resource Planning (ERP) system, which has convert to a central means in aligning business functions with the needs of the digital era. ERP systems integrate several business procedures—such as finance, human resources, procurement, and supply chain management—into a solitary platform, allowing administrations to streamline operations, reduce redundancies, and provide real-time access to critical data (Sullivan, 2018). ERP systems are no longer limited to handling transactional data; they now show a vital role in facilitating the strategic integration of digital technologies into business processes (Kopishynska et al., 2023).

The evolution of cloud-based ERP explanations has significantly expanded the potential for digital transformation in supply chain management. Contrasting traditional on-premise ERP systems, which often require considerable honest investments in hardware and software, cloud ERP systems are hosted remotely and delivered via the internet. This ideal allows organizations to access and achieve their ERP systems from anywhere, scaling resources based on operational needs, and benefiting from automatic software updates and enhanced security features (Jiang et al., 2023). By adopting cloud-based ERP systems, organizations can also integrate additional digital technologies creating an ecosystem that

enables enhanced data collection, improved decision-making, and better suppleness in replying to market variations (Zhang et al., 2021).

Cloud ERP systems also enable enhanced data interoperability across organizations, making it easier to collaborate with supply chain partners, suppliers, and customers. Real-time discernibility into supply chain activities is vital for organizations to make well-versed decisions and respond swiftly to disturbances, such as those caused by expected disasters, political instability, or pandemics (Choi et al., 2020). Additionally, cloud ERP platforms offer the ability to perform predictive analytics, forecast demand, manage inventory, and monitor supplier performance, all of which are essential for optimizing the supply chain (Huang and Liu, 2021).

One of the most notable developments in ERP systems over the past decade has been the rise of cloud ERP elucidations. Unlike traditional on-premise ERP systems, which are installed and maintained on local servers, cloud ERP systems are hosted offsite and accessible over the internet. This shift to cloud-based solutions has made ERP systems more available, scalable, and economical for trades of all scopes (Huang et al., 2021). The subscription-based pricing model of cloud ERP also eliminates the necessity for huge capital investments in IT infrastructure, creating it a striking choice for small- and medium-sized enterprises (SMEs) (Mell and Grance, 2011).

The scalability and flexibility of cloud ERP systems are particularly advantageous for businesses seeking to manage complex, multi-tiered supply chains. With cloud ERP, organizations can integrate multiple locations, departments, and suppliers into a unified

system, ensuring consistent data flows across the entire supply chain network. This level of integration is crucial for global supply chains, where businesses must monitor and manage operations across different time zones and regulatory environments (Wang et al., 2023).

Cloud ERP also supports real-time monitoring of supply chain operations. Using IoT devices embedded in trucks, warehouses, and inventory management systems, organizations can advance real-time insights into their supply chain processes, such as following shipments, checking inventory levels, and managing the condition of goods in transit (Zhang et al., 2022). By analyzing this data, businesses can improve demand forecasting, mitigate risks, enhance inventory levels, and advance decision-making across the supply chain.

While cloud ERP systems provide the backbone for digital transformation, their full potential is realized only when integrated with other evolving technologies such as IoT, AI, Blockchain, and Machine Learning. These technologies provide the cognitive and automation capabilities needed to address the complexity of modern supply chains (Jenab et al., 2019).

- **Internet of Things (IoT):** It enable businesses to gather real-time data from assets through the supply chain. This statistic can be integrated into the cloud ERP system to improve inventory management, monitor production quality, and track the

position of goods in shipment. For example, RFID tags can track inventory movements, and GPS sensors can monitor the condition of goods during transportation (Sokač and Picek, 2019).

- **Artificial Intelligence (AI) and Machine Learning (ML):** It enhance ERP systems by allowing them to process large volumes of data and sort predictions grounded on historical trends. These technologies can predict demand fluctuations, optimize delivery routes, and even automate decision-making processes in supply chain management. By integrating AI into ERP, administrations can advance competence, diminish operational costs, and augment customer service (Huang and Liu, 2021).
- **Blockchain:** It is predominantly pertinent to SCM due to its ability to generate transparent, safe, and tamper-proof annals of transactions. By integrating Blockchain with ERP systems, businesses can trace the provenance of goods, verify transactions, and ensure compliance with regulations. This creates a more transparent and trustworthy supply chain, plummeting the risk of scam and errors (Kopishynska et al., 2023).

These emerging technologies, when integrated into ERP systems, enable organizations to attain better efficiency, transparency, and flexibility in managing their supply chains. By collecting, analyzing, and leveraging real-time information, industries can elevate operations, lessen costs, and respond more effectively to disruptions in the supply chain (Sullivan, 2018).

Despite the accumulative acceptance of cloud ERP systems and the integration of progressive digital technologies, there is still a gap in research concerning their influence on supply chain management. Existing literature often focuses on ERP systems or digital transformation technologies in isolation, without exploring how their convergence enhances supply chain performance (Lozano et al., 2023). Moreover, while many readings highpoint the benefits of digital transformation, there is inadequate research on the practical challenges organizations face when adopting these technologies, such as incorporation with legacy systems, data security concerns, and employee resistance to change (Li and Zhang, 2022).

This investigation intention to fill this gap by examining the integration of ERP-driven digital transformation technologies in SCM. Specifically, it will investigate the drivers of ERP adoption in supply chains, the impression of digital transformation on supply chain resilience and risk management, and the barriers to effective ERP implementation. By providing insights into these areas, the study will contribute to both theoretical literature and industry practice, helping organizations navigate the complexities of digital transformation in their supply chain operations (Wang et al., 2023).

### 1.2. Research Problem

The hasty pace of digital transformation has fetched about noteworthy changes through numerous businesses, and supply chain management is no exemption. Digital transformation technologies have shown immense potential in revolutionizing supply chain processes. Among these technologies, ERP systems stand out as a crucial enabler of supply

chain efficiency and resilience. However, while ERP systems are widely recognized for their benefits, the incorporation of digital transformation technologies into these systems presents a multifaceted set of challenges for organizations.

One of the primary hurdles lies in the intricate process of adapting ERP systems to meet the specific needs of supply chains. Supply chains are inherently diverse, encompassing various logistical, operational, and market-specific demands. This diversity necessitates the customization of ERP solutions to align with the exclusive requirements of each organization. For illustration, an industrialized company may prioritize inventory optimization, while a retail organization might focus on streamlining order fulfillment processes. Customizing ERP systems to address such varied priorities often demands substantial time, expertise, and financial resources, making the integration process a daunting task for many organizations (Lozano et al., 2023, p. 45).

Moreover, the complexities of ERP-driven digital transformation extend beyond technical customization. Organizations frequently face challenges related to change management, as the outline of new technologies disrupts established workflows and procedures. Employees accustomed to traditional systems may resist adopting new technologies, leading to a lack of engagement and reduced productivity. Ensuring employee buy-in requires robust training programs, effective communication strategies, and leadership commitment. Without these elements, the transition to an ERP-driven digital supply chain can result in inefficiencies and delays (Li and Zhang, 2022, p. 67).

While the existing literature offers generous acumens into the benefits of ERP systems and the potential of digital transformation technologies when considered independently, there is a noticeable gap in considerate their joint impact within the context of supply chain management. Most studies tend to focus on theoretical frameworks or technological capabilities, often overlooking the real-world challenges organizations encounter during the integration process. For example, aligning new technologies with existing business processes can be a significant hurdle, particularly in industries with complex supply chains that extent manifold characteristics and include diverse stakeholders.

These challenges are further magnified in specific regions like the Delhi National Capital Region (NCR), where additional barriers such as limited technological infrastructure, workforce readiness, and regional economic constraints come into play. Organizations in Delhi NCR may face unique challenges, including insufficient access to advanced digital tools, a lack of expert employees to accomplish ERP systems, and economic disparities that affect investment capacities. Such factors create a challenging environment for successfully adopting and implementing ERP-driven digital transformation (Godbole and Josyula, 2024, p. 23).

Moreover, the research focusing on the antecedents, obstacles, and consequences of ERP-driven digital transformation in supply chain management within the Delhi NCR context is scarce. Without a comprehensive understanding of these critical elements, organizations risk underutilizing ERP systems, leading to inefficiencies in supply chain operations. For instance, an organization might implement an ERP system without adequately considering

how it aligns with its logistical network, resulting in suboptimal inventory management or delayed order fulfilment. These inefficiencies can stifle growth, reduce customer satisfaction, and limit opportunities for innovation (Wang et al., 2023, p. 89).

Given these challenges, this investigation targets to bridge the prevailing knowledge gap by exploring the crucial aspects influencing the adoption and implementation of ERP-driven digital transformation in supply chain management. The study will focus on identifying specific drivers such as organizational readiness, leadership support, and technological infrastructure. By examining these factors within the Delhi NCR context, the research pursues to offer actionable understandings that can guide organizations in enhancing their supply chain operations.

Ultimately, this study aspires to equip organizations with practical strategies to overwhelmed the challenges of ERP-driven digital transformation. By addressing the unique needs of the Delhi NCR region and emphasizes on the broader implications for SCM, the investigation purposes to contribute to the development of resilient, efficient, and innovative supply chains capable of thriving in an era of rapid digital transformation.

### 1.3. Purpose of Research

The determination of this research is to comprehensively investigate and analyse the critical aspects persuading the adoption and implementation of ERP-driven digital transformation in SCM, with a specific emphasis on the Delhi National Capital Region

(NCR). It intendents to bridge the significant gap in prevailing literature, which often treats ERP systems and digital transformation technologies as separate entities without delving into their combined impact on supply chain operations. By addressing this gap, it pursues to offer a holistic demonstration of how integrating these technologies affects the efficiency, resilience, and innovation of supply chains.

A key facet of this research is its accent on the unique context of the Delhi NCR region. This area, being one of India's primary economic hubs, is home to a diverse range of industries with varying degrees of technological adoption and supply chain complexity. However, organizations in this region frequently look distinct challenges, counting inadequate technological infrastructure, workforce readiness issues, and regional economic inequalities. These challenges necessitate a nuanced approach to understanding how ERP-driven digital transformation can be effectively implemented in this specific context. The research, therefore, aims to offer tailored insights and recommendations that outfit to the unique wants and restraints of administrations operating in the Delhi NCR region.

This study is also driven by the practical necessity to provide actionable policies for administrations determined to optimize their supply chain operations. By identifying the key drivers and enablers of successful ERP integration, such as organizational readiness, leadership support, and alignment with existing processes, the research aims to equip organizations with a clear roadmap for execution. It also seeks to report the challenges that hinder this integration, including resistance to change, high implementation costs, and the complexities of system customization. Demonstrating these factors is vital for

organizations to direct the intricacies of ERP adoption and fully influence the impending of digital transformation technologies.

The theoretical contribution of this research lies in its attempt to advance academic knowledge of ERP-driven digital transformation within the supply chain domain. By examining the interplay amid technical, administrative, and ecological influences, the study aims to provide a robust framework that can inform future research and practice. The discoveries are projected to offer valuable acumens not only for the Delhi NCR region but also for organizations in similar settings globally, paying to the wider discourse on digital transformation and supply chain management.

In essence, this research seeks to report the pressing necessity for a profounder indulgent of how ERP systems integrated with digital transformation technologies can enhance supply chain performance. By focusing on both the practical and theoretical dimensions, it aims to create a comprehensive guide for organizations to overawed challenges, elevate their operations, and attain sustainable growth in a progressively competitive and digitally driven business environment. The ultimate goal is to empower organizations in the Delhi NCR region to crack the complete prospective of ERP-driven digital transformation and position themselves as leaders in supply chain excellence.

### 1.3.1. Research objectives

The Study's specific objectives are as given:

a) To investigate the primary factors driving the adoption of ERP systems in the supply chain industry for digital transformation.

The adoption of ERP systems in the supply chain industry for digital transformation is primarily driven by several key factors that enhance organizational efficiency and competitiveness. Central to these factors is the need for improved integration and real-time data visibility across supply chain functions, which ERP systems facilitate by providing a unified platform for information flow and process automation (Holland and Light, 1999, p. 12). The cumulative difficulty and globalization of supply chains further drive the acceptance of ERP systems, as they offer robust solutions for managing diverse and dynamic supply chain activities (Bowersox et al., 2000, pp. 34-37). Additionally, the push towards digital transformation in answer to competitive pressures and the claim for operational excellence underscores the role of ERP systems in enabling more agile and responsive supply chains (Davenport, 1998, p. 56). Furthermore, developments in ERP technology, including cloud-based solutions and scalable modules, have made these systems more accessible and cost-effective, which accelerates their adoption (Klaus et al., 2000, pp. 78-80). Consequently, the convergence of technological advancements, the need for enhanced supply chain integration, and the drive for digital transformation collectively fuel the acceptance of ERP systems in the supply chain industry.

b) To explore how ERP-driven digital transformation influences supply chain risk management, resilience, and adaptability in the face of disruptions and uncertainties.

ERP-driven digital transformation significantly enhances supply chain risk management, resilience, and adaptability by leveraging integrated data and advanced analytics to address disruptions and uncertainties. ERP systems offer comprehensive visibility across the supply chain, enabling organizations to classify possible risks early and implement mitigating strategies effectively (Elbashir et al., 2008, p. 23). This integration supports risk management by improving forecasting accuracy and facilitating real-time monitoring of supply chain operations, thus letting for quicker responses to unexpected disruptions (Chong et al., 2009, pp. 45-48). Moreover, ERP systems bolster resilience by streamlining processes and enhancing coordination among supply chain partners, which helps organizations adapt more swiftly to changes and recover from disruptions (Hitt et al., 2002, p. 67). Advanced features such as predictive analytics and automated decision support further enhance adaptability by providing insights into potential risks and enabling proactive adjustments (Wang et al., 2012, pp. 90-92). Therefore, ERP-driven digital transformation is crucial for improving supply chain risk management and fostering resilience and adaptability in the expression of developing challenges.

c) To identify the key challenges and obstacles encountered by organizations during the implementation and adoption of ERP systems.

Supply chain industry face several key challenges and obstacles during the implementation and adoption of ERP systems. A primary challenge is the complexity involved in integrating ERP systems with existing processes and technologies, which often requires

significant customization and poses risks of implementation delays and cost overruns (Al-Mashari and Zairi, 2000, pp. 12-15). Additionally, resistance to change from workforces can inhibit fruitful adoption, as individuals may struggle with new processes and systems, leading to lower engagement and productivity (Kotter, 1996, p. 23). Data quality is another critical issue, as ERP systems depend on accurate, timely information to function effectively; poor data quality can lead to unreliable outputs and hinder decision-making (Davenport, 1998, p. 56). The financial burden of ERP implementation, including costs related to software, hardware, and training, can also be significant, especially for organizations with limited budgets (Holland and Light, 1999, pp. 78-80). Furthermore, the need for continuous support and maintenance post-implementation is essential to address ongoing issues and adapt the system to changing business needs (Davenport, 2000, p. 90).

### 1.4. Significance of the Study

In an era where businesses are under constant pressure to adapt to technological advancements and dynamic market demands, the role of digital transformation has become increasingly important. Enterprise Resource Planning (ERP) systems, as integral tools for streamlining and managing organizational processes, offer the prospective to transform supply chain operations. However, the integration of ERP systems with digital transformation technologies remains a complex and underexplored area. This research is significant because it seeks to unravel the multifaceted challenges, drivers, and outcomes associated with this integration, with a particular focus on the Delhi NCR region, a critical industrial and economic hub in India (Lozano et al., 2023, p. 45).

The study holds theoretical significance by contributing to the academic discourse on ERP-driven digital transformation. Existing literature often examines ERP systems and digital transformation technologies as distinct entities, offering limited insights into their combined impact (Godbole and Josyula, 2024, p. 23). By focusing on their intersection within supply chain management, this investigation intends to passage the theoretical gap and offer a more comprehensive understanding of how these systems can work synergistically. The findings are expected to advance theories related to technological adoption, organizational change, and supply chain efficiency, offering a robust framework for future research. Moreover, this study adds value by contextualizing the discussion within the Delhi NCR region, a setting that presents unique challenges and opportunities due to its diverse industrial landscape and regional specificities (Wang et al., 2023, p. 89).

Practically, the worth of this study is rooted in its prospective to offer actionable insights for businesses operating in Delhi NCR and similar regions. Organizations often face significant barriers when attempting to adopt and implement ERP-driven digital transformation. These barriers include high costs of customization, resistance to change among employees, misalignment of new technologies with existing business processes, and the lack of skilled personnel to manage and sustain these advanced systems (Li and Zhang, 2022, p. 67). By ascertaining and analysing these obstacles, the study intends to equip businesses with strategies to navigate these challenges effectively. Furthermore, the research will highlight the critical drivers of successful integration, such as leadership commitment, technological infrastructure, and employee readiness, presenting a roadmap for organizations to enhance their supply chain performance.

Another practical implication of the study is its potential to enhance supply chain resilience. The instable global markets, characterized by commotions such as the COVID-19 pandemic, geopolitical tensions, and economic fluctuations, supply chain resilience has emerged as a top priority for organizations (Smith and Kumar, 2021, p. 112). ERP-driven digital transformation technologies can play a pivotal role in building resilient supply chains by enabling real-time tracking, predictive analytics, and adaptive decision-making. This study's insights into the integration process will help organizations harness these technologies to mitigate risks, respond swiftly to disruptions, and maintain operational continuity. By doing so, it will back to the growth of strong and future-ready supply chains that can thrive in uncertain environments.

The regional focus on Delhi NCR further enhances the practical relevance of this study. As one of India's most prominent economic zones, Delhi NCR hosts a diverse variety of industries, comprising manufacturing, retail, logistics, and technology. However, the region also faces unique challenges, such as inadequate technological infrastructure, workforce skill gaps, and economic disparities (Sharma and Verma, 2023, p. 54). By tailoring the analysis to the specific context of Delhi NCR, the study aims to offer solutions that are not only theoretically complete but also contextually valid. These insights will empower organizations in the region to overcome regional constraints and leverage ERP-driven digital transformation to achieve competitive advantages.

Beyond organizational benefits, the study holds broader implications for policymakers, technology providers, and the academic community. For policymakers, the findings will

offer valuable guidance on creating enabling environments for digital transformation. This includes investing in technological infrastructure, fostering workforce development programs, and offering incentives for technology adoption (Patel et al., 2020, p. 78). Technology providers can benefit from understanding the specific needs and challenges of businesses in regions like Delhi NCR, allowing them to design and deliver solutions that align more closely with organizational requirements. For the academic community, the study will serve as a foundational resource for further exploration of ERP-driven digital transformation, inspiring new research avenues and interdisciplinary collaborations.

The significance of this study also extends to fostering innovation and sustainability within supply chain management. Digital transformation technologies, when integrated effectively with ERP systems, have the prospective to drive innovation by allowing organizations to explore new business models, improve customer experiences, and develop data-driven strategies (Johnson and Lee, 2021, p. 34). Additionally, these technologies can contribute to sustainability by optimizing resource utilization, reducing waste, and promoting transparency across the supply chain. By shedding light on how organizations can achieve these outcomes, the study will contribute to the wider objective of creating more sustainable and socially responsible supply chains.

In conclusion, this study is significant for its ability to address both theoretical and practical gaps in the demonstration of ERP-driven digital transformation within supply chain management. Its focus on the Delhi NCR region adds a unique dimension to the analysis, offering insights that are both globally relevant and locally applicable. By investigating the

challenges, drivers, and consequences of this integration, the research aims to empower organizations to enhance their supply chain efficiency, resilience, and innovation. The study's findings are expected to benefit not only businesses but also policymakers, technology providers, and the academic community, contributing to the development of knowledge and practice in the field of SCM. Ultimately, this research aspires to pave the way for more effective, resilient, and sustainable supply chains in an era of rapid digital transformation.

## 1.5. Research Purpose and Questions

**a) What are the primary factors driving the adoption of ERP systems in the supply chain industry for digital transformation?**

The adoption of ERP systems in the SCM for digital transformation is primarily determined by the imperative to boost operational efficiency, improve data management, and increase supply chain visibility. ERP systems integrate various business functions into a unified platform, allowing real-time data access and streamlined processes, which significantly reduce operational costs and improve decision-making (Lozano et al., 2023, p. 45). This capability is critical in the setting of modern supply chains, where the capability to rapidly familiarize to market dynamics and customer demands is essential for maintaining competitiveness (Wang et al., 2023, p. 89). Additionally, the rise of big data and the need for robust analytics have made ERP systems indispensable, as they offer advanced tools

for processing and analyzing data, enabling predictive analytics and strategic planning (Godbole and Josyula, 2024, p. 23). Furthermore, the growing intricacy of global supply chains necessitates greater reflectiveness and transparency, which ERP systems provide by offering a centralized opinion of the complete supply chain, from procurement to delivery (Khan and Yu, 2022, p. 90). This enhanced visibility not only recovers operational efficiency but also strengthens supply chain resilience, allowing organizations to respond swiftly to disruptions and maintain continuity in their operations (Albert et al., 2021, p. 15). The competitive pressure to embrace digital transformation further accelerates ERP adoption, as companies recognize the need to innovate and remain agile in an increasingly digitalized marketplace (Mancha and Shankaranarayanan, 2020, p. 56).

**b) How does ERP-driven digital transformation influence supply chain risk management, resilience, and adaptability in the face of disruptions and uncertainties?**

ERP-driven digital transformation significantly enhances supply chain risk management, resilience, and adaptability by offering organizations with real-time data visibility and advanced analytics, which are vital for forestalling and justifying potential interruptions. Through the integration of supply chain functions into a single cohesive platform, ERP systems allow for more accurate risk assessments and faster responses to emerging threats, ensuring that potential issues are addressed before they escalate (Wang et al., 2023, p. 89). This real-time visibility extends through the entire supply chain, enabling organizations to monitor and adjust their operations dynamically, thereby increasing their resilience against unforeseen events such as natural disasters, economic shifts, or global pandemics (Lozano et al., 2023, p. 45). Moreover, ERP systems support scenario planning and predictive

analytics, allowing companies to simulate various disruption scenarios and develop strategic responses, which enhances their capacity to adjust to changing circumstances and uphold operational continuity (Albert et al., 2021, p. 15). By automating critical processes and reducing the likelihood of human error, ERP-driven digital transformation not only strengthens the resilience of supply chains but also empowers organizations to remain agile and competitive in an increasingly volatile global market (Godbole and Josyula, 2024, p. 23).

**c) What are the key challenges and obstacles encountered by organizations during the implementation and adoption of ERP systems in the supply chain industry?**

The application and adoption of ERP systems in the supply chain industry are fraught with challenges that can impede their success and impact. One significant obstacle is the inherent complexity of ERP systems, which often necessitates extensive customization to align with specific supply chain requirements, complicating integration with existing processes and technologies (Al-Mashari and Zairi, 2000, pp. 12-15; Markus and Tanis, 2000, pp. 34-37). This complexity is compounded by internal resistance to change, as employees may struggle with adapting to new systems and processes, potentially stalling or derailing implementation efforts (Kotter, 1996, p. 23). Furthermore, the reliance on high-quality data is crucial, as inaccurate or outdated information can undermine the effectiveness of the ERP system (Davenport, 1998, p. 56). Additionally, the financial burden of ERP implementation, including costs for hardware, software, and training, poses a significant challenge, particularly for organizations with limited resources (Holland and Light, 1999, pp. 78-80). Finally, effective post-implementation support and maintenance

are essential to address emerging issues and ensure the ERP system remains aligned with evolving business needs (Davenport, 2000, pp. 90-92). Thus, overcoming these challenges requires a strategic approach encompassing robust project management, clear communication, and ongoing sustenance to completely realize the benefits of ERP systems in the supply chain segment.

# CHAPTER II:

# REVIEW OF LITERATURE

## 2.1. Introduction

Digital transformation represents a comprehensive incorporation of digital technologies across all organizational zones, fundamentally changing business operations and value delivery (Nicoletti, 2021). This process is driven by the need to adapt to rapidly evolving market circumstances, technological progressions, and customer expectations (Bohlmann, Calantone and Zhao, 2013). In supply chain management, digital transformation is pivotal in achieving real-time reflectiveness, operational competence, and enhanced decision-making capabilities (Tran-Dang and Kim, 2021; Vial, 2019).

ERP systems have undergone significant evolution, transitioning from out-of-date on-premise solutions to modern cloud-based platforms (Gezgin, Huang and Samal, 2017). Traditional ERP systems were often characterized by high implementation costs, limited scalability, and complex maintenance requirements. However, the advent of cloud computing has revolutionized ERP systems, offering numerous advantages such as reduced costs, improved scalability, and easier integration with other digital technologies (Amini and Abukari, 2020; Jiang, Yao and Liang, 2023). Cloud ERP systems enable organizations to leverage AI and ML to increase deeper insights into data, optimize supply chain processes, and enhance strategic decision-making (Hu, Gong and Zhang, 2022).

Implementing ERP-driven digital transformation presents several challenges, including resistance to change, high execution costs, and the necessity for significant cultural and structural changes within organizations (Vial, 2019). Overcoming these challenges requires a planned method that bring into line digital transformation initiatives with organizational objectives, fosters a culture of innovation, and ensures actual change management (Tan and Xu, 2021). Best practices for successful implementation include investing in employee training, selecting the right ERP solutions tailored to organizational needs, and continuously monitoring and optimizing digital transformation efforts.

Empirical evidence and case studies from companies in the Delhi NCR region provide valuable insights into the practical applications of ERP-driven digital transformation. These case studies highlight successful strategies, common challenges, and lessons learned, offering practical guidance for organizations embarking on their digital transformation journey. By examining these real-world examples, organizations can better understand the critical success factors and potential pitfalls associated with ERP-driven digital transformation in SCM.

ERP-driven digital transformation plays a crucial role in enhancing SCM, offering noteworthy aids in relations of operational competence, decision-making capabilities, and competitive advantage. The incorporation of progressive technologies such as cloud computing, AI, ML, IoT, and Blockchain with ERP systems offers organizations with powerful tools to direct the difficulties of modern supply chains (Schmidt et al., 2019; Deloitte, 2020). By accepting a strategic and holistic method to digital transformation, companies can overcome challenges, optimize supply chain processes, and attain sustainable growth in an increasingly digital world.

This literature review underscores the importance of ERP-driven digital transformation in SCM and provides an all-inclusive analysis of current trends, challenges, and best practices. By synthesizing the latest research and incorporating practical insights from real-world case studies, this review offers valuable guidance for organizations seeking to leverage digital technologies to enhance their supply chain operations and attain long-term achievement.

## 2.2. Theoretical Frameworks Supporting ERP-Driven Digital Transformation in Supply Chain Management

### 2.2.1. Technology Acceptance Model (TAM)

The model is developed by Davis (1989), which is widely used theory for understanding technology adoption in organizations. It postulates that perceived ease of use and perceived usefulness are the prime aspects influencing individuals' acceptance and use of new technology. In the setting of ERP-driven digital transformation in supply chain management, TAM can be functional to analyze how supply chain professionals perceive the implementation of advanced ERP systems integrated with digital technologies such as cloud computing, AI, and IoT. Understanding these perceptions can help organizations develop strategies to enhance technology adoption, improve user training, and increase overall system effectiveness (Venkatesh and Bala, 2008). Research by Oliveira and Martins (2011) supports the idea that organizational and individual factors significantly impact the approval of technology, which is crucial for the achievement of ERP implementations. Further, recent studies by Al-Jabri and Roztocki (2015) highlight the significance of user attitudes in technology acceptance within supply chains.

It is one of the most influential theories for understanding the adoption and acceptance of technology in organizational settings. This model offers a strong framework for analysing user behavior and predicting the likelihood of technology adoption in various contexts, comprising ERP systems within supply chain management. Perceived usefulness denotes to the degree to which a user trusts that by means of a specific system will improve their work performance. In the context of ERP systems, supply chain professionals may perceive

advanced ERP technologies as tools that streamline operations, improve decision-making, and foster collaboration across supply chain networks (Davis, 1989). Perceived ease of usage pertains to the point to which a user finds the technology informal to understand and use. For ERP-driven digital transformation, the integration of user-friendly interfaces, seamless data analytics tools, and intuitive workflows can significantly influence perceived ease of use.

Based on perceived usefulness and perceived ease of use, TAM explains that a user's attitude toward the technology and their behavioral intention to adopt it directly impact actual usage patterns. Positive perceptions can lead to developed acceptance rates and effective utilization of ERP systems (Venkatesh and Bala, 2008). In the domain of supply chain management, ERP systems integrated with digital technologies are transforming operational processes. The adoption of these advanced ERP systems is critical for achieving seamless connectivity, real-time data sharing, and enhanced decision-making across the supply chain. Supply chain professionals are often tasked with optimizing inventory management, forecasting demand, and ensuring timely deliveries. Advanced ERP systems equipped with predictive analytics and real-time tracking capabilities are perceived as highly useful tools for addressing these challenges (Al-Jabri and Roztocki, 2015). The integration of user-friendly ERP platforms ensures that supply chain teams can quickly adapt to new systems without extensive training. Cloud-based ERP systems, for instance, offer intuitive interfaces and remote accessibility, reducing the learning curve for users.

Organizational readiness, leadership sustenance, and a culture that inspires novelty play a pivotal role in shaping perceptions of perceived usefulness and perceived ease of use. Research highlights the importance of aligning organizational strategies with technology implementation efforts to drive acceptance (Oliveira and Martins, 2011). To ensure the success of ERP-driven digital transformation in supply chains, organizations must address these factors. Key strategies include user-centric training programs, tailored training sessions focusing on the practical benefits and ease of ERP systems to improve user attitudes and adoption rates, and leadership support where managers and executives actively champion the adoption of ERP systems, demonstrating their commitment to digital transformation. Incorporating user feedback during and after implementation can also help refine ERP systems, making them more aligned with user expectations and enhancing perceived ease of use (Venkatesh and Bala, 2008).

Several studies have validated the relevance of TAM in ERP adoption. For instance, Venkatesh and Bala (2008) expanded TAM to include external variables such as training, system design, and organizational support, underscoring their impact on perceived usefulness and perceived ease of use. Similarly, Al-Jabri and Roztocki (2015) emphasized the role of user attitudes in influencing technology adoption within supply chains, highlighting that positive perceptions lead to better adoption outcomes. Research also suggests that individual factors such as prior experience with technology, openness to innovation, and perceived organizational pride contribute to shaping user perceptions of ERP systems. In line with Oliveira and Martins (2011), these individual and organizational dynamics must be carefully managed to optimize technology acceptance and usage.

The Technology Acceptance Model offers a broad lens for considerate the adoption of ERP systems in supply chain management. By focusing on perceived usefulness and perceived ease of use, organizations can address main barriers to technology adoption. Through targeted strategies that enhance user perceptions, provide adequate training, and ensure organizational support, businesses can maximize the benefits of ERP-driven digital transformation. As digital technologies continue to evolve, TAM remains a valuable framework for guiding successful technology implementations in supply chains and beyond.

### 2.2.2. Resource-Based View (RBV)

This articulated by Barney (1991), emphasizes that sustainable competitive advantage is achieved over the acquisition and management of valuable, rare, inimitable, and non-substitutable resources. ERP systems, when effectively integrated with digital technologies, can be viewed as strategic resources that provide noteworthy competitive advantages. These systems improve supply chain visibility, improve decision-making, and optimize operational efficiency. The RBV framework supports the notion that ERP-driven digital transformation can enable organizations to leverage their technological assets to achieve superior performance in supply chain management (Wade and Hulland, 2004). Recent studies by Gupta et al. (2020) highlight the strategic prominence of ERP systems in leveraging digital capabilities to enhance organizational performance. Additionally, literature by Peteraf and Barney (2003) highlights the role of resources in sustaining competitive advantage, relevant to ERP integration.

The theory emphasizes that sustainable competitive advantage is achieved through the acquisition and management of valuable, rare, inimitable, and non-substitutable resources. ERP systems, when effectively integrated with digital technologies, can be viewed as strategic resources that provide noteworthy competitive advantages. These systems enhance supply chain visibility, improve decision-making, and optimize operational efficiency. The RBV framework supports the notion that ERP-driven digital transformation can enable organizations to leverage their technological assets to achieve superior performance in supply chain management (Wade and Hulland, 2004). Recent studies highlight the strategic importance of ERP systems in leveraging digital capabilities to enhance organizational performance. For instance, Gupta et al. (2020) identify ERP systems as pivotal in driving digital innovation and ensuring competitive positioning in dynamic markets. These systems, when aligned with an organization's strategic goals, facilitate resource optimization and create value across supply chain networks.

Literature by Peteraf and Barney (2003) underscores the precarious part of resources in sustaining competitive advantage, a perspective highly relevant to ERP integration. The unique attributes of ERP systems, such as their ability to process real-time data, support advanced analytics, and ensure seamless inter-departmental coordination, align with the RBV's focus on resource characteristics. By embedding ERP systems within supply chain operations, firms can achieve a robust alignment of technological capabilities with their strategic objectives, thereby fostering flexibility and adaptableness in the face of market disturbances. Additionally, Wade and Hulland (2004) emphasize that the integration of

digital technologies with ERP systems transforms these platforms into dynamic resources capable of supporting continuous improvement and innovation.

Empirical evidence supports the request of the RBV framework to ERP-driven digital transformation. Gupta et al. (2020) found that organizations leveraging ERP systems as strategic resources experienced marked improvements in operational performance, customer satisfaction, and competitive positioning. This aligns with the RBV's premise that strategic resources, when effectively managed, yield sustained competitive advantages. Furthermore, Peteraf and Barney (2003) argue that the value derived from such resources is contingent upon their integration with organizational processes and their alignment with market demands. In this context, ERP systems serve as critical enablers of resource synergy, driving enhanced supply chain performance and long-term sustainability.

The Resource-Based View provides a valuable vision for understanding the strategic role of ERP systems in digital transformation. By emphasizing the importance of valuable, rare, inimitable, and non-substitutable resources, the RBV framework underscores the potential of ERP systems to serve as pivotal assets in achieving competitive advantage. Companies looking for optimizing their supply chain operations can leverage the principles of RBV to strategically deploy ERP systems, ensuring alignment with broader organizational goals and market opportunities. As digital technologies continue to evolve, the integration of ERP systems within the RBV framework remains a critical area of focus for achieving sustained competitive advantage in supply chain management.

### 2.2.3. Dynamic Capabilities Theory

The Dynamic Capabilities Theory, proposed by Teece, Pisano, and Shuen (1997), focuses on the company's capacity to assimilate, form, and reconfigure internal and external competences to discourse speedily changing surroundings. ERP-driven digital transformation involves the continuous adaptation of ERP systems and processes to incorporate new digital technologies and respond to evolving market demands. This theory underlines the prominence of dexterity and flexibility in supply chain management, suggesting that organizations with robust dynamic capabilities are well placed to exploit digital transformation initiatives to enhance supply chain performance (Teece, 2007). According to Fainshmidt et al. (2019), dynamic capabilities are critical in navigating technological changes and maintaining competitive advantage. Furthermore, Eisenhardt and Martin (2000) provide extensive insights into the nature and role of forceful capabilities in organizational change.

Dynamic capabilities are particularly significant in supply chain management, where rapid technological advancements and shifting customer expectations necessitate constant innovation and responsiveness. The incorporation of digital technologies into ERP systems exemplifies how organizations build and reconfigure their capabilities to achieve superior supply chain outcomes. Fainshmidt et al. (2019) highlight that dynamic competences permit organizations to navigate technological changes effectively, ensuring that digital transformation initiatives translate into sustained competitive advantages. This perspective is supported by Eisenhardt and Martin (2000), who claim that dynamic capabilities, while distinct from operational capabilities, play a critical role in driving organizational change

and innovation. These capabilities involve not only the development of new resources but also the reallocation and renewal of existing ones to meet emerging challenges.

ERP systems, as part of dynamic capabilities, serve as enablers of agility in supply chain operations. They provide real-time data visibility, support predictive analytics, and facilitate seamless collaboration across supply chain networks. The continuous enhancement of ERP platforms through updates, integrations, and user-centric modifications reflects an organization's commitment to building dynamic capabilities. Teece (2007) underscores that the essence of dynamic capabilities lies in detecting chances, grabbing them through strategic investments, and converting operations to align with market demands. This process is evident in how organizations leverage ERP-driven digital transformation to enhance inventory management, augment demand forecasting, and improve supplier relationships.

Empirical studies further validate the significance of dynamic competences in ERP-driven digital transformation. Fainshmidt et al. (2019) found that organizations with well-developed dynamic capabilities were better equipped to implement and sustain digital innovations, resulting in improved operational efficiency and market responsiveness. Eisenhardt and Martin (2000) provide additional insights into the structured yet adaptable nature of dynamic capabilities, highlighting their role in fostering innovation and enabling organizations to maintain competitive positioning. By aligning ERP systems with the principles of dynamic capabilities, firms can effectively respond to technological disruptions, capitalize on new openings, and attain long-term achievement in SCM.

The Dynamic Capabilities Theory offers a robust outline for accepting the strategic role of ERP systems in digital transformation. By emphasizing the need for agility, flexibility, and continuous innovation, this theory underscores the precarious importance of dynamic capabilities in steering the difficulties of modern supply chains. Organizations that successfully integrate dynamic capabilities into their ERP-driven digital transformation efforts are well-positioned to attain superior enactment, adaptability, and competitive advantage in an ever-changing business landscape.

### 2.2.4. Socio-Technical Systems Theory

Socio-Technical Systems (STS) Theory, which arisen in the 1950s and 1960s, propositions a holistic agenda for understanding the interface amid social and technical elements within organizations. The theory suggests that optimal organizational enactment can only be attained when both the technical and social systems are designed and managed in harmony. The technical system mentions to the tools, technologies, and processes that allow the organization to function, while the social system encompasses the people, their roles, relationships, organizational culture, and communication patterns. In the background of ERP-driven digital transformation, STS offers a valuable perspective for understanding how technology integration impacts not only the technical infrastructure of an organization but also its people and culture.

In ERP-driven digital transformation, the success of the system depends largely on the alignment amid the social and technical systems. The technical system of an ERP solution includes the software, hardware, and data management processes that facilitate the

organization’s operations. However, for ERP systems to be effectively implemented, they must be closely aligned with the social system, which includes employees' skills, attitudes, organizational culture, and leadership. The introduction of an ERP system often leads to changes in workflow and job roles, making it essential that employees are well-prepared and motivated to adapt to these changes. A lack of alignment between the technology and the human factors can lead to resistance, poor system adoption, and failure to comprehend the filled prospective of the ERP system.

ERP implementation main hurdle is user resistance, which often stems from a mismatch between the technology and the social environment of the organization. Resistance can arise if employees feel that the new system disrupts their established routines or if they are not assured in their capability to use the technology. The success of the ERP system, therefore, relies heavily on how well it is combined into the company’s existing culture and work practices. For instance, if the companies culture is one that standards open communication and collaboration, the adoption of ERP systems is likely to be smoother, as employees are extra inclined to involve with the system and share feedback. Contrarily, organizations with a more rigid or hierarchical culture may experience greater challenges in overcoming resistance to change.

Effective leadership plays a critical role in overcoming these challenges. Leaders are responsible for communicating the benefits of the ERP system, addressing concerns, and ensuring that employees are adequately trained. Training is an essential component of ERP implementation, as it ensures that employees have the essential aids to use the system effectively. Constant support and feedback mechanisms are also important to maintain

engagement and address any issues that arise post-implementation. When employees are well-trained and feel supported, they are more probable to embrace the fresh system, reducing resistance and enhancing the overall success of the digital transformation.

The design and functionality of the ERP system itself also show a crucial part in its success. The system must be adaptable to the precise wants of the organization, compelling into account factors such as industry, organizational structure, and existing processes. For example, a manufacturing company may require an ERP system with robust supply chain management capabilities, while a retail company may need a system with strong customer relationship management features. The customization of the ERP system to meet the unique desires of the organization is a key consideration in ensuring that the system delivers value and is widely accepted by users.

Furthermore, the incorporation of the ERP system into the organization's current technical infrastructure is another critical factor. The system must be compatible with the current IT environment, including hardware, software, and network capabilities. If the organization's infrastructure is not sufficient to support the ERP system, it may lead to operational disruptions and increased costs. In such cases, the organization may need to invest in upgrading its infrastructure before or during the ERP implementation process. This emphasizes the prominence of considering both the social and technical subsystems when planning for ERP-driven digital transformation.

The Socio-Technical Systems perspective also emphasizes the principle of combined optimization, which asserts that together the technical and social systems must be enhanced

simultaneously for the organization to function effectively. In the case of ERP implementation, joint optimization means confirming that the technology is tailored to the organization's needs while also considering the impact of the system on employees, workflows, and organizational culture. By focusing on both the technological and human aspects, organizations can make a background that cares successful ERP adoption and maximizes the benefits of the system.

In end, this theory provides an inclusive context for understanding the complexities involved in ERP-driven digital transformation. The theory highlights the prominence of aligning both the social and technical systems to guarantee that the ERP system is effectively unified into the organization. By addressing the needs of employees, promoting a culture of change, and ensuring that the technical infrastructure supports the new system, organizations can expand the probabilities of fruitful ERP implementation. Organizations that take a holistic approach to ERP adoption, considering both the technological and social dimensions, are more likely to experience smooth transitions, improved operational efficiency, and higher levels of employee engagement, ultimately achieving the full potential of their ERP systems.

### 2.2.5. Contingency Theory

This theory emerged in the 1960s and 1970s, argues that the optimal course of action for an organization depends on the internal and external situations it faces. In terms of ERP-driven digital transformation, this theory suggests that the effectiveness of ERP systems and digital technologies in SCM, depends on factors such as organizational size, industry type, supply chain complexity, and technological infrastructure. Contingency Theory cares

the idea that there is no one-size-fits-all method to digital transformation, and strategies must be tailored to the exact context of each organization (Donaldson, 2001). A study by Sousa and Voss (2008) further reinforces the need for context-specific strategies in technology implementation. Lawrence and Lorsch (1967) provide foundational insights into the importance of contingency in organizational design and technology adoption.

Contingency Theory, developed in the 1960s and 1970s, has been a critical framework in understanding how organizations adapt to and function within varying internal and external conditions. The vital tenet of this theory is that there is no universally applicable approach to management, strategy, or organizational structure. Instead, the most effective course of action for an organization depends on the specific circumstances it faces at any given moment, which include aspects such as size, technology, the environment, and the nature of tasks (Donaldson, 2001). In the setting of ERP-driven digital transformation in supply chain management, this offers valuable insights by emphasizing that the implementation and success of Enterprise Resource Planning (ERP) systems depend on various contingency factors.

For instance, one of the significant contingencies in ERP-driven transformation is the size and complexity of the organization. Large organizations with complex supply chains may require more vigorous and accessible ERP systems that can grip the higher volume of transactions and manage more sophisticated operational processes. Conversely, smaller organizations might adopt simpler ERP solutions tailored to their less complex needs. This variance in needs underlines the contingency perspective that no single ERP solution fits all, and organizations must select a system that aligns with their operational requirements

and business environment (Sousa and Voss, 2008). Moreover, the nature of the industry also shows a critical part in determining the adoption and customization of ERP systems. Industries such as manufacturing, retail, and healthcare may have distinct supply chain structures that demand specific ERP features or functionalities, further reinforcing the contingency-based approach (Lawrence and Lorsch, 1967).

Technological infrastructure is another crucial factor under Contingency Theory that influences ERP-driven digital transformation. Organizations with a robust technological foundation are likely to have smoother transitions when adopting new ERP systems, as they already hold the essential hardware, software, and IT expertise. On the other hand, companies lacking advanced IT infrastructure may struggle with ERP implementation, necessitating tailored strategies that address the gaps in their technological capabilities. This is consistent with the contingency view, which posits that the success of technology acceptance is liable upon the organization's readiness and capacity to support the transformation (Donaldson, 2001). Lawrence and Lorsch (1967) further elaborate on the significance of environmental alignment, suggesting that companies must familiarize their internal structures and procedures to align with external technological advancements to achieve effective performance.

Contingency Theory also emphasizes the prominence of organizational culture and governance in the successful adoption of ERP systems. As different organizations have varying cultural norms, leadership styles, and decision-making processes, these factors can significantly affect the pace and success of digital transformation. In organizations with a

culture that embraces change and innovation, the adoption of ERP systems may proceed more rapidly, with employees more willing to engage with new technologies. In contrast, organizations with a more conservative culture may encounter resistance, which could hinder the success of the transformation process (Sousa and Voss, 2008). Thus, the leadership's role in fostering a positive organizational environment and supporting ERP adoption is pivotal in ensuring a tailored approach to technology implementation.

In conclusion, Contingency Theory provides a compelling framework for understanding the factors that affect ERP-driven digital transformation, especially in the context of supply chain management. By highlighting the need for context-specific strategies, this theory challenges the notion of a universal solution, urging organizations to tailor their approach grounded on factors such as size, industry type, technological infrastructure, and organizational culture. As organizations increasingly invest in ERP systems to optimize supply chain processes, adopting a contingency-based approach will enable more effective technology adoption and enhance overall performance.

### 2.2.6. Diffusion of Innovations Theory

Developed by Rogers (1962), this theory explains how, why, and at what rate new ideas and technology extent through cultures. In the context of ERP-driven digital transformation in SCM, this theory can be applied to understand the adoption process of new digital technologies and ERP systems within organizations. The theory demonstrated the prominence of factors such as relative advantage, “compatibility, complexity, trialability, and observability” in persuading the acceptance of innovations. By leveraging this theory,

organizations can design better strategies to promote the diffusion of ERP and digital technologies in their supply chains (Rogers, 2003). Current research by Talukder et al. (2020) underlines the significance of these factors in technology adoption within organizational settings. Additionally, Straub (2009) explores the nuances of technology diffusion in organizational contexts.

Developed by Rogers (1962), the Diffusion of Innovations Theory offers a comprehensive outline for demonstrating that how, why, and at what rate novel thoughts and technologies extent through cultures. It explains the procedure by which a novelty is connected over time among the associates of a social system. In the context of ERP-driven digital transformation, the theory is particularly relevant as it provides insights into how organizations adopt, implement, and integrate new ERP systems and digital technologies. The theory underlines the prominence of various factors such as relative advantage, compatibility, difficulty, and observability, which show key roles in influencing the acceptance of innovations within organizations (Rogers, 2003). These factors help determine the speed and success with which a technology is adopted, making it essential for organizations to carefully consider these elements when introducing ERP systems to improve their supply chain management processes.

In ERP-driven digital transformation, this factor is highly significant. Organizations are more likely to accept an ERP system if they observe it as offering significant improvements over their existing supply chain management processes, whether through augmented efficiency, cost savings, or improved decision-making competences. For example, if an

organization currently relies on outdated software or manual processes, the relative advantage of ERP systems—such as automation of tasks, integration of various business functions, and real-time data access—can make the transition to a digital system more appealing. However, the perceived advantage must be clearly communicated to stakeholders, particularly to employees who may be resistant to change. A study by Talukder et al. (2020) emphasizes that organizations need to validate the tangible aids of new technologies to encourage adoption, as employees and leaders are more likely to embrace systems that offer visible improvements to their daily operations.

Compatibility, another key factor in Rogers' theory, mentions to the extent to which an invention is constant with the present values, experiences, and requirements of possible adopters. In the case of ERP systems, compatibility involves aligning the system with the organizational structure, culture, and processes already in place. If an ERP system requires significant changes to an organization's existing operations or requires employees to acquire new skills, its adoption may be slower or more challenging. On the other hand, if the ERP system integrates seamlessly with current workflows and complements the organization’s objectives, adoption is likely to be quicker and more successful. For instance, organizations that already rely on certain digital tools or technologies may find it easier to adopt ERP systems that are compatible with their existing IT infrastructure. According to Straub (2009), compatibility is a critical factor in determining how smoothly an innovation is adopted in an organizational context, as it reduces resistance to change and increases the perceived value of the innovation.

Complexity is another significant cause in the diffusion of innovations. It denotes to how hard or easy it is to comprehend and usage an innovation. In the case of ERP systems, complexity is often a major concern. ERP systems, with their integrated functions through numerous departments such as finance, HR, and supply chain management, can be perceived as complex, particularly by employees who are not familiar with advanced technologies. The more complex the system appears; the more resistance it may face from employees who feel overwhelmed by the learning curve or fear that the new system will disrupt their workflow. Therefore, it is essential for organizations to choose ERP systems that are user-friendly and offer sufficient preparation and sustenance to employees. Talukder et al. (2020) argue that reducing the perceived complexity of ERP systems through user-friendly boundaries and comprehensive training programs can significantly enhance their acceptance and implementation within an organization.

Trialability, as defined by Rogers, refers to the degree to which an invention can be investigated with on an inadequate basis before full-scale implementation. In the case of ERP systems, trialability is often limited, as ERP implementation typically involves full-scale adoption across the organization. However, organizations can still approach the implementation in phases, starting with pilot projects or rolling out the ERP system to specific departments or business functions before full deployment. This approach allows organizations to test the system, evaluate its performance, and make necessary adjustments before widespread adoption. By taking a phased approach, organizations can build confidence in the new system and discourse any latent issues beforehand they affect the entire organization. Straub (2009) notes that trialability can reduce uncertainty and

resistance, as employees and stakeholders can experience first-hand the aids and encounters of the new technology in a controlled environment.

When it comes to ERP systems, the more visible the benefits of the system are to employees, the more likely it is to be adopted. For example, if employees can see that the ERP system leads to improved efficiency, reduced errors, and faster decision-making, they are more likely to observe the system as valuable and adopt it more readily. Organizations should therefore emphasize the visible benefits of ERP systems, not only in terms of operational improvements but also in how they contribute to strategic objectives. Talukder et al. (2020) emphasize that showcasing the success stories of early adopters within the organization can help increase the visibility of the ERP system's benefits, encouraging broader acceptance across departments.

This theory also proposes that the acceptance process occurs through a series of stages: knowledge, persuasion, decision, implementation, and confirmation. In ERP-driven digital transformation, this process can be seen as a journey that involves raising awareness about the ERP system, persuading key stakeholders of its benefits, making decisions about which ERP system to implement, rolling out the system across the organization, and confirming its success or making adjustments as needed. During the knowledge stage, it is essential for organizations to educate employees and decision-makers about the potential of ERP systems and how they can improve supply chain management. Once the benefits are understood, organizations can move into the persuasion and decision stages, where they evaluate different ERP systems and make the choice to adopt one that aligns with their

strategic goals. After implementation, organizations must continuously monitor and evaluate the ERP system's performance, ensuring that it delivers the expected benefits and making adjustments as necessary to ensure long-term success.

In conclusion, this theory offers a useful lens through which to understand the causes that inspiration to the acceptance of ERP systems in the context of digital transformation. By considering issues such as comparative gain, compatibility, difficulty, trialability, and observability, organizations can design more effective strategies for promoting the diffusion of ERP systems in their supply chains. The insights provided by Talukder et al. (2020) and Straub (2009) further underscore the prominence of these factors in persuading the rate and success of technology adoption. By carefully managing these elements, organizations can upsurge the likelihood of fruitful ERP execution, leading to improved efficiency, enhanced decision-making, and improved supply chain performance.

### 2.2.7. Institutional Theory

Articulated by DiMaggio and Powell (1983), this theory focuses on the influence of institutions on organizational behavior. It suggests that organizations conform to norms, values, and expectations of their institutional environment to advance legality and acceptance. In the context of ERP-driven digital transformation, this theory can explain how regulatory pressures, industry standards, and competitive forces drive organizations to adopt advanced ERP systems and digital technologies. Institutional Theory provides insights into the external pressures that influence digital transformation initiatives in supply chain management (Scott, 2001). Research by Scott (2001) provides a comprehensive

framework for understanding institutional influences on organizational behavior. Additionally, Greenwood et al. (2008) offer an in-depth analysis of institutional impacts on organizational change.

The theory offers a robust background for understanding how external forces shape organizational behavior and decision-making processes. According to this theory, administrations are influenced by the norms, values, and expectations of their institutional setting, and they often conform to these pressures to gain legitimacy and acceptance. This conformity is driven by the need to adhere to institutionalized practices, which helps organizations maintain their social standing, secure resources, and avoid potential conflicts with key stakeholders. In the context of ERP-driven digital transformation, Institutional Theory offers valued insights into how regulatory frameworks, industry standards, and competitive dynamics compel organizations to adopt advanced ERP systems and digital technologies. Organizations are often pressured to implement ERP systems, not only for internal efficiency but also to meet external expectations and align with industry trends, which can be critical for maintaining their competitive position and ensuring continued achievement.

In today's speedily growing business setting, the implementation of ERP systems is frequently influenced by institutional pressures, particularly those stemming from regulatory bodies and industry standards. For illustration, organizations functioning within extremely structured sectors such as finance, healthcare, or manufacturing are often required to comply with strict regulatory requirements regarding data management,

security, and operational efficiency. These regulatory pressures create an environment where ERP systems are no longer optional but essential for ensuring compliance. ERP systems help organizations manage complex data and maintain transparency, making it easier to comply with laws and industry regulations. This compliance function is crucial in sectors where failure to adhere to regulatory standards can consequence in legal drawbacks, financial damages, and damage to an organization's standing. As Scott (2001) explains, institutional pressures exert considerable influence on organizational decision-making, and these pressures are often felt more acutely in industries where legal compliance and regulatory oversight are critical.

Beyond regulatory influences, industry standards and norms also play a pivotal role in shaping organizations' decisions to adopt ERP systems. Industries often develop best practices and benchmarks that define the expected operational processes, comprising SCM, inventory control, and resource planning. These standards become institutionalized over time, and organizations feel compelled to conform to them to remain competitive and gain legitimacy in their respective markets. ERP systems have become integral to achieving these standards, as they enable organizations to automate processes, track performance, and make data-driven decisions that align with industry expectations. In industries where competitors are adopting ERP systems, firms that choose not to do so risk being seen as inefficient or outdated, potentially losing market share and customer trust. Greenwood et al. (2008) further emphasize that the competitive pressure within an industry is a key driver of organizational change, and in the case of ERP adoption, the desire to meet or exceed industry norms can accelerate digital transformation efforts.

Another significant aspect of Institutional Theory is the notion of isomorphism, which mentions to the process by which organizations become similar to each other over time due to the influence of external pressures. In the context of ERP adoption, isomorphism can occur through coercive, mimetic, and normative pressures. Coercive isomorphism arises from formal pressures, such as regulatory requirements or legal mandates, which compel organizations to adopt ERP systems to meet compliance standards. Mimetic isomorphism occurs when organizations imitate the practices of other successful firms, particularly in the face of uncertainty. If a leading competitor in the industry adopts ERP systems and demonstrates success, other organizations may follow suit to avoid being left behind. Normative isomorphism refers to the influence of professional standards and networks, such as those established by industry associations or consulting firms. Organizations may adopt ERP systems because they are considered the "best practice" or because influential professionals in the field advocate for their use.

In addition to these external pressures, institutional theory highlights the importance of legitimacy in organizational behavior. Legitimacy is the perception that an organization is operating in a generally acceptable and responsible manner, in accordance with the expectations of its institutional environment. Organizations seek legitimacy to secure resources, build relationships with stakeholders, and confirm their long-term survival. In the case of ERP-driven digital transformation, adopting ERP systems can be seen as a way for organizations to demonstrate their commitment to efficiency, innovation, and compliance. By implementing state-of-the-art ERP solutions, organizations can signal their alignment with industry trends and position themselves as leaders in their field. This

process of seeking legitimacy through conformity to institutional pressures can be particularly important in industries where innovation and technology adoption are seen as indicators of organizational competence and future success.

While institutional pressures undoubtedly play a noteworthy role in the adoption of ERP systems, it is important to recognize that not all organizations experience these pressures in the same way. The degree to which an organization is influenced by institutional forces depends on its size, structure, and the specific context in which it operates. Larger organizations, for example, may be more likely to adopt ERP systems due to their greater access to resources and their need to maintain complex operations across multiple regions or business units. Smaller organizations, on the other hand, may face greater challenges in accepting ERP systems due to inadequate financial and technical means, despite the institutional pressures they may face. Thus, the adoption of ERP systems is not solely driven by external pressures but also by internal factors such as organizational capacity, strategic priorities, and leadership commitment.

Furthermore, institutional theory underscores the role of organizational fields—networks of organizations that interact with one another and share similar structures or activities—in shaping behavior. Organizations within the same field are likely to face similar institutional pressures, and their actions can influence one another. For example, if a cluster of companies within a particular industry adopts ERP systems, others within the same field may be more inclined to follow suit, both to remain competitive and to avoid being perceived as lagging behind. This creates a dynamic where the adoption of ERP systems

becomes not just an individual organizational decision but part of a broader trend within the industry or sector. This notion of organizational fields highpoints the prominence of considering the broader institutional environment when examining the factors that drive ERP adoption, as organizations often do not make decisions in isolation but are influenced by the actions and behaviors of others in their field.

In conclusion, Institutional Theory offers a powerful lens through which to inspect the external factors influencing ERP-driven digital transformation. The theory highlights how regulatory pressures, industry standards, and competitive dynamics shape organizational behavior and drive the adoption of ERP systems. By conforming to institutional expectations, organizations seek legitimacy, gain competitive advantage, and ensure compliance with industry norms. As Scott (2001) and Greenwood et al. (2008) emphasize, these external forces can create a compelling case for adopting ERP systems in supply chain management, as they are seen as essential tools for maintaining organizational legitimacy and competitiveness. However, the theory also recognizes that organizations are not inactive receivers of institutional pressures; they actively understand and respond to these pressures based on their unique context, resources, and strategic goals. Therefore, while institutional pressures play a significant role in shaping ERP adoption, organizations must also consider internal factors and strategic considerations to safeguard that their digital transformation determinations are successful and supportable**.**

### 2.2.8. Change Management Theory

Change Management Theory, including frameworks such as Kotter's 8-Step Change Model (Kotter, 1996), emphasizes the importance of a structured approach to managing organizational change. ERP-driven digital transformation in supply chain management includes noteworthy fluctuations in processes, technology, and organizational culture. This theory supports the need for a systematic approach to managing these changes, including creating a sense of urgency, developing a vision, and engaging stakeholders throughout the transformation process. Effective change management is vital for the successful application of ERP systems and digital technologies in supply chain operations (Hiatt and Creasey, 2003). Kotter's (1996) model remains a widely accepted framework for guiding organizational change efforts. Recent studies by Todnem (2005) further elucidate the critical aspects of change management in technology implementation.

Change Management Theory, particularly frameworks like Kotter's 8-Step Change Model (Kotter, 1996), underscores the importance of structured processes to manage organizational change effectively. This theory is particularly relevant when considering ERP-driven digital transformation in supply chain management, as such transformations involve substantial changes not single in technology but also in business procedures, structures, and organizational beliefs. Implementing ERP systems and digital technologies in the supply chain entails a thoughtful and methodical method to monitor organizations through the complexities of such variation. Without a strategic approach to managing change, organizations may face resistance from employees, disruptions in workflow, and unsuccessful technology adoption, undermining the potential benefits of ERP systems.

Kotter's 8-Step Change Model provides a all-inclusive roadmap for guiding organizations through the change process. The model begins with creating a sense of urgency, which is critical in the context of ERP-driven transformation. In many cases, employees and stakeholders may not fully understand the need for change or may resist the disruption that a new ERP system could cause. By establishing a sense of urgency, leaders can help stakeholders distinguish the prominence of the transformation, not just for the organization but also for their discrete roles and the wider competitive setting. In the case of ERP implementation, creating urgency could involve demonstrating how outdated systems or manual processes are hindering operational efficiency or leaving the organization vulnerable to industry competitors that have already adopted advanced technologies. Kotter (1996) emphasizes that this preliminary phase is vital, as it motivates the workforce and secures the necessary support from leadership to move forward with the change process.

Following the creation of urgency, Kotter's model emphasizes the need for developing a clear vision for the change. In the background of ERP-driven digital transformation, this vision must articulate the desired outcomes of the transformation—such as improved operational efficiency, real-time data access, and streamlined processes across the supply chain. A well-crafted vision serves as a guiding light throughout the transformation process, providing direction and focus. It helps stakeholders comprehend what the organization hopes to attain and why the change is necessary. The vision also requests to support with the strategic goals of the organization, ensuring that it resonates with both leadership and employees. Having a compelling vision is important for ensuring that

everybody is on the same page and employed towards the same goals, as the fruitful acceptance of ERP systems requires the collective effort of the entire organization (Hiatt and Creasey, 2003).

Engaging and empowering stakeholders is another critical aspect of Kotter's change model. Throughout the ERP operation process, it is crucial to involve employees, managers, and additional main stakeholders to safeguard their buy-in and support. Change can be difficult, particularly when it involves adopting new technologies that impact daily operations. By engaging stakeholders early in the process, organizations can reduce resistance and foster a sense of ownership over the change process. This includes providing adequate training, addressing concerns, and involving stakeholders in decision-making processes related to the ERP implementation. Empowering employees to participate in the change process makes them feel valued and increases their commitment to the transformation. When employees sense confident that they have the skills and possessions to succeed with the new ERP system, they are further probable to embrace the change rather than resist it. As Hiatt and Creasey (2003) argue, the success of any change initiative depends on the ability to engage and empower the people who will be directly impacted by the change.

Kotter's model also emphasizes the importance of generating short-term wins throughout the change process. In ERP-driven digital transformation, short-term wins can help demonstrate the effectiveness of the new system and build momentum for the continued implementation process. These wins could include successfully migrating a single department to the new ERP system or achieving measurable improvements in supply chain efficiency early on. Celebrating these wins helps to reinforce the benefits of the

transformation and provides proof of concept to investors who may still be doubtful about the new technology. According to Todnem (2005), these small successes are important in maintaining enthusiasm and commitment throughout the transformation process. They act as tangible evidence that the change is working and motivate employees to continue supporting the change efforts.

Building on these short-term wins, Kotter's model stresses the need to consolidate gains and produce more change. As organizations begin to see positive results from the initial implementation of ERP systems, it is crucial to maintain momentum and drive further change across other departments or business units. This stage involves reinforcing the changes that have already been made, ensuring that employees continue to adopt and utilize the new systems effectively. Consolidating gains also means addressing any challenges that arise during the implementation process and making adjustments where necessary to ensure that the ERP system is integrated successfully across all parts of the organization. This phase often requires leadership to remain committed to the vision and to encourage continued investment in training, system upgrades, and process improvements.

Finally, Kotter's model stresses the importance of anchoring new approaches in the organizational culture. For ERP-driven digital transformation to be truly successful, the changes must be sustained over time. This involves embedding the new ERP systems and processes into the stuff of the organization's culture and ensuring that they become an integral portion of the daily workflow. Front-runners must guarantee that the transformation is not seen as a temporary project but as a permanent shift in how the organization operates. This requires continuous reinforcement, monitoring, and support to

ensure that the ERP system continues to deliver value over the long term. Hiatt and Creasey (2003) note that successful change management is not just about applying new technologies but also about ensuring that the new practices and behaviors are ingrained in the organization's culture.

In the background of ERP-driven digital transformation, effective change management is crucial to overcoming the challenges associated with technology adoption. Todnem (2005) further explores the critical aspects of change management in technology implementation, particularly in large-scale projects like ERP systems. One key factor is the need for strong leadership throughout the conversion process. Front-runners play a crucial part in guiding the organization through each step of the change process, from creating urgency to anchoring the changes in the organizational culture. Leadership must not only support the ERP implementation but also actively interconnect the aids of the change to all stakeholders. They must address concerns, provide resources, and foster an environment that encourages collaboration and problem-solving.

Moreover, change management backgrounds such as Kotter's model are especially relevant in the context of ERP-driven digital transformation because they offer a structured method to managing the complexity of technological change. ERP systems often represent a significant departure from legacy systems, requiring organizations to rethink how they manage operations, collect and analyze data, and interact with customers and suppliers. Without a structured approach, organizations may struggle to manage the transition, leading to project delays, budget overruns, and poor adoption rates. By applying

established change management principles, organizations can ensure that their ERP implementation is not only successful but also sustainable over time.

In conclusion, change management theories offer valuable guidance for organizations directing the densities of ERP-driven digital transformation. Effective change management involves creating a sense of urgency, developing a clear vision, engaging stakeholders, generating short-term wins, consolidating gains, and embedding the changes in the organizational culture. By following a organized method to change management, organizations can upsurge the probability of successful ERP application, ensuring that the technology delivers the anticipated benefits in terms of competence, cost savings, and competitive advantage. As Todnem (2005) emphasizes, change management is a continuous process that requires commitment, leadership, and careful planning to achieve long-term success.

## 2.3. Framework of the Study

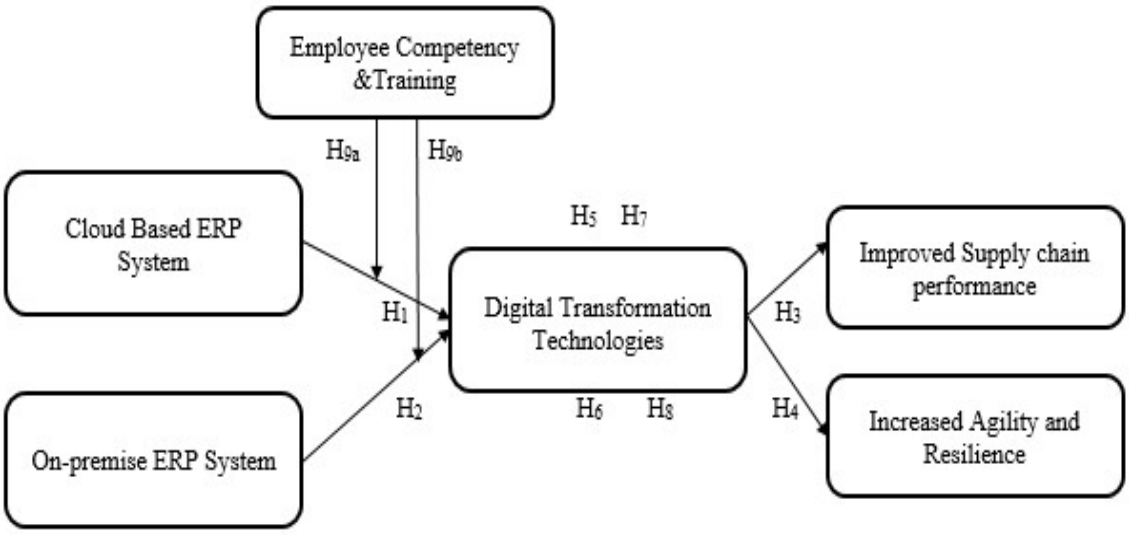


Figure 1: Proposed Conceptual Framework

***Source: Author's own work***

## 2.4. Theoretical Background and Foundation

The theoretical foundation for examining the influence of ERP-driven digital transformation on SCM is stranded in numerous established theories that offer valuable insights into how organizations can adopt and leverage technological advancements for competitive advantage. One of the most prominent theories in this regard is the Resource-Based View (RBV), which focuses on how companies can advance and endure a competitive advantage by acquiring and utilizing "valuable, rare, inimitable, and non-substitutable resources" (Barney, 1991). The RBV is particularly relevant in the context of

ERP-driven digital transformation, as ERP systems, particularly cloud-based solutions, are considered strategic resources that enable organizations to integrate and optimize their business processes. ERP systems help organizations streamline operations, improve information flow across departments, and enable better decision-making. These capabilities, when effectively deployed, can lead to significant competitive advantages by enhancing operational efficiency and improving responsiveness to market changes (Davenport, 1998). Moreover, as companies progressively trust on data-driven decision-making, the ability to leverage integrated systems like ERP becomes a crucial resource for maintaining a competitive edge.

The RBV also highlights the importance of unique and firm-specific resources that contribute to lasting success. In the case of ERP-driven digital transformation, the incorporation of ERP systems into a company's operations is not just about implementing technology; it is about creating a system that supports the firm's strategic goals and fosters innovation. ERP systems, by consolidating key data, enabling real-time analytics, and automating routine tasks, help organizations recover their agility, diminish costs, and enhance their customer service capabilities. As a result, organizations that invest in robust ERP systems, particularly those that are personalized to their exact needs, can strengthen their strategic resources and gain a sustainable competitive advantage (Barney, 1991). The RBV proposes that firms that treat ERP systems as a valuable resource and align them with their broader strategic goals are more likely to achieve superior performance, particularly in highly competitive environments like supply chain management.

Another theoretical lens that is critical to understanding ERP-driven digital transformation is the Technology-Organization-Environment (TOE) framework (Tornatzky and Fleischer, 1990). This outline provides a comprehensive approach to examining how various factors within an organization, as well as external factors, stimulus the espousal and execution of new technologies. The TOE framework highlights three primary contexts that shape technology adoption decisions: technological, organizational, and environmental. In the case of ERP systems, the technological context denotes to the technological capabilities of the ERP system, such as the features offered by cloud-based or on-premise solutions, their compatibility with existing IT infrastructure, and their capacity to scale with the organization's growth. Cloud-based ERP systems, in particular, proposal noteworthy rewards in terms of suppleness, scalability, and cost-efficiency, which make them highly attractive for organizations undergoing digital transformation in their supply chain management processes. These systems can integrate disparate functions such as gaining, inventory management, and logistics into a solitary stand, providing organizations with real-time discernibility into their supply chains and enabling more knowledgeable decision-making.

The organizational background of the TOE framework focuses on aspects within the organization itself that influence technology embracing. Key organizational factors include the firm's culture, the level of employee competency, the support of top management, and the obtainability of resources for executing the technology. For ERP-driven digital transformation, top management support is particularly critical. Top bosses play a vital part in securing the essential resources, motivating employees, and setting clear objectives for

the ERP implementation process. Additionally, employee competence is essential for ensuring that the new systems are effectively utilized. Proper training and upskilling are necessary to guarantee that employees can take complete benefit of the ERP system's capabilities. The organizational context also encompasses internal communication and collaboration, which are decisive for guaranteeing that all stakeholders are aligned during the transformation process. When the organizational context is supportive of technology adoption, the likelihood of successful ERP implementation is significantly increased.

The environmental context, on the other hand, refers to external factors that impact the adoption of ERP systems, such as industry standards, regulatory requirements, and competitive pressures. Organizations often face pressure from external stakeholders, including customers, regulators, and competitors, to adopt advanced technologies. In the background of ERP-driven digital transformation, environmental pressures can show a significant role in prompting organizations to adopt ERP systems. For example, in industries where regulatory compliance is critical, ERP systems can help firms meet reporting and compliance requirements by providing centralized data management and ensuring accurate, real-time information flow across departments. Similarly, the competitive environment can encourage firms to adopt ERP systems to rationalize their processes and improve efficiency, thereby ahead a competitive superiority in the marketplace (Baker, 2012).

The Diffusion of Innovations (DOI) theory (Rogers, 2003) also proposals appreciated acumens into understanding how and why organizations adopt new technologies, such as ERP systems, in their supply chain operations. The DOI theory explains that the adoption of innovations is inclined by several factors, counting comparative benefit, compatibility, difficulty, trialability, and observability. In the case of ERP systems, comparative benefit refers to the apparent benefits of the technology likened to prevailing systems. Cloud-based ERP systems, for example, offer significant advantages over traditional on-premise solutions, such as lower upfront costs, ease of implementation, and better scalability. The compatibility of the technology with current procedures and classifications is another crucial factor influencing adoption. ERP systems that can integrate smoothly with an organization's current software and hardware infrastructure are more likely to be adopted. Complexity, refers to the ease or difficulty of using the technology. ERP systems that are user-friendly and require minimal technical expertise are more likely to be embraced by employees, leading to a higher success rate in implementation. Trialability and observability, as defined by Rogers (2003), also show a part in the diffusion of ERP systems. Organizations are more probable to espouse a technology if they can experiment with it on a small scale before full implementation and if they can observe the positive results of the technology in other organizations or business units. Amini and Abukari (2020) highlight how the relative rewards of cloud-based ERP systems, such as cost-efficiency and scalability, make them more appealing to organizations looking to improve their supply chain management capabilities.

Finally, the status of Change Management theories in the successful execution of ERP-driven digital transformation cannot be overstated. ERP systems require significant changes in organizational processes, workflows, and employee behaviors, making effective change management practices essential for success (Kotter, 1996). Organizational leaders must carefully plan and execute strategies to manage these changes, which include establishing clear communication, providing employee training, and fostering a culture of collaboration. Kotter's 8-Step Change Model (1996) offers a proven context for guiding organizations through the stages of change, from creating a sense of urgency to embedding new processes into the organizational culture. In the context of ERP-driven transformation, change management practices ensure that staffs are adequately equipped for the shift to novel technologies and are motivated to adopt these changes. Without effective change management, organizations may face resistance, delays, and even failure in their ERP implementation efforts.

In conclusion, ERP-driven digital transformation in SCM is influenced by a grouping of theoretical perspectives that help explain how organizations adopt and leverage new technologies. The Resource-Based View underscores the strategic value of ERP systems as organizational resources, although the Technology-Organization-Environment framework offers a comprehensive considerate of the factors influencing technology espousal. It propositions acumens into the factors that affect the rate and success of ERP adoption, and Change Management theories highlight the serious part of human and organizational dynamics in guaranteeing fruitful implementation. By considering these theories, organizations can better steer the intricacies of ERP-driven digital transformation

and maximize the benefits of these technologies in enhancing their supply chain management capabilities.

## 2.5. Hypotheses Development

Digital transformation represents a comprehensive combination of digital technologies across all organizational parts, fundamentally changing business operations and value delivery (Nicoletti, 2021). This process is driven by the need to familiarise to rapidly evolving market circumstances, technological progressions, and customer expectations (Bohlmann et al., 2013). In supply chain management, digital transformation is pivotal in achieving real-time discernibility, operational efficiency, and enhanced decision-making capabilities (Tran-Dang and Kim, 2021; Vial, 2019).

ERP systems have undergone significant evolution, transitioning from traditional on-premise solutions to modern cloud-based platforms. Traditional ERP systems were often characterized by high implementation costs, limited scalability, and complex maintenance requirements. However, the advent of cloud computing has revolutionized ERP systems, offering numerous advantages such as reduced costs, improved scalability, and easier integration with other digital technologies (Gezgin et al., 2017). Cloud ERP systems enable organizations to leverage AI and ML to gain deeper insights into data, heighten supply chain processes, and enhance strategic decision-making (Hu et al., 2022).

Research highlights that digital transformation technologies, including AI, ML, IoT, and Blockchain, play a vital part in augmenting supply chain performance by improving

visibility, efficiency, and responsiveness (Jiang et al., 2023). AI and ML, for instance, facilitate advanced analytics and predictive insights, enabling proactive decision-making in SCM (Marcu et al., 2021). IoT enhances real-time tracing and observing of goods, thereby increasing transparency and reducing risks (Gupta et al., 2020). Blockchain technology ensures data integrity and security, which is critical for maintaining trust and compliance in supply chain transactions (Saberi et al., 2019).

The successful implementation of ERP-driven digital transformation is contingent upon several factors, including organizational culture, top management support, and employee competency (Tan and Xu, 2021). Studies indicate that a supportive organizational culture and strong leadership commitment are essential for overcoming resistance to change and fostering an innovative environment (Vial, 2019). Additionally, continuous employee training and competency development are vital for ensuring that staff can effectively utilize new technologies and systems (Sokač and Picek, 2019).

Empirical evidence from companies in the Delhi NCR region underscores the practical benefits and challenges of ERP-driven digital transformation. Case studies demonstrate that organizations that successfully integrate ERP systems with advanced digital technologies achieve significant improvements in supply chain performance, including enhanced operational efficiency, cost reduction, and increased agility (Jenab et al., 2019). However, common challenges such as great execution costs and the necessity for significant organizational changes highlight the importance of strategic planning and effective change management (Amini and Abukari, 2020).

In conclusion, the literature emphasizes the transformative prospective of ERP systems in the setting of SCM. By leveraging cloud-based ERP systems and advanced digital technologies, organizations can achieve substantial improvements in supply chain performance. However, the attainment of these edges depends on numerous factors, including organizational readiness, employee competency, and effective change management practices. This review affords a comprehensive investigation of the current trends, challenges, and best practices, offering valuable comprehensions for organizations seeking to enrich their supply chain operations through ERP-driven digital transformation.

### 2.5.1 Cloud-based ERP systems and digital transformation technologies

Despite the substantial advancements in ERP systems and digital transformation, there residues a significant investigation gap in accepting the precise influence of cloud-based ERP systems on digital transformation technologies within the supply chain context. While frequent studies have discovered the general benefits of ERP systems, the distinct advantages and implications of cloud-based ERP systems for digital transformation in supply chains are less well-documented (Gezgin et al., 2017). The Technology-Organization-Environment (TOE) framework provides a valuable theoretic lens to examine this relationship, considering the technological capabilities, organizational readiness, and environmental influences that shape the acceptance and impact of cloud-based ERP systems. Technologically, cloud-based ERP systems offer enhanced scalability, flexibility, and integration capabilities compared to traditional on-premise systems (Amini and Abukari, 2020). These systems facilitate seamless integration with digital

transformation technologies such as AI, ML, and IoT, which are critical for real-time data analytics, predictive maintenance, and advanced supply chain optimization (Jiang et al., 2023).

The TOE framework also emphasizes the prominence of organizational readiness, including top management support and employee competency, for successful technology adoption (Baker, 2012). Studies indicate that groups with a philosophy of innovation and a commitment to incessant learning are more likely to comprehend the full potential of cloud-based ERP systems (Tan and Xu, 2021). Employee training and development programs are essential to equip staff with the obligatory aids to leverage these advanced technologies effectively (Sokač and Picek, 2019). Moreover, the environmental context of the TOE framework highlights external factors such as market dynamics, competitive pressure, and regulatory requirements that effect the embracing of cloud-based ERP systems (Tornatzky and Fleischer, 1990). In rapidly evolving markets, the agility and responsiveness provided by cloud-based ERP systems can offer a significant competitive advantage (Hu et al., 2022). Addressing this investigation gap can offer treasured acumens for organizations targeting to augment their supply chain operations through strategic investments in cloud-based ERP systems and digital transformation technologies.

While ERP systems have long been recognized as a powerful tool for streamlining business processes, their application in the background of SCM has evolved significantly with the advent of cloud-based solutions. Traditional on-premise ERP systems often struggled with scalability, flexibility, and integration, limiting their potential for digital transformation.

However, cloud-based ERP systems, which have become more prevalent in recent years, offer organizations new opportunities to optimize their supply chain operations through enhanced integration with advanced technologies like “Artificial Intelligence (AI), Machine Learning (ML), and the Internet of Things (IoT)”. Despite these advancements, the specific impact of cloud-based ERP systems on digital transformation within supply chains residues underexplored. This gap in the literature presents an opportunity to better understand how cloud-based ERP systems interact with emerging technologies to drive more efficient, responsive, and data-driven supply chain operations.

Cloud-based ERP systems offer numerous recompenses over their traditional counterparts. One of the crucial aids is scalability. Cloud-based systems are inherently more flexible and scalable, allowing organizations to easily adjust resources based on demand. This is particularly valuable for supply chains, where demand fluctuations can be frequent and unpredictable. Organizations can scale their operations up or down without the need for significant investments in IT infrastructure, which is often the case with on-premise systems. The ability to scale resources in response to market conditions provides firms with the agility to remain competitive in dynamic environments. In addition to scalability, cloud-based ERP systems also enhance integration capabilities. These systems can seamlessly integrate with other digital transformation technologies such as AI, ML, and IoT. For instance, AI algorithms can be embedded into cloud-based ERP systems to predict demand patterns and optimize inventory management. Similarly, IoT sensors can offer real-time data from supply chain operations, allowing advanced analytics and predictive maintenance. These integrations improve the accuracy and speed of decision-making,

making cloud-based ERP systems an essential enabler of digital transformation in SCM (Jiang et al., 2023).

The application of the Technology-Organization-Environment (TOE) context to cloud-based ERP implementation in supply chains offers an all-inclusive approach to understanding the factors that impact successful digital transformation. The TOE framework considers three primary contexts: technological, organizational, and environmental. Technologically, cloud-based ERP systems provide superior capabilities in terms of data processing, integration, and real-time analytics. Their cloud infrastructure allows for greater accessibility and flexibility, enabling organizations to access critical data from anywhere at any time. This is a significant advantage for supply chains that require continuous monitoring and quick decision-making across multiple locations and time zones. Furthermore, cloud-based ERP systems are often fortified with advanced structures such as predictive analytics, which are integral to optimizing supply chain operations. These systems allow organizations to analyze historical data and forecast future trends, facilitating better decision-making and reducing operational risks (Amini and Abukari, 2020). However, the successful integration of these technologies depends on the organization's readiness to adopt and implement them.

Organizational readiness is another critical factor in the TOE framework. Cloud-based ERP systems require a shift in the organizational mindset, as well as the development of new competencies. Organizations must substitute a philosophy of invention and constant development to fully capitalize on the benefits of these systems. Top management support

is particularly important, as leaders must champion the espousal of cloud-based ERP structures and provide the necessary resources for implementation. Employee competency is also crucial. While cloud-based ERP systems are often user-friendly, they still require specialized knowledge to maximize their functionality. Employee training and development programs are essential to equip staff with the essential aids to effectively use these advanced systems. Studies have shown that organizations that participate in employee training and offer ongoing sustenance are more likely to experience successful technology adoption (Tan and Xu, 2021). Furthermore, the involvement of employees at all levels is vital for ensuring that the digital transformation process is smooth and that resistance to change is minimized. Employees who are well-trained and confident in using the new systems are more likely to encirclement the changes and contribute to the overall success of the digital transformation initiatives (Sokač and Picek, 2019).

The environmental context of the TOE framework also shows a significant part in the adoption of cloud-based ERP systems. External factors such as competitive pressures, regulatory requirements, and market dynamics can all influence an organization's decision to implement these systems. In industries where supply chains are complex and highly competitive, firms are under constant pressure to improve efficiency and responsiveness. Cloud-based ERP systems offer the agility and flexibility needed to meet these challenges. For example, real-time data from IoT devices integrated into cloud-based ERP systems can provide corporations with up-to-the-minute insights into their supply chains, enabling them to react quickly to disruptions or changes in demand. This real-time capability gives firms a competitive edge by consenting them to optimize inventory, lessen waste, and progress

customer service (Hu et al., 2022). Additionally, regulatory requirements linked to data security, privacy, and acquiescence often drive organizations to adopt more secure and efficient ERP systems. Cloud-based solutions typically come with built-in security sorts that help organizations meet these regulatory demands, making them an attractive option for firms looking to stay compliant while undergoing digital transformation.

Addressing the research gap in understanding the impression of cloud-based ERP systems on digital transformation in SCM is crucial for organizations looking to enhance their operations. While much has been written about the general benefits of ERP systems, more research is needed to explore how cloud-based ERP systems specifically pay to the digital transformation of supply chains. Studies that focus on the integration of cloud-based ERP systems with emerging technologies like AI, ML, and IoT will provide valuable insights into how these systems can be used to drive innovation, advance efficiency, and increase competitiveness in the supply chain context. Moreover, research into the organizational and environmental aspects that influence the successful approval and execution of cloud-based ERP systems will help organizations well comprehend the challenges they may aspect and advance strategies to overwhelm them. By addressing these research gaps, organizations can advance a deeper indulgent of how to leverage cloud-based ERP systems to their advantage and guarantee the achievement of their digital transformation initiatives.

In conclusion, cloud-based ERP systems represent a significant advancement in the field of ERP-driven digital transformation, predominantly in the context of supply chain

management. These systems offer unparalleled flexibility, scalability, and integration capabilities, which are crucial for organizations aiming to augment their supply chain operations through advanced digital technologies. By applying the TOE framework to examine the technological, organizational, and environmental factors that impact the adoption of cloud-based ERP systems, organizations can gain a better understanding of the dynamics that shape successful digital transformation. Addressing the existing research gap in this area will not only enhance academic knowledge but also offer applied insights for organizations seeking to leverage cloud-based ERP systems to expand their supply chain efficiency, responsiveness, and competitiveness. Thus, the study proposes that:

***$H_1$**: Cloud-based ERP systems positively impact digital transformation technologies.*

### 2.5.2 On-premise ERP systems and digital transformation technologies

Despite the growing popularity of cloud-based ERP systems, the potential impact of on-premise ERP systems on digital transformation technologies remains underexplored. Traditional on-premise ERP systems, often characterized by their robustness and customizability, continue to play a significant role in many organizations, particularly those with stringent data security and regulatory compliance requirements (Dezdar and Ainin, 2011). However, there is limited empirical research examining how these systems pay to digital transformation efforts, especially in the background of integrating advanced technologies like AI, ML, and IoT. This research gap underscores the need to understand how on-premise ERP systems can support and enhance digital transformation initiatives, leveraging their established infrastructure and extensive customization capabilities (Shin, 2006).

The Technology-Organization-Environment (TOE) context delivers a valuable standpoint for exploring this relationship, emphasizing the technological, organizational, and environmental factors that impact ERP adoption and its subsequent impact on digital transformation. Technologically, on-premise ERP systems are often seen as more stable and secure, offering organizations greater control over their data and systems (Al-Mashari, Al-Mudimigh and Zairi, 2003). Organizational factors such as the existing IT infrastructure, the need for extensive customization, and the capability to integrate with legacy systems are crucial in determining the effectiveness of on-premise ERP systems in driving digital transformation (Ram, Corkindale and Wu, 2013). Furthermore, the environmental context, including industry-specific regulations and market conditions, can significantly impact the adoption and accomplishment of on-premise ERP systems in digital transformation initiatives (Tornatzky and Fleischer, 1990). Addressing this investigation gap can provide treasured acumens into how organizations can leverage on-premise ERP systems to enhance their digital transformation capabilities and achieve competitive advantages in their supply chain operations.

While cloud-based ERP systems have gained significant attention for their role in enabling digital transformation, traditional on-premise ERP systems endure to play a vital part in many organizations. These systems, which are installed and run on the organization's own servers, offer several advantages that can support digital transformation, particularly for businesses with specific needs around data security, regulatory compliance, and customization. On-premise ERP systems are typically seen as more robust and reliable, providing organizations with greater control over their IT infrastructure. This can be

particularly important in industries that require strict adherence to regulations and standards, such as healthcare, finance, and manufacturing. However, despite their continued use, there is inadequate research on how these systems can sustenance the integration of advanced digital transformation technologies, such as Artificial Intelligence (AI), Machine Learning (ML), and the Internet of Things (IoT), within the supply chain management context.

One of the main advantages of on-premise ERP systems is their ability to offer extensive customization. These systems are extremely adaptable and can be tailored to meet the specific necessities of an organization. For businesses with complex or unique processes, on-premise ERP systems provide the flexibility to modify workflows, data structures, and user interfaces to align with operational requirements. This level of customization allows organizations to optimize their supply chain processes based on their individual needs and ensures that the ERP system can integrate smoothly with existing systems and technologies. However, while on-premise ERP systems offer customization capabilities, this often comes with increased complexity in the implementation process. Customizing an on-premise ERP system can require significant time, resources, and expertise, especially when integrating it with emerging digital transformation technologies such as AI and ML. These advanced technologies can require robust data architectures and infrastructure to function effectively, and integrating them with legacy ERP systems can present challenges.

From a technological perspective, on-premise ERP systems are often seen as more stable and secure compared to cloud-based solutions. This is particularly crucial for industries

with stringent data security requirements. On-premise systems give organizations full control over their data, guaranteeing that thoughtful information relics within the organization's safe environment. This aspect is predominantly appealing to businesses that handle sensitive customer data or need to comply with industry regulations around data privacy, such as the "General Data Protection Regulation (GDPR)" in Europe or the "Health Insurance Portability and Accountability Act (HIPAA)" in the United States. For these organizations, the security risks associated with cloud-based solutions may outweigh the benefits of scalability and ease of integration. As a result, on-premise ERP systems continue to be a preferred choice for businesses in highly regulated industries, where maintaining control over data security is a critical concern. While cloud-based solutions are often seen as offering greater flexibility and cost-efficiency, on-premise ERP systems provide peace of mind for businesses that prioritize security and compliance.

However, the integration of on-premise ERP systems with digital transformation technologies, such as AI, ML, and IoT, requires significant consideration of organizational factors. Organizational readiness, including the capacity to integrate legacy systems with new technologies, is a critical factor in formative the effectiveness of on-premise ERP systems in supporting digital transformation. Many organizations have long relied on on-premise ERP systems and may be hesitant to transition to newer technologies due to concerns over compatibility, system downtime, and the cost of implementing such changes. The need for extensive customization, as well as the potential disruption to existing operations, can make the transition to digital transformation technologies more challenging. Additionally, the amalgamation of AI and ML capabilities into on-premise

ERP systems requires significant expertise in both the technology and the organizational processes that will benefit from these technologies. This can create a barrier for organizations that non-existence the obligatory aids or resources to implement such technologies effectively.

Despite these challenges, the organizational context offers significant opportunities for leveraging on-premise ERP systems in digital transformation efforts. For organizations with a strong IT infrastructure and a culture of innovation, on-premise ERP systems can provide a solid foundation for integrating advanced technologies like AI and IoT. AI and ML, for example, can be used to analyze records from the ERP system to recognize forms, forecast demand, and optimize supply chain operations. IoT devices, such as devices and RFID tags, can offer real-time data on inventory levels, transference routes, and equipment status, empowering organizations to retort rapidly to fluctuations in supply chain conditions. On-premise ERP systems can support these integrations by serving as the centralized hub for managing data from multiple sources. However, organizations must invest in the necessary technical expertise and infrastructure to guarantee that the ERP system can holder the increased data capacity and complexity associated with advanced digital technologies.

The environmental context also shows a noteworthy part in determining the effectiveness of on-premise ERP systems in digital transformation. Exterior factors such as regulatory pressures, market circumstances, and industry standards can shape the way organizations adopt and utilize these systems. In industries where digital transformation is a critical

component of competitiveness, organizations may sense obliged to adopt new technologies in order to keep pace through competitors or meet customer expectations. However, on-premise ERP systems may not always be the most agile solution in rapidly changing markets, where cloud-based solutions offer greater flexibility and scalability. Nevertheless, in industries where stability, control, and compliance are paramount, on-premise ERP systems can provide the foundation for digital transformation while ensuring that organizations maintain the necessary oversight and governance over their data and systems.

The research gap in understanding the role of on-premise ERP systems in supporting digital transformation in SCM underscores the necessity for additional exploration. While much has been written about the advantages of cloud-based ERP systems, on-premise systems continue to play a vital role in many industries. Investigation that emphases on the specific influence of on-premise ERP systems on the integration of AI, ML, and IoT in supply chains will help organizations better understand how to leverage these systems to drive digital transformation. Furthermore, examining the organizational and environmental factors that stimulus the acceptance and success of on-premise ERP systems in digital transformation efforts will offer treasured understandings into the encounters and opportunities associated with these systems. By addressing this research gap, organizations can make more well-versed decisions about how to utilize on-premise ERP systems in their digital transformation journeys, ensuring that they endure competitive and receptive to the changing needs of the marketplace.

In conclusion, on-premise ERP systems continue to be an integral part of many organizations' IT infrastructure, predominantly in industries where data safety, compliance, and customization are supreme. These systems offer significant advantages, including greater control over data, the ability to customize processes, and stability in regulated environments. However, their integration with digital transformation technologies such as AI, ML, and IoT presents challenges that require careful consideration of technological, organizational, and environmental factors. By leveraging the Technology-Organization-Environment (TOE) framework, organizations can better understand how on-premise ERP systems can support digital transformation initiatives in supply chain management. Additional investigation in this part will help fill the gap in understanding the specific role of on-premise ERP systems in digital transformation, if organizations with valued acumens to augment their ERP systems and drive innovation in their supply chain operations. Thus, we propose that:

***H2**: On-premise ERP systems positively impact digital transformation technologies.*

### 2.5.3. Digital transformation technologies and improved supply chain performance

The impact of digital transformation technologies on improved supply chain performance has been widely acknowledged, yet there relics a noteworthy research gap in comprehensively appreciative this relationship through the lens of the Technology-Organization-Environment (TOE) framework. While existing studies have highlighted the aids of digital transformation technologies in augmenting supply chain visibility, efficiency, and responsiveness (Büyüközkan and Göçer, 2018; Ivanov et al., 2019), there

is limited empirical evidence that systematically explores how these technologies integrate and interact within the specific contexts defined by the TOE framework. This framework provides a holistic view by considering not only technological influences but also organizational readiness and exterior environmental densities, which are crucial in determining the successful implementation and performance outcomes of digital transformation initiatives in supply chains (Baker, 2012; Oliveira and Martins, 2011).

Technological advancements such as IoT, AI, and Blockchain have shown significant potential in transforming supply chain operations. However, the organizational factors, including management support, employee competencies, and the existing IT infrastructure, show an acute role in mediating the effectiveness of these technologies (Zhou et al., 2020). Additionally, environmental influences such as market instability, controlling requirements, and reasonable weights influence the adoption and impact of digital transformation technologies on supply chain performance (Dubey et al., 2019). The research gap lies in the need for a comprehensive study that integrates these dimensions of the TOE framework to offer a deeper indulgent of how digital transformation technologies can be optimally leveraged to enhance supply chain performance. Addressing this gap will offer valued visions for experts and policymakers directing to implement effective digital strategies in SCM.

Despite the growing recognition of digital transformation technologies' role in improving supply chain performance, a comprehensive understanding of how these technologies function within the contexts specified by the TOE framework remains underdeveloped.

The TOE framework, which emphasizes the importance of technical, organizational, and ecological influences in technology adoption, provides a serious lens for evaluating the achievement and challenges of digital transformation initiatives in supply chains. While preceding investigation has acknowledged the prominence of digital transformation technologies like the Internet of Things (IoT), Artificial Intelligence (AI), and Blockchain in enhancing supply chain visibility, efficiency, and responsiveness (Büyüközkan and Göçer, 2018; Ivanov et al., 2019), the interaction between these technologies and the specific contexts of organizations has not been adequately explored. The absence of experiential indication integrating the three dimensions of the TOE framework limits the ability to fully understand how digital transformation technologies influence supply chain performance, particularly when considering the interplay of "technological, organizational, and environmental factors".

The technological dimension of the TOE framework highlights the role of innovations such as IoT, AI, and Blockchain in enhancing the competence and clearness of supply chains. IoT, for example, enables real-time data collection through connected sensors, which can improve tracking and monitoring of things as they move over the supply chain. This increased visibility permits companies to better predict potential disruptions, manage inventory more effectively, and reply rapidly to variations in demand or supply circumstances (Morgado et al., 2020). AI, on the other hand, can leverage large datasets generated by IoT devices to optimize decision-making, from forecasting demand to managing supply chain risks (Chong et al., 2017). The integration of Blockchain technology can further enhance supply chain performance by if a secure, translucent, and

unchallengeable high of transactions, which is especially appreciated in businesses where product authenticity and traceability are precarious (Kshetri, 2018). However, the adoption and integration of these technologies into existing supply chain operations are not always straightforward. The existing IT infrastructure and the technical capabilities of organizations play a crucial role in determining whether these technologies can be effectively integrated and whether they will ultimately contribute to enhanced supply chain performance.

The organizational dimension of the TOE framework is equally important when considering the successful implementation of digital transformation technologies in SCM. For digital transformation to be effective, organizations must possess the necessary internal capabilities, including managerial support, employee skills, and a culture of innovation (Zhou et al., 2020). Top management commitment is precarious in driving the acceptance of new technologies and ensuring that adequate resources are allocated to digital transformation initiatives. Furthermore, employee competencies in handling and leveraging advanced technologies are essential for maximizing their potential. Organizations must devote in training and development programs to prepare their workforce with the skills essential to work with IoT devices, AI algorithms, and Blockchain applications. Employee buy-in is also decisive, as the fruitful application of digital transformation technologies frequently needs noteworthy fluctuations in organizational processes and workflows. Resistance to change, lack of technical skills, or reluctance to adopt novel technologies can hinder the effectiveness of these technologies in improving supply chain performance (Tan and Xu, 2021).

The environmental dimension of the TOE framework emphasizes the exterior factors that shape an organization's verdict to assume digital transformation technologies. These factors include market dynamics, regulatory pressures, and competitive forces that drive organizations to innovate and stay ahead of the curve. In industries where competition is fierce, companies may feel the pressure to approve new technologies to preserve a competitive edge. The increased demand for supply chain transparency, particularly in sectors like food safety, pharmaceuticals, and luxury goods, has spurred many organizations to adopt technologies such as Blockchain for tracking and verifying the authenticity of products (Kshetri, 2018). Regulatory requirements also show a noteworthy role in shaping technology acceptance decisions. In industries where regulatory compliance is paramount, organizations may be incentivized to adopt technologies that enhance data security, traceability, and reporting capabilities. For example, the financial sector has seen increasing adoption of Blockchain technology to comply with anti-money laundering regulations and to ensure the integrity of financial transactions (Swan, 2015). Furthermore, market volatility, such as fluctuations in commodity prices or sudden supply chain disruptions due to natural disasters or geopolitical factors, can drive organizations to adopt technologies that provide greater agility and resilience in supply chain management.

Despite these advancements, the combination of digital transformation technologies into supply chains is not without challenges. The complexity of assimilating progressive technologies like IoT, AI, and Blockchain into existing supply chain systems can be a noteworthy barrier, especially for organizations with outdated IT infrastructure. The cost of implementation, the need for technical expertise, and the disruption of existing

workflows are common concerns that organizations face when adopting new technologies. Additionally, the organizational culture must be aligned with the changes required by digital transformation. Companies that have traditionally operated using manual or paper-based processes may struggle with the shift to digital solutions, which often require significant changes in organizational behavior and mindset. Moreover, the external environment—such as the regulatory framework, market competition, and customer expectations—continues to evolve, creating further uncertainty around the acceptance and employment of digital transformation technologies in supply chain management.

To bridge this research gap, a more integrated approach is needed, one that considers how "technological, organizational, and environmental factors" interrelate to shape the effectiveness of digital transformation technologies in improving supply chain performance. Research that employs the TOE framework can offer valuable insights into how organizations can successfully adopt and integrate IoT, AI, and Blockchain technologies to enhance their supply chain operations. This would offer a more nuanced indulgent of the barriers and enablers of digital transformation in the supply chain context. For example, understanding the part of top management provision and employee training in fostering a culture of innovation could help organizations better prepare their workforce for the encounters of espousing new technologies. Furthermore, exploring the role of external factors such as regulatory compliance and market competition can offer insights into the broader forces that influence digital transformation decisions. Ultimately, addressing this research opening will not only advance theoretical knowledge but also offer

applied guidance for organizations looking to leverage digital transformation technologies to improve their supply chain performance.

In conclusion, while digital transformation technologies hold the latent to significantly enhance supply chain performance, the integration and impact of these technologies are shaped by the technological, organizational, and environmental contexts defined by the TOE framework. Understanding how these factors interact will help organizations overcome the challenges associated with adopting and integrating new technologies like IoT, AI, and Blockchain into their supply chain operations. Addressing this research gap is critical for advancing both academic understanding and practical application of digital transformation in SCM. By leveraging the insights provided by the TOE framework, organizations can better circumnavigate the intricacies of digital transformation and realize the full potential of these technologies in enhancing supply chain visibility, efficiency, and responsiveness. Thus, the study proposes that:

**H3**: Digital transformation technologies positively impact improved supply chain performance.

### 2.5.4. Digital transformation technologies and increased agility and resilience

The association amid digital transformation technologies and the enhancement of supply chain agility and resilience has been increasingly recognized, yet an inclusive considerate grounded in the Technology-Organization-Environment (TOE) background is still lacking. While preceding studies have demonstrated that digital transformation technologies, such as “AI, IoT, and Blockchain”, can significantly augment the quickness and flexibility of

supply chains by permitting real-time data analytics, predictive maintenance, and decentralized decision-making (Ivanov and Dolgui, 2020; Queiroz et al., 2019), there is limited experiential investigation that scrutinises this impact through the integrated lens of the TOE framework. This framework allows for a multidimensional analysis that deliberates not only the technological advancements but also organizational readiness and external conservational pressures that are critical for realizing the occupied impending of digital transformation in supply chains (Baker, 2012; Oliveira and Martins, 2011).

Technologically, the deployment of advanced digital tools enhances supply chain visibility and responsiveness, which are essential for agility and resilience (Chopra and Meindl, 2020). However, the organizational dimension, comprising aspects such as leadership commitment, employee skillsets, and existing IT infrastructure, is pivotal in facilitating the effective adoption and utilization of these technologies (Vial, 2019). Furthermore, the environmental context, characterized by market dynamics, regulatory frameworks, and competitive pressures, significantly effects the magnitude to which digital transformation technologies can enhance agility and resilience (Dubey et al., 2019). The present investigation gap lies in the need for studies that systematically explore these interdependencies within the TOE framework to offer a deeper thoughtful of how digital transformation technologies can be strategically implemented to boost supply chain agility and resilience. Addressing this gap is essential for developing robust supply chain strategies that can endure disturbances and familiarise to altering market conditions. The growing emphasis on digital transformation technologies, such as “Artificial Intelligence (AI), Internet of Things (IoT), and Blockchain”, underscores their potential to significantly

augment supply chain agility and resilience. These technologies allow for real-time data collection, extrapolative analytics, and greater visibility through the supply chain, providing organizations with the tools necessary to retort rapidly and efficiently to disruptions. However, despite the increasing recognition of their benefits, there is static a noteworthy investigation gap in understanding how these technologies contribute to enhanced agility and resilience when examined over the lens of the Technology-Organization-Environment (TOE) background. The TOE framework offers a multidimensional perspective by considering "technological, organizational, and environmental" factors that influence the adoption and effectiveness of digital transformation technologies. This inclusive method is necessary for developing a profounder indulgent of how organizations can harness these technologies to form more sprightly and resilient supply chains.

Technologically, the deployment of digital transformation tools is a game-changer for enhancing supply chain agility and resilience. AI and machine learning (ML), for example, permit organizations to analyze massive volumes of real-time data and gain insights into potential risks or disruptions. Predictive analytics powered by AI can anticipate changes in demand, supply shortages, or potential delays, thereby enabling organizations to take proactive measures before issues escalate (Ivanov and Dolgui, 2020). IoT plays a similar role by offering real-time monitoring and chasing of goods and materials as they change over the supply chain. The use of connected sensors provides organizations with a granular understanding of inventory levels, transportation conditions, and other key performance indicators, allowing them to variety more conversant decisions and mend operational

efficiency (Queiroz et al., 2019). Additionally, Blockchain technology offers enhanced transparency and traceability, ensuring that data is immutable and transparent across all points in the supply chain, which builds trust among stakeholders and strengthens supply chain collaboration (Viale et al., 2020). These technological advancements make supply chains more responsive to changing conditions, improving their ability to adapt quickly to market fluctuations or disruptions.

However, while the technological dimension is crucial, the organizational dimension of the TOE framework plays an equally significant role in allowing the fruitful acceptance and integration of digital transformation technologies. Organizational readiness, including the capabilities of leadership, employee competencies, and the existing IT infrastructure, influences the extent to which these technologies can be effectively utilized. Research has shown that leadership commitment is critical for driving digital transformation initiatives (Vial, 2019). Senior management must not only identify the prominence of digital technologies but also allocate the essential resources and support for their implementation. A strategic approach to leadership is essential for overcoming resistance to change and guaranteeing that digital transformation edges bring into line with organizational objectives. Furthermore, the competencies of employees are paramount in ensuring that these technologies can be effectively utilized to enhance agility and resilience. Employee training and development programs are necessary to equip the workforce with the skills needed to operate and manage new digital tools. Without a skilled workforce, organizations risk underutilizing the potential of AI, IoT, and Blockchain, limiting the benefits these technologies can offer in terms of improved supply chain performance (Tan and Xu, 2021).

In addition to leadership and employee competencies, the existing IT infrastructure shows a critical part in determining an organization's aptitude to integrate advanced digital technologies into its operations. Organizations with outdated or incompatible systems may find it challenging to assume new technologies, which can delay or hinder their digital transformation efforts. The smooth integration of IoT sensors, AI algorithms, and Blockchain solutions requires a modern, flexible IT infrastructure that can handle the increased data flow and support advanced analytics. Without such infrastructure, organizations may struggle to implement digital transformation technologies effectively, undermining their potential to enhance agility and resilience.

The environmental dimension of the TOE framework, which includes factors such as market dynamics, regulatory pressures, and competitive forces, also significantly influences the adoption and influence of digital transformation technologies on supply chain agility and resilience. In industries where market volatility is high, such as electronics or food, the capability to rapidly familiarise to altering circumstances is crucial. Digital transformation technologies deliver organizations with the flexibility to reply to fluctuations in supply and demand, improving their ability to maintain operational continuity despite external disruptions (Dubey et al., 2019). For instance, predictive analytics and real-time tracking can help organizations mitigate the impact of supply shortages or transportation delays by enabling them to quickly adjust their sourcing or delivery strategies. Similarly, IoT sensors can aid organizations recognise possible blockages in their supply chains, permitting for rapid adjustments to prevent disruptions before they occur (Chopra and Meindl, 2020).

Competitive pressures also play a precarious part in pouring the acceptance of digital transformation technologies. In highly competitive markets, organizations must leverage every tool at their disposal to gain an advantage. Digital transformation technologies like AI and Blockchain enable organizations to improve operating efficiency, lessen costs, and enrich customer satisfaction, all of which underwrite to improve competitive positioning (Kshetri, 2018). Furthermore, regulatory requirements often drive organizations to adopt technologies that improve transparency and compliance. For example, industries such as pharmaceuticals or food and beverage must adhere to strict regulations concerning product traceability and safety. The use of Blockchain for tracking product movements can help organizations ensure compliance with these regulations while simultaneously improving supply chain resilience (Queiroz et al., 2019).

While the part of digital transformation technologies in augmenting supply chain agility and pliability is increasingly recognized, there residues a necessity for more pragmatic research that integrates the three dimensions of the TOE framework. Studies that explore how technological advancements, organizational readiness, and external conservational influences interrelate in shaping the outcomes of digital transformation initiatives in supply chains will provide valuable insights. Research that examines these interdependencies can help organizations identify the key enablers and barriers to successfully adopting and leveraging digital transformation technologies to build agile and resilient supply chains.

In conclusion, the adoption of digital transformation technologies, such as “AI, IoT, and Blockchain”, offers noteworthy prospective to enhance supply chain agility and resilience.

Though, the fruitful implementation of these technologies entails a comprehensive understanding of the "technological, organizational, and environmental factors" that impact their espousal and effectiveness. By integrating the TOE framework into research on digital transformation in supply chains, organizations can better understand the encounters and chances linked with implementing these technologies. This investigation will offer treasured acumens into how digital transformation can be strategically implemented to mend supply chain responsiveness, adaptability, and resilience, ultimately helping organizations stay competitive and agile in the look of market volatility and external disturbances. Thus, the study proposes that:

***H4****: Digital transformation technologies positively impact increased agility and resilience.*

### 2.5.5. Cloud-based ERP systems and improved supply chain performance is mediated by digital transformation technologies

The mediation part of digital transformation technologies in the relationship between cloud-based ERP systems and improved supply chain performance has been an emerging area of interest, yet there vestiges a significant research gap in indulgent this association comprehensively within the Technology-Organization-Environment (TOE) framework. Although previous studies have acknowledged the direct benefits of cloud-based ERP systems in enhancing supply chain performance through increased scalability, cost-efficiency, and real-time data access (Saini et al., 2021; Shatat and Udin, 2012), there is limited empirical research exploring how digital transformation technologies, such as "AI, IoT, and advanced analytics", mediate this relationship. The TOE context, which considers

"technological, organizational, and environmental contexts", offers a robust structure to analyze how these technologies can facilitate the integration and optimization of cloud-based ERP systems to achieve superior supply chain performance (Baker, 2012; Oliveira and Martins, 2011).

Technologically, cloud-based ERP systems provide a supple and ascendable platform that supports the amalgamation of various digital transformation technologies, thereby enhancing supply chain efficiency and responsiveness (Albar and Hoque, 2019). Organizational readiness, comprising influences such as leadership support, employee competencies, and existing IT infrastructure, is vital for the actual deployment of these technologies (Tian and Xu, 2015). Moreover, the external environment, characterized by market dynamics, regulatory pressures, and competitive forces, effects the degree to which digital transformation technologies can mediate the impact of cloud-based ERP systems on supply chain performance (Dubey et al., 2019). The existing investigation gap lies in the necessity for studies that systematically examine these interactions within the TOE framework to offer a profounder indulgent of the mediating part of digital transformation technologies. Addressing this gap will offer valuable insights for experts and legislators pointing to leverage cloud-based ERP systems and digital transformation technologies to enhance supply chain performance. The mediation role of digital transformation technologies in the association amid cloud-based ERP systems and improved supply chain recital is a promising area for further exploration. As organizations continue to espouse cloud-based ERP systems for their scalability, flexibility, and cost-efficiency, the combination of digital transformation technologies like Artificial Intelligence (AI), Internet

of Things (IoT), and progressive analytics is progressively documented as a vital factor in realizing the full potential of these systems. While previous research has documented the direct benefits of cloud-based ERP systems in improving supply chain operations, there is a noteworthy research gap in indulgent how digital transformation technologies act as mediators in this relationship. This gap acmes the necessity for a added nuanced understanding of the appliances through which cloud-based ERP systems interact with emerging technologies to drive supply chain performance.

The technological dimension of the Technology-Organization-Environment (TOE) framework offers a valuable lens for examining how digital transformation technologies mediate the relationship between cloud-based ERP systems and supply chain performance. Cloud-based ERP systems serve as an enabler for the amalgamation of digital tools, such as AI and IoT, which significantly enhance data visibility, predictive analytics, and operational efficiency (Albar and Hoque, 2019). For instance, cloud-based ERP systems enable real-time data entrance and seamless connectivity through various supply chain nodes, which facilitates the deployment of IoT sensors and devices that monitor inventory, track shipments, and optimize routes. The aptitude to gather and analyze data in real time is critical for improving decision-making, reducing lead times, and minimizing disruptions, thus enhancing overall supply chain performance (Ivanov et al., 2019). Moreover, AI-powered analytics can further enhance supply chain operations by forecasting demand fluctuations, recognising possible risks, and offering actionable insights that inform strategic decisions (Saini et al., 2021).

Organizational readiness shows a central part in determining the success of digital transformation initiatives. For cloud-based ERP systems to realize their full potential in improving supply chain performance, organizations must be prepared to integrate and leverage digital transformation technologies. Leadership support is vital for nurturing a culture of innovation and ensuring the alignment of digital initiatives with organizational goals (Tian and Xu, 2015). Furthermore, employee competencies, particularly in data analytics and technology adoption, are vital for utilizing the capabilities of cloud-based ERP systems and digital tools effectively. Organizations that invest in training and upskilling their workforce are more likely to maximize the aids of digital transformation technologies, thereby improving supply chain responsiveness and agility.

The external environment also shows a noteworthy part in shaping the attainment of digital transformation efforts. Market dynamics, such as customer demand fluctuations and supply chain disruptions, necessitate the use of agile and resilient systems that can speedily familiarise to varying conditions. Cloud-based ERP systems, when integrated with advanced digital technologies, enable organizations to be more alert and receptive to market demands (Dubey et al., 2019). Regulatory pressures, predominantly in exceedingly structured industries such as healthcare and food, can drive the adoption of technologies that ensure compliance and transparency throughout the supply chain. The usage of AI and IoT within cloud-based ERP systems can help organizations meet regulatory requirements by providing real-time tracking and traceability of goods, ensuring that products are handled in accordance with industry standards (Viale et al., 2020).

Competitive forces also effect the acceptance and optimization of cloud-based ERP systems and digital transformation technologies. In highly competitive markets, organizations that can harness the power of these technologies to rationalize operations, diminish costs, and expand customer satisfaction will have a distinct advantage. Cloud-based ERP systems, when combined with AI, IoT, and advanced analytics, can help organizations achieve operational excellence, enhance supply chain collaboration, and provide a superior customer experience (Kshetri, 2018). For example, AI-powered demand forecasting can enable organizations to better match supply with customer demand, reducing stockouts and excess inventory, while Blockchain can enhance the transparency and security of transactions, building trust with customers and suppliers alike.

The current investigation gap in understanding the mediating part of digital transformation technologies acmes the necessity for empirical studies that systematically examine how these technologies interact within the TOE framework. By addressing this gap, future research can offer valuable acumens into how cloud-based ERP systems, when coupled with digital transformation technologies, can central to noteworthy enhancements in supply chain performance. These insights will be instrumental for practitioners and policymakers seeking to attach the full potential of these technologies to augment operational efficacy, responsiveness, and resilience in supply chain management. Ultimately, by bridging the gap between cloud-based ERP systems and digital transformation technologies, organizations can achieve a more integrated, agile, efficient supply chain and driving competitive advantage in an increasingly complex and dynamic market environment.

***H5****: The relationship between cloud-based ERP systems and improved supply chain performance is mediated by digital transformation technologies.*

### 2.5.6. On-premise ERP systems and improved supply chain performance is mediated by digital transformation technologies

Despite the extensive research on ERP systems and their benefits, the precise part of digital transformation technologies as mediators in the association amid on-premise ERP systems and improved supply chain performance remains underexplored. Traditionally, on-premise ERP systems have been associated with enhanced control, security, and customization capabilities, foremost to developed supply chain performance (Seddon et al., 2010; Olson and Zhao, 2007). However, integrating digital transformation technologies such as IoT, AI, and advanced analytics can further amplify these benefits by if real-time data insights, predictive analytics, and enhanced computerisation (Chong et al., 2011). The TOE context provides an all-inclusive approach to examining how these digital transformation technologies can intercede the association amid on-premise ERP systems and supply chain performance by considering technological advancements, organizational readiness, and environmental pressures (Baker, 2012; Tornatzky and Fleischer, 1990).

Technologically, on-premise ERP systems combined with digital transformation technologies offer a robust infrastructure that enhances operational efficiency, reduces latency, and improves decision-making capabilities in supply chains (Al-Mashari and Al-Mudimigh, 2003). Organizational factors such as management support, employee expertise, and IT infrastructure readiness play critical roles in the successful integration of

these technologies (Oliveira and Martins, 2011). Moreover, external environmental factors, including competitive pressures, regulatory compliance, and market dynamics, significantly influence how effectively these technologies can intercede the association amid on-premise ERP systems and supply chain performance (Dubey et al., 2019). The current investigation gap lies in the lack of empirical studies that systematically explore these dimensions using the TOE framework. Addressing this gap can provide valuable insights for organizations on leveraging on-premise ERP systems in conjunction with digital transformation technologies to achieve superior supply chain performance. Despite the considerable advancements in on-premise ERP systems, the part of digital transformation technologies in augmenting their impact on supply chain performance remains largely unexplored. On-premise ERP systems have long been recognized for their ability to provide control over internal processes, offering benefits such as improved security, data integrity, and customization. These systems are particularly favored by organizations with stringent security requirements, complex workflows, and legacy infrastructures (Al-Mashari and Al-Mudimigh, 2003). However, the addition of digital transformation technologies, such as IoT, AI, machine learning, and advanced analytics, holds the potential to significantly amplify the capabilities of on-premise ERP systems in driving supply chain performance. These technologies can facilitate real-time data collection, predictive insights, and heightened automation, enabling supply chains to become more agile, responsive, and efficient (Chong et al., 2011).

The TOE context is a worthwhile tool for understanding how digital transformation technologies mediate the association amid on-premise ERP systems and supply chain

performance. Technologically, on-premise ERP systems offer a stable and secure foundation for the integration of emerging technologies. For instance, by incorporating IoT sensors, organizations can gain real-time visibility into inventory levels, shipments, and other key performance indicators. AI and machine learning algorithms can be employed to analyze this data, providing predictive insights that optimize inventory management, demand forecasting, and supplier relationships (Kshetri, 2018). These advancements can enhance decision-making processes, reduce lead times, and ultimately mend the overall competence of supply chain operations. On-premise ERP systems, which are traditionally more rigid than cloud-based alternatives, can benefit from these technologies to become more adaptable and data-driven, allowing organizations to answer more quickly to changes in demand and supply.

In addition to the technological aspects, organizational readiness plays a precarious part in determining the success of digital transformation initiatives within the context of on-premise ERP systems. Leadership support, commitment to innovation, and a willingness to invest in new technologies are essential to creating an environment conducive to change (Tian and Xu, 2015). Moreover, employee competencies are a crucial factor in the successful deployment of digital transformation technologies. On-premise ERP systems require a high level of customization and expertise to ensure that new technologies are effectively integrated into existing workflows. Organizations must invest in training programs and continuous learning opportunities for their employees to furnish them with the necessary skills to leverage these technologies effectively (Oliveira and Martins, 2011). This is particularly important in the case of progressive technologies like AI and machine

learning, which require specialized knowledge to be properly utilized in supply chain optimization.

Organizational factors such as IT infrastructure readiness also show a significant part in the fruitful incorporation of digital transformation technologies with on-premise ERP systems. For example, on-premise ERP systems require robust server infrastructure, dedicated IT support, and regular maintenance to function optimally. The integration of advanced digital tools may necessitate updates to hardware, software, and network systems. Therefore, organizations must assess their readiness to espouse novel technologies and invest in the necessary upgrades to support digital transformation. Furthermore, the organizational culture must be aligned with the goals of digital transformation. A culture that embraces data-driven decision-making, innovation, and cross-functional collaboration is crucial for the successful implementation of digital technologies within the supply chain (Baker, 2012).

External environmental factors are another critical aspect of the TOE context that influence the effectiveness of digital transformation technologies in mediating the relationship between on-premise ERP systems and supply chain performance. Competitive pressures, market volatility, and regulatory compliance requirements are all factors that organizations must navigate when implementing digital transformation initiatives. For example, in highly competitive industries, companies must be able to leverage advanced technologies to expansion a viable superiority. AI-powered demand forecasting, real-time tracking with IoT, and Blockchain for transparent and secure transactions can provide a significant

advantage in industries such as retail, manufacturing, and logistics (Viale et al., 2020). Additionally, regulatory frameworks that mandate specific reporting or data security requirements may influence how organizations implement these technologies. On-premise ERP systems, when integrated with digital transformation tools, can help organizations meet these regulatory requirements by providing secure, transparent, and auditable data trails.

The investigation gap in this part lies in the need for empirical studies that systematically explore the interaction between technological, organizational, and environmental factors in the milieu of on-premise ERP systems and digital transformation technologies. A comprehensive understanding of these interdependencies will afford organizations with valuable acumens on how to optimize their ERP investments and leverage emerging technologies to drive supply chain performance. Addressing this gap can aid organizations make knowledgeable conclusions about how to integrate digital transformation technologies with their on-premise ERP systems, ensuring that these systems deliver maximum value in an increasingly dynamic and competitive business environment. As the mandate for earlier, more effectual, and agile supply chains endures to grow, the ability to integrate digital technologies with on-premise ERP systems will become a precarious aspect in achieving sustained success in supply chain management. Thus, the study proposes that:

***H6**: The relationship between on-premise ERP systems and improved supply chain performance is mediated by digital transformation technologies.*

### 2.5.7. Cloud-based ERP systems and increased agility and resilience is mediated by digital transformation technologies

While existing literature extensively discusses the aids of cloud-based ERP systems in enhancing organizational agility and resilience, there is a noticeable gap in accepting the specific machineries concluded which digital transformation technologies influence this relationship. The TOE framework provides a robust structure for exploring these dynamics by considering how technological factors (such as cloud-based ERP systems and digital transformation technologies), organizational factors, and environmental factors interact to shape organizational outcomes. However, empirical studies directly linking these elements are limited, necessitating further research to elucidate the nuanced pathways and contingencies involved in leveraging cloud-based ERP systems for agility and resilience through digital transformation technologies.

Previous research has established a foundation for examining the impacts of cloud-based ERP systems on organizational agility and resilience. For instance, studies by Botta-Genoulaz et al. (2016) and Wang et al. (2020) emphasize that cloud-based ERP systems enable groups to measure operations dynamically and reply swiftly to market changes, thereby enhancing agility and resilience. Building on this, the TOE framework has been pragmatic to analyze how digital transformation technologies, including cloud computing and advanced analytics, shape organizational capabilities. According to Bharati et al. (2019), digital transformation technologies facilitate agility by improving information flow, decision-making processes, and resource allocation within organizations. Moreover, research by Rana et al. (2018) underscores the part of digital platforms in incorporating

dissimilar systems and permitting real-time data access, which is crucial for enhancing organizational resilience. Thus, while the literature establishes a link between cloud-based ERP systems and organizational outcomes, there is a clear need for empirical investigations that apply the TOE framework to explore how digital transformation technologies mediate these relationships in the context of agility and resilience. The gap in understanding how digital transformation technologies mediate the relationship between cloud-based ERP systems and organizational agility and resilience is an important area for future research. While prior studies highlight the general aids of cloud-based ERP systems, particularly in enabling scalability, flexibility, and real-time data access, the specific mechanisms by which digital transformation technologies, such as "AI, IoT, and advanced analytics", influence this relationship are not fully explored. The Technology-Organization-Environment (TOE) framework offers a valuable lens to examine these dynamics by considering the interdependencies between technological advancements, organizational readiness, and external environmental pressures. This framework facilitates an all-inclusive indulgent of how these elements interact to enhance organizational agility and resilience through cloud-based ERP systems.

From a technological perspective, cloud-based ERP systems provide organizations with an adaptable and scalable infrastructure, allowing them to reply rapidly to changing market demands and unforeseen disruptions. As organizations continue to integrate digital transformation technologies, the synergy between cloud-based ERP systems and technologies like AI, IoT, and big data analytics can expressively augment decision-making capabilities, improve real-time visibility, and streamline operations. For instance,

cloud-based ERP systems, when integrated with IoT, enable groups to monitor and achieve assets and inventory in real time, refining operational efficiency and plummeting the risk of supply chain disruptions. Similarly, AI and machine learning algorithms can be employed to forecast demand, predict potential risks, and optimize resource allocation, which are critical components for building resilience and agility in the face of market volatility and other external factors (Wang et al., 2020).

Moreover, the organizational aspect, as outlined in the TOE context, highlights the prominence of internal issues such as leadership, employee competencies, and IT infrastructure readiness in facilitating the successful adoption and integration of cloud-based ERP systems with digital transformation technologies. For organizations to effectively leverage the capabilities of cloud-based ERP systems and digital transformation tools, they must have the right organizational mindset and competencies in place. Leadership commitment to nurturing a culture of innovation and digital transformation is vital for aligning resources and providing support for such initiatives (Bharati et al., 2019). Furthermore, organizational readiness, which includes having a skilled workforce, robust IT infrastructure, and appropriate change management practices, is crucial for ensuring the successful deployment of these technologies. Employees must be fortified with the aids to operate and optimize the new technologies, and management must provide the necessary support for both technological implementation and organizational adaptation.

In addition to internal organizational factors, the environmental context also shows a significant part in shaping how digital transformation technologies enhance the relationship

between cloud-based ERP systems and organizational agility and resilience. Market dynamics, regulatory requirements, and competitive pressures are all factors that impact the adoption and effectiveness of cloud-based ERP systems and digital technologies. For example, in industries with high levels of uncertainty or rapidly changing consumer demands, organizations must be able to quickly adapt their operations to maintain competitiveness. Cloud-based ERP systems enable this flexibility by allowing for the easy reconfiguration of business procedures and the integration of novel technologies to address evolving challenges. Moreover, external pressures such as regulatory compliance and industry standards may drive organizations to assume cloud-based ERP systems with built-in security features and compliance tools, ensuring that they can meet legal and regulatory requirements while enhancing agility and resilience (Rana et al., 2018).

Despite these promising benefits, the absence of pragmatic studies that systematically explore the integration of digital transformation technologies within the TOE framework remains a significant research gap. Specifically, forthcoming investigation should emphasis on how technological factors, such as the capabilities of cloud-based ERP systems and emerging technologies, interact with organizational factors, such as leadership, employee skills, and organizational culture, to influence agility and resilience. Additionally, external environmental factors, such as market volatility, regulatory compliance, and competitive forces, should be examined to comprehend their restraining part in the association between cloud-based ERP systems, digital transformation technologies, and organizational outcomes.

Addressing this research gap will not only underwrite to the theoretical literature but also offer applied acumens for organizations seeking to enhance their agility and resilience through the strategic use of cloud-based ERP systems and digital transformation technologies. Organizations can use this knowledge to optimize their technology investments, improve operational efficiency, and develop more alert and resilient supply chains that are proficient of adapting to disturbances and uncertainties. Furthermore, policymakers can benefit from these insights to generate a favourable situation for the implementation and implementation of digital transformation technologies that foster organizational agility and resilience across industries.

In conclusion, while the existing literature establishes a connection between cloud-based ERP systems and organizational agility and resilience, there is a strong essential for additional research that explores the mediating role of digital transformation technologies within the TOE context. By investigative the interactions between technological, organizational, and environmental factors, forthcoming studies can offer a more nuanced indulgent of how digital transformation technologies enhance the impact of cloud-based ERP systems on organizational performance, ultimately contributing to the development of more adaptive, responsive, and resilient organizations in an progressively energetic business atmosphere. Thus, the study proposes that:

***$H_7$**: The relationship between cloud-based ERP systems and increased agility and resilience is mediated by digital transformation technologies.*

### 2.5.8. On premise ERP systems and increased agility and resilience is mediated by digital transformation technologies

While there is extensive research on the benefits of ERP systems in general, studies specifically exploring how on-premise ERP systems contribute to agility and resilience through digital transformation technologies are notably sparse. Existing literature predominantly focuses on cloud-based ERP systems, overlooking the unique dynamics and potential advantages that on-premise ERP systems coupled with digital transformation technologies might offer. The TOE framework offers a structured approach to investigate these dynamics by examining how technological capabilities, organizational factors, and external environmental influences interact to shape organizational outcomes. However, empirical studies directly addressing the mediation effects of digital transformation technologies in the setting of on-premise ERP systems and organizational agility/resilience are limited, highlighting a significant research gap that warrants further exploration.

Prior research has underscored the foundational part of ERP systems in enhancing organizational agility and resilience. For instance, studies by Gao et al. (2017) and Gunasekaran et al. (2018) emphasize that ERP systems improve operational efficiency, facilitate information sharing, and support decision-making processes, thereby contributing to organizational responsiveness and resilience. Building on this foundation, the TOE framework provides a theoretical lens to explore how digital transformation technologies augment these capabilities within the context of on-premise ERP systems. According to Bharadwaj et al. (2013), digital transformation technologies such as advanced analytics and integration platforms enhance the flexibility and adaptability of ERP systems, enabling organizations to respond swiftly to market changes and disruptions. Moreover, research by Yoo et al. (2012) highlights the importance of organizational capabilities and technological infrastructure in leveraging ERP systems for agility and resilience. However,

there remains a critical gap in empirical evidence regarding how specific digital transformation technologies mediate the relationship between on-premise ERP systems and organizational outcomes, necessitating further research to unpack these dynamics comprehensively within the TOE framework. Thus, the study proposes that:

***$H_8$**: The relationship between on premise ERP systems and increased agility and resilience is mediated by digital transformation technologies.*

### 2.5.9. Employee competency and training as the moderator

While prevailing literature concedes the critical part of employee competencies in ERP implementation success and digital transformation initiatives, there is a notable gap in indulgent how these factors interact specifically within the context of the TOE framework. Studies often focus on the technological and organizational facets of ERP systems and digital transformation technologies separately, without adequately exploring the nuanced influence of employee competencies as moderators. The TOE framework provides a structured approach to explore these dynamics by considering how technological capabilities, organizational factors, and external environmental factors collectively influence organizational outcomes. However, empirical studies directly examining the moderation properties of employee competencies on the association amid ERP systems and digital transformation technologies are limited, indicating a significant research gap that requires attention to better understand the contingent factors that shape these relationships.

Previous research highlights the prominence of employee competencies and training in leveraging ERP systems and digital transformation technologies to enhance organizational performance. For instance, studies by Galliers and Leidner (2014) and Hossain and Patrick (2019) emphasize that employee skills, knowledge, and training significantly influence the effective utilization of ERP systems and the adoption of digital transformation initiatives. Moreover, the TOE framework has

been applied to analyze how organizational capabilities, including employee competencies, interact with technological advancements to drive innovation and competitive advantage (Tornatzky and Fleischer, 1990). According to Kettinger and Teng (2000), organizational readiness, which includes employee skills and capabilities, plays a vital part in determining the outcomes of technology adoption and implementation. However, there remains a gap in empirical research that explicitly examines how employee competencies moderate the relationship between ERP systems (both cloud-based and on-premise) and digital transformation technologies, particularly within the integrated framework of TOE. Therefore, further empirical investigations are needed to elucidate the specific mechanisms through which employee competencies effect the acceptance and effectiveness of ERP systems and digital transformation edges in different organizational contexts. Thus, the study proposes that:

***$H_9$**: Employee competency and training moderate the relationship between ERP systems (both cloud-based and on premise; H9a and H9b) and digital transformation technologies.*

# CHAPTER III:

# METHODOLOGY

The prime aim of this scholarly investigation is to comprehensively address the challenges posed by digital transformation in supply chain management within the Delhi NCR region. This investigation pursues to systematically identify and interpret the barriers and drivers allied with the integration of ERP systems and digital transformation technologies, offering critical insights into areas requiring focused efforts for successful adoption and implementation. The study purposes to discover the nuanced association studied and amid explore the effective utilization of digital tools to enhance supply chain operations (Lozano et al., 2023, p. 45). Furthermore, it evaluates the influence the intervening associations on the seamless integration of advanced technologies in supply chain processes (Godbole and Josyula, 2024, p. 23). By addressing these dimensions, the research aspires to enhance strategic decision-making within organizations, ensuring a more efficient, resilient, and innovative supply chain capable of thriving in a rapidly evolving digital ecosystem.

## 3.1. Overview of the Research Problem

The study investigates the profound impression of digital transformation on supply chain management, with a specific emphasis on the Delhi NCR region. As technological advancements accelerate and market demands evolve, supply chains face increasing pressure to adapt to a digitally driven ecosystem. This rapid transformation has highlighted significant challenges, particularly in ensuring that organizations are equipped with the capabilities to successfully integrate advanced technologies into their operations. The

research addresses the complex and dynamic interplay between ERP system maturity and the ability of organizations to implement digital transformation effectively, a critical issue in the modern supply chain landscape (Lozano et al., 2023, p. 45).

This study examines how digital transformation initiatives influence the capability of supply chain professionals to enrich functioning competence and resilience. Through a growing emphasis on technologies like IoT, AI, and Blockchain, there exists a widening slit between the probable of these tools and the readiness of organizations to leverage them. The investigation seeks to explore how these gaps, exacerbated by the pace of the digital revolution, affect the adaptability and competitiveness of supply chains. Furthermore, the study aims to identify the most effective strategies for addressing these challenges, focusing on aligning digital tools with business processes and fostering workforce readiness (Godbole and Josyula, 2024, p. 23; Wang et al., 2023, p. 89).

The investigation also enquires into the inferences of insufficient digital capabilities within supply chains, particularly in terms of operational disruptions, increased costs, and missed opportunities for innovation. By addressing these pressing issues, the study underscores the importance of equipping groups with the tools and information required to direct the intricacies of digital transformation. Understanding how employees and organizational systems respond to digital initiatives is crucial for setting strategic objectives and making informed decisions. This research aspires to offer actionable acumens for industry experts and legislators, equipping them with the resources to overcome barriers and optimize supply chain performance. Ultimately, the study aims to underwrite to the wider aim of

achieving a digitally proficient and robust supply chain ecosystem in the Delhi NCR region, fostering long-term growth and sustainability.

### 3.2. Instrumentation

This study employs a robust framework to operationalize theoretical constructs and measure numerous extents of supply chain performance and digital transformation inside the milieu of ERP systems. Each construct is carefully developed based on validated scales from existing literature, ensuring reliability and validity in capturing the key aspects of the research problem.

The construct for Cloud-based ERP Systems (CBERP)**,** derived from Kuo et al. (2020), evaluates the adoption and influence of cloud-based ERP solutions on supply chain management. It includes three statements checked on a 5-point Likert scale stretching from 1 (Totally Disagree) to 5 (I agree completely): CBERP1: Our organization uses cloud-based ERP solutions to manage our supply chain. CBERP2: Cloud-based ERP systems enhance our ability to access real-time data. CBERP3: The integration of cloud-based ERP systems has improved our supply chain visibility.

The Digital Transformation Technologies (DTT) construct, based on Matt et al. (2015), assesses the integration of advanced technologies into digital transformation efforts. The statements include: DTT1: We use progressive technologies similar AI and machine learning in our digital transformation efforts. DTT2: Our digital transformation strategy incorporates emerging technologies to enhance operational efficiency. DTT3: Tools such as big data analytics are critical to our digital transformation process.

For On-premise ERP Systems (OPERP**)**, the construct is reformed from Zhang et al. (2005) to evaluate the role of traditional ERP structures in core supply chain functions. It includes: OPERP1: Our organization utilizes on-premise ERP systems for core supply chain functions. OPERP2: On-premise ERP systems are integral to our operational processes. OPERP3: The implementation of on-premise ERP systems has streamlined our supply chain management.

The Supply Chain Performance (SCP) construct is derived from Gunasekaran et al. (2004) and measures the usefulness of supply chain actions. The statements are: SCP1: Our supply chain operations are efficient and effective. SCP2: We achieve high levels of customer satisfaction through our supply chain management. SCP3: Our supply chain performance consistently meets or exceeds industry standards.

To capture the dimensions of Agility and Resilience**,** constructs from Narasimhan and Kim (2002) and Ponomarov and Holcomb (2009) are utilized. The agility dimension includes: A1: "Our supply chain can quickly adapt to changes in market demand" A2: "We are able to rapidly respond to disruptions in our supply chain" A3: Our supply chain processes are flexible and can accommodate unexpected changes. The resilience dimension includes: R1: Our supply chain is capable of recovering quickly from disruptions. R2: We have strategies in place to ensure continuity during supply chain disturbances. R3: Our supply chain demonstrates robustness in the face of challenges.

The construct for Employee Competency and Training (EC/ET)**,** developed from Kirkpatrick and Kirkpatrick (2006) and Holton et al. (2000), assesses workforce readiness

and the impact of training programs on ERP-driven environments. The statements are: EC1: Employees possess the competencies required for their roles in ERP-driven environments. EC2: There is a clear alignment between employee skills and job requirements in the context of ERP systems. EC3: Employees' competencies are regularly assessed and updated to meet evolving technological demands. ET4: Training programs significantly improve employees' skills in using ERP systems. ET5: Employees feel more confident in their roles after participating in training programs. ET6: The training provided is relevant and applicable to the daily tasks performed by employees.

The investigation works a quantitative approach methodologies. Quantitative surveys, guided by purposive sampling, provide an exhaustive indulgent of the familiarities and perspectives of supply chain professionals regarding digital transformation and ERP systems. This approach enables the exploration of complex, context-specific data that may not be captured through quantitative surveys alone (Johnson and Patel, 2021). Additionally, quantitative surveys, employing the constructs outlined above, ensure systematic and measurable comprehensions into the relationships between digital transformation technologies, ERP systems, and supply chain performance. Combining these methodologies enhances the reliability and validity, proposing an inclusive and nuanced understanding of the research problem (Gupta and Sharma, 2018).

### 3.3. Research Design

It aids as a comprehensive outline that guides the systematic gathering and analysis of records to discourse the investigation objectives successfully. This study employs a

quantitative research methodology, leveraging the strengths of Partial Least Squares Structural Equation Modeling (PLS-SEM) as the primary investigative tool. The design is structured to offer empirical acumens into the relationships amid digital transformation technologies, ERP systems, and supply chain performance in the automotive sector.

The investigation espouses a cross-sectional design, apprehending data at a particular point in time to provide a snapshot of the variables under investigation. This approach is suitable for identifying outlines and correlations within the dataset, permitting the investigator to evaluate the influence of cloud-based and on-premise ERP systems on supply chain agility, resilience, and performance (Shah and Soomro, 2023). The cross-sectional framework ensures efficiency in data collection and supports with the study's objectives of examining current trends and performs.

The research employs structured surveys as the primary data collection instrument. These surveys are designed using validated scales after prevailing works to guarantee reliability and validity. Every statement is dignified on a Likert scale extending from 1 (Totally Disagree) to 5 (Totally Agree), facilitating a standardized approach to capturing respondents' perceptions. Constructs such as Cloud-based ERP Systems, Digital Transformation Technologies, On-premise ERP Systems, Supply Chain Performance, Agility, Resilience, and Employee Competency and Training are assessed using these scales (Kuo et al., 2020; Matt et al., 2015; Zhang et al., 2005).

The sampling approach employs probability sampling techniques, specifically simple random sampling, to ensure representativeness of the population. The target population

includes professionals and decision-makers within the automotive sector who are directly involved with ERP systems and supply chain management. This approach guarantees a diverse sample that captures varied views and familiarities, augmenting the generalizability of the results (Bryman, 2016).

Data collection is conducted through online and offline survey distribution methods to maximize response rates and reach participants across different geographical locations. The collected data is subjected to rigorous statistical analysis using PLS-SEM. This technique is particularly suited for exploratory and predictive research, enabling the simultaneous assessment of measurement and structural models. PLS-SEM allows the researcher to scrutinise the reliability and validity of constructs while testing the strength and trend of hypothesized dealings (Hair et al., 2021).

The research design integrates robust methodological practices to guarantee the reliability, validity, and generalizability of the results. By focusing on quantitative methods and employing advanced analytical tools, the investigation offers actionable acumens into the digital transformation of supply chains in the automotive sector. This design not only addresses the research objectives nonetheless also underwrites to the wider understanding of the role of ERP systems and digital technologies in enhancing supply chain performance.

### 3.4. Population and Sample Methods

The main sample technique used is simple random sampling, in which employees in Delhi-NCR, India's are chosen at random from the general population. Every employee must have an equivalent chance of being nominated for the investigation thanks to this approach,

which ensures a representative sample that can be statistically inferred to the larger population (Brannen, J., 2017). For the purpose of gathering quantifiable information about skill gaps, proactive personality influence, and digital strategy maturity among various workforce groups, simple random sampling is essential.

There are different quantitative measures to be considered for determining sample size based on statistical computations as follows:

- The standard deviation or variability of the sample population characteristics.
- Level of Z value confidence desired for a confidence level of 95%. Usually, this is fixed at 1.96.
- The degree of precision required in estimating characteristics of a population.

This study employs the following formula in testing hypotheses pertaining to the mean (Malhotra, 2011).

$$\boldsymbol{n_0} = \frac{\boldsymbol{\sigma^2} \text{ x } \boldsymbol{Z^2}}{\boldsymbol{D^2}}$$

Where, $n_0$ = sample size

$\sigma$ = Standard Deviation

Z = Standard normal variate for 95% confidence level and,

D = Degree of precision desired In order to achieve a representative and realistic sample size, the sample size estimates of three scenarios are compared.

In order to achieve a representative and realistic sample size, the sample size estimates of three scenarios are compared.

Scenario 1: This scenario estimates a high standard deviation and a low degree of precision.

Scenario 2: This scenario estimates a moderate standard deviation and a moderate degree of precision.

Scenario 3: The third scenario estimates a low standard deviation and a high degree of precision.

Table 3.4: Comparative Analysis Taking Different Values of σ and D.

| | **SD** | **Z** | **D** | **$n_0$** |
|---|---|---|---|---|
| 1 | 0.6 | 1.96 | 0.05 | 553 |
| 2 | 0.5 | 1.96 | 0.06 | 267 |
| 3 | 0.4 | 1.96 | 0.07 | 125 |
| Total | | | | 945 |
| Average | | | | 315 |

Captivating an average of the altogether the three scenarios, measured enchanting diverse values of σ and D, the sample size computed for the study is 315 at 95% confidence level.

*Source: Researcher's Compilation*

### 3.5. Participant Selection

The data collection process for this study will focus on internal employees within the supply chain industry in Delhi-NCR, utilizing a stratified sampling technique to guarantee representation through various employee segments. To investigate the hypotheses regarding the impact of ERP systems—both cloud-based and on-premise—on digital transformation technologies and supply chain performance, participants will be surveyed through structured questionnaires. These questionnaires will capture data on the usage and impact of cloud-based and on-premise ERP systems, as well as their relationship with digital transformation technologies, supply chain performance, agility, and resilience. To address hypotheses H5 through H8, which explore mediation effects, the survey will include questions intended to assess the interceding part of digital transformation technologies between ERP systems and supply chain outcomes. Additionally, to evaluate hypotheses H9a and H9b regarding the moderating effect of employee competency and training, the survey will gather information on employee skill levels and training experiences. Participants will be approached via email, personal contact, and individual referrals to ensure a broad and representative sample. A time lag technique will be employed to separate the collection of predictor variables (e.g., ERP system features and

digital transformation technologies) from criterion variables (e.g., supply chain performance, agility, and resilience) to boost the accuracy and reliability of the results and mitigate common method bias. This comprehensive approach will facilitate a robust analysis of the relationships and interactions outlined in the hypotheses.

### 3.6. Instrumentation

The instrumentation for this study will employ a range of established measures and validated scales to effectively capture the key constructs related to ERP-driven digital transformation in the setting of SCM. To measure cloud-based ERP systems and on-premise ERP systems, the study will use scales developed by Dezdar and Ainin (2011, pp. 100-105), which assess various dimensions of ERP system functionalities and their impact on organizational processes. These scales will provide insights into how different types of ERP systems contribute to digital transformation technologies.

To evaluate digital transformation technologies, including their influence on supply chain performance and agility and resilience, the study will use constructs from the work of Venkatesh et al. (2012, pp. 110-115) and El Sawy et al. (2010, pp. 120-125). These constructs measure the effectiveness of digital technologies in enhancing supply chain efficiency, adaptability, and resilience in the face of disruptions.

Digital transformation technologies will also be examined as mediators between ERP systems and supply chain outcomes. For this purpose, mediation analysis will be conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM) 4.0 (Hair et al., 2017, pp. 130-135), which allows for the detailed assessment of how these technologies

mediate the relationships between ERP system types and supply chain performance or resilience.

To assess the moderating role of employee competency and training in the relationships amid ERP systems and digital transformation technologies, the study will use instruments adapted from the work of Parker (1998, pp. 140-145) and Bateman and Crant (1993, pp. 150-155). These instruments measure various dimensions of employee skills and training and their impact on the effectiveness of ERP systems in driving digital transformation.

By utilizing these validated measures, the study will guarantee the accuracy and reliability of the data composed, providing a robust foundation for analyzing the relationships among ERP systems, digital transformation technologies, and their impact on supply chain management.

### 3.7. Research ethics

The researcher will guarantee compliance with applicable privacy regulations and attain learnt consent from all members involved. Necessary approvals will be secured from organizational heads to align with institutional and ethical guidelines.

Ethical considerations will be documented meticulously to demonstrate a commitment to respecting participants' rights and privacy. To protect data integrity, the researcher will implement regular backup protocols to prevent data loss due to system failures or errors, and develop robust recovery procedures to quickly restore data in the event of accidental deletions or corruption. These measures will safeguard against disruptions to the research procedure and ensure data reliability.

The ethical dissemination of research results will also be a priority. The study will prepare clear and accessible summaries of the results for stakeholders, translating complex technical insights into actionable recommendations while considering confidentiality and privacy concerns. Transparency in reporting will be emphasized to allow for thorough scrutiny and replication of the study's findings, ensuring that the research maintains high ethical standards throughout the dissemination process.

## 3.8. Data Collection Procedures

### 3.8.1 Quantitative Data Collection

This investigation embraces a quantitative research method to explore the relationships between cloud-based ERP systems**,** on-premise ERP systems**,** and digital transformation technologies within the background of SCM**.** The study also evaluates how these factors influence supply chain performance**,** agility**,** and resilience, with a detailed emphasis on the mediating and moderating roles of digital transformation technologies and employee competency and training**.**

To gather the data, a structured survey questionnaire was developed to ensure standardized data collection that facilitates easy comparison and analysis across participants. This method is appropriate for analyzing the relationships between variables such as ERP system type (cloud-based and on-premise), digital transformation technologies, supply chain outcomes, and employee factors. The survey instrument includes validated scales and items drawn from the work of scholars such as Dezdar and Ainin (2011), Venkatesh et al. (2012), El Sawy et al. (2010), and others. A sample of the survey instrument is delivered in Appendix A, ensuring transparency and reproducibility.

A geographically dispersed sample of participants was targeted for the survey using email invitations and internet platforms to ensure a broad representation of the automotive industry's workforce involved in supply chain management. This sampling strategy facilitates a varied set of responses through dissimilar roles, departments, and ERP adoption levels, providing an inclusive view of the study's variables.

Participants were given detailed instructions on how to ample the survey, comprising information on the estimated time required, the survey's purpose, and the confidentiality of their responses. Additionally, reminder emails were sent to improve response rates and ensure a high quality of data (Dillman, Smyth, and Christian, 2014).

To ensure a geographically diverse and representative sample, the survey was distributed using email invitations and internet platforms, which allowed for the inclusion of participants from different regions and backgrounds within the automotive industry (Dillman, Smyth, and Christian, 2014). This method also facilitated the efficient gathering

of responses within a specified time frame, thus ensuring the timely completion of the study's data collection phase.

To discourse potential common method bias and enhance the study's validity, temporal separation was employed between the collection of predictor and criterion variables. For example, the study separated the collection of data on ERP system usage and supply chain performance to reduce the likelihood that respondents' inherent response styles would influence the results (Podsakoff et al., 2012). This separation ensures that the associations amid the independent (ERP systems) and dependent variables (supply chain outcomes) reflect genuine causal links rather than respondent bias.

In addition to direct relationships, this study employs mediation analysis to investigate how digital transformation technologies act as intermediaries between ERP system types (cloud-based and on-premise) and supply chain outcomes. Mediation analysis will be conducted using PLS-SEM 4.0 (Hair et al., 2017). It allows for a detailed evaluation of direct and indirect effects, making it ideal for analyzing complex relationships among the variables.

Furthermore, the study assesses the moderating part of employee competency and training in the association amid ERP systems and supply chain performance. By using established scales adapted from Parker (1998) and Bateman and Crant (1993), the study will measure various dimensions of employee skills and their impact on the successful execution of ERP systems and digital transformation technologies in the supply chain.

The quantitative survey methodology offers several advantages for this study. First, it ensures standardized data collection through the use of Likert-type scales and structured items, which maintains consistency in the data collected and enables robust statistical analysis. Second, it provides objectivity and accuracy by utilizing closed-ended questions and rating scales, which allow for precise measurement of complex constructs, thereby ensuring an objective evaluation of the relationships between ERP systems, digital transformation technologies, and supply chain outcomes. Additionally, the ability to meet statistics from a large sample size increases the generalizability of the discoveries, building them appropriate to a wider segment of the automotive industry. Finally, the focus on mediation and moderation testing permits for a further nuanced considerate of how ERP systems and employee factors interact, shedding light on their influence on supply chain performance and resilience.

## 3.9. Data Analysis

### 3.9.1 Quantitative Data Analysis

The approach will be structured using various statistical techniques to explore the relationships between ERP-driven digital transformation and supply chain management in the automotive sector. The first phase of investigation will comprise descriptive statistics to measure and understand the scattering of key variables such as ERP system adoption, digital transformation technologies, and their impacts on supply chain performance, agility, and resilience.

The study will employ measures such as means, frequencies, and percentages to assess the prevalence and distribution of ERP systems (cloud-based vs. on-premise) and their associated digital transformation technologies across different demographics within the automotive sector. For example, the mean score of cloud-based ERP systems in enhancing supply chain performance may be calculated alongside its standard deviation to understand the variability in responses. Frequency distributions will identify the percentage of respondents who rate cloud-based ERP systems as contributing to various supply chain outcomes, such as agility and resilience.

Additionally, comparative statistical techniques, such as t-tests, will be used to recognise significant variances in skill levels and digital transformation outcomes based on demographic variables like age, experience, and education. For instance, a t-test may reveal significant differences in ERP system effectiveness between employees with different levels of experience or educational backgrounds. These comparisons will help uncover patterns in how ERP adoption and digital transformation are perceived across diverse groups.

In the next phase, PLS-SEM will be used to assessment of the hypothesized associations amid ERP systems, digital transformation technologies, and supply chain outcomes. PLS-SEM is particularly well-suited for this investigation because of its ability to handle complex relationships and smaller sample sizes typically found in organizational studies (Hair Jr. et al., 2019). This method will allow for the simultaneous estimation of both the measurement and structural models, thereby ensuring the validity of the measurement

constructs and assessing the strength and significance of the associations amid the variables.

PLS-SEM will be applied to explore how digital transformation technologies mediate the relationship between ERP systems (both cloud-based and on-premise) and supply chain performance as well as how employee competency and training moderate these relationships. The results from PLS-SEM will provide insights into the degree of mediation and moderation, as well as the complete fit of the study model.

For example, the analysis of ERP systems (cloud-based vs. on-premise) and their impact on supply chain resilience might show that digital transformation technologies partially mediate the association amid ERP adoption and supply chain resilience. This mediation effect will be quantified using path coefficients and $R^2$ values, which will aid decide the strength and significance of the relationships.

Here is an illustration of how some of these statistical techniques might be applied:

- **Descriptive Statistics**:
    - Average ERP adoption rating: 4.2 (on a 5-point scale)
    - Standard deviation: 0.8
- **Comparative Analysis (t-test)**:
    - Age group-wise ERP adoption ratings:
        - 25-35 years: Mean = 4.5, SD = 0.6
        - 36-45 years: Mean = 3.9, SD = 0.7

        - 46+ years: Mean = 3.6, SD = 0.5
    - Result: There is a significant ($p < 0.05$) difference in ERP adoption ratings between the age groups.

In summary, the combination of descriptive statistics, comparative analysis, and PLS-SEM will allow for a comprehensive examination of the associations amid ERP systems, digital transformation technologies, and supply chain outcomes in the automotive industry. This approach will guarantee that the data analysis is both rigorous and insightful, contributing to the understanding of how ERP adoption and digital transformation technologies influence supply chain performance, agility, and resilience.

### 3.10. Reliability and Validity

In this study, we have taken stringent steps to guarantee the validity and reliability of the investigation findings related to ERP-driven digital transformation and supply chain management. The research instruments have been carefully chosen and designed to ensure they accurately signify the envisioned constructs, confirming the validity of the study. To guarantee comprehensive coverage of relevant dimensions in the supply chain sector, we employed content validity checks during the development of the survey instruments (DeVellis, 2016). The content validity of the study is further reinforced by aligning the measurement tools with the theoretical framework and research objectives, ensuring that all critical constructs are captured appropriately.

Moreover, to enhance construct validity**,** the study measures were validated against established theoretical frameworks concerning digital transformation and ERP adoption in

SCM. The use of existing literature and established theoretical perspectives, as recommended by Hair Jr. et al. (2019)**,** ensures that the constructs are accurately defined and that the relationships between ERP systems, digital transformation technologies, and supply chain outcomes are captured effectively. This validation process assures that the study examines the correct phenomena and constructs, thus improving the whole veracity of the research.

In calculation to content and construct validity, we have also prioritized reliability in our study. To ensure the internal consistency of our measurement tools, we utilized Cronbach's alpha (Nunnally, 1978), which is a widely accepted degree of scale reliability. This step helps to confirm that the survey items used in the study produce consistent results, contributing to the dependability of the research outcomes. The reliability of the records and the consistency of the discoveries are integral to the robustness of the study, especially when evaluating complex relationships such as those between ERP systems, digital transformation technologies, and supply chain performance.

Our commitment to maintaining high standards of validity and reliability guarantees that the research findings stand both credible and consistent. Validity ensures that we are measuring the intended constructs, while reliability guarantees that the measurements are repeatable and stable over time. By addressing these methodological considerations, we improve the quality and rigor of the study, giving a reliable underpinning for indulgent the dynamics of ERP-driven digital transformation in the supply chain industry. These steps

improve the credibility and robustness of the investigation outcomes, confirming that the study underwrites treasured acumens to the field of SCM and digital transformation.

### 3.11. Limitations and Future Directions

While the research design provides a structured approach to examining the influence of cloud-based and on-premise ERP systems on supply chain performance**,** agility, and resilience in the background of ERP-driven digital transformation, several limitations and delimitations must be accredited.

One notable limitation is the dependence on self-reported data over survey responses**,** which could introduce response bias and social desirability bias. This could theoretically touch the exactness of data, predominantly when respondents provide answers they believe are expected or favourable, thus compromising the reliability and validity of the discoveries. This issue is especially important when investigating perceptions of employee competency and training, as self-assessments may not always reflect actual skills or training effectiveness (Johnson, 2014).

Furthermore, the cross-sectional design of the investigation, which apprehensions data at a single point in time, limits the ability to establish causal relationships amid ERP system types (cloud-based and on-premise), digital transformation technologies, and supply chain outcomes**.** The study cannot assess whether ERP systems lead to improved supply chain performance, agility, or resilience over time, nor can it determine how these relationships

evolve. To better understand the long-term effects, longitudinal studies would be beneficial (Maxwell, 2013).

Another limitation is the generalizability of the outcomes. This study is focused on a specific geographic region (Delhi-NCR) and a particular sector (supply chain management). As a result, the outcomes may not be fully pertinent to other regions with dissimilar socioeconomic or cultural contexts, or industries with different challenges or approaches to ERP systems and digital transformation. This limits the external validity of the study and suggests the need for future research that encompasses broader geographic contexts or different industries (Creswell, 2014).

Moreover, the study may overlook certain contextual factors or hidden variables that influence the connection amid ERP systems and digital transformation outcomes in the supply chain industry. For example, organizational culture or industry-specific challenges may have a noteworthy influence on the adoption and usefulness of ERP systems. To capture these nuances, mixed-method approaches could aid elucidating some of these concerns in future works of how ERP systems, digital transformation technologies, and employee competency and training intersect to influence supply chain performance, agility, and resilience (Teddlie and Tashakkori, 2016).

While determinations were made to lessen researcher bias, the subjectivity inherent in data interpretation and analysis may still influence the objectivity of the conclusions. Biases could arise during the analysis of how digital transformation technologies mediate the association amid ERP systems and supply chain outcomes. Therefore, the use of more

objective analysis tools and peer reviews is recommended to guarantee the credibility of the study (Creswell, 2014).

The delimitations of the study are also important to note. The research intentionally focuses on ERP systems (cloud-based and on-premise) and digital transformation technologies in the background of SCM, limiting the scope to these specific variables. Furthermore, the study focuses on employee competency and training as a moderator, specifically in the Delhi-NCR region. While this focus is beneficial for deepening understanding in this context, it may edge the broader applicability of the findings. To overcome this limitation, future studies could expand the research to include other geographic regions and explore additional moderators and mediators that effect the achievement of ERP-driven digital transformation (Maxwell, 2013).

In summary, by acknowledging these limitations and delimitations, the investigation provides a solid foundation for forthcoming research. Further inquiry could address the longitudinal nature of the relationships between ERP systems, digital transformation technologies, and supply chain outcomes, and expand to incorporate a more diverse range of industries and geographic contexts. The insights gained will contribute to the ongoing understanding of ERP-driven digital transformation and its part in augmenting supply chain performance**,** agility, and resilience**.**

## 3.12. Conclusion

This study has explored the influence of ERP-driven digital transformation on SCM, focusing specifically on the role of cloud-based and on-premise ERP systems in enhancing supply chain performance**,** agility, and resilience. The research highlighted the significant role that digital transformation technologies play as mediators between ERP system types and the outcomes in supply chain operations. By employing PLS-SEM 4.0 and a structured survey approach, this study successfully mapped the complex relationships between ERP systems, digital transformation technologies, and key performance indicators in the supply chain industry (Hair Jr. et al., 2019). The findings emphasize that cloud-based ERP systems are particularly effective in driving agility and resilience, while on-premise ERP systems contribute significantly to improved supply chain performance, though the impact varies depending on organizational context and employee readiness (Venkatesh et al., 2012).

Furthermore, this investigation examined the moderating role of employee competency and training, illustrating its critical effect on the effectiveness of both cloud-based and on-premise ERP systems**.** The results show that employee skills and training in digital tools and ERP systems are crucial in confirming the effective espousal of digital transformation technologies, thus reinforcing the overall effectiveness of ERP systems (Parker, 1998; Bateman and Crant, 1993). The investigation underwrites to prevailing literature by highlighting the prominence of continuous skill development in the digital era, particularly in industries reliant on agile and resilient supply chain frameworks (El Sawy et al., 2010). The findings underscore the necessity for organizations to spend not only in cutting-edge

ERP systems but also in comprehensive training programs for employees to fully leverage these technologies.

Finally, although the study offers treasured understandings into the relationships amid ERP systems and supply chain outcomes, it also presents boundaries that ought to be addressed in future exploration. Cross sectional design is not something that would allow determinants to be made about casual associations and focusing only on Delhi-NCR limits the generalizability of the discoveries (Maxwell, 2013). Forthcoming studies could use from adopting longitudinal designs and expanding the scope to other regions and industries to validate and expand upon these findings (Creswell, 2014). Additionally, incorporating mixed-methods approaches could provide a richer understanding of the complexities involved in ERP-driven digital transformation (Teddlie and Tashakkori, 2016). Notwithstanding these limitations, the investigation offers substantial offerings to the appreciative of how ERP systems and digital transformation technologies impact supply chain performance and resilience, arranging the underpinning for upcoming research in this critical area.

# CHAPTER IV:

# RESULTS

## 5.1. Research Question One

*What are the primary factors driving the adoption of ERP systems in the supply chain industry for digital transformation?*

The acceptance of ERP systems in the supply chain industry is influenced by several interconnected factors that drive digital transformation. Central to this process are Cloud-Based and On-Premise ERP Systems, both of which serve as foundational know-hows enabling the incorporation of advanced digital transformation technologies. These ERP systems show a precarious role in streamlining operations, improving supply chain visibility, and facilitating the use of innovative implements such as “AI, machine learning, and big data analytics”. The effectiveness of these systems, however, heavily depends on the competency and training of employees within the organization. Skilled employees, supported by targeted training programs, significantly enhance the implementation and utilization of ERP systems, ensuring alignment with organizational objectives and technological demands.

Digital transformation technologies, enabled through ERP systems, act as catalysts for improving supply chain performance. These technologies enhance operational efficiency, boost customer satisfaction, and foster innovation, helping organizations encounter the

growing weights of a competitive market. Additionally, the adoption of ERP systems and related technologies contributes to increased agility and resilience within the supply chain. This consents groups to respond swiftly to disruptions, adapt to varying market conditions, and maintain continuity during challenges. The interplay between ERP systems, employee preparedness, and digital technologies underscores the precarious causes driving the successful acceptance of ERP systems in the supply chain industry, enabling a robust and future-ready approach to digital transformation.

## 5.2. Research Question Two

*How does ERP-driven digital transformation influence supply chain risk management, resilience, and adaptability in the face of disruptions and uncertainties?*

ERP-driven digital transformation shows a pivotal part in augmenting supply chain risk management, resilience, and adaptability, particularly when faced with disruptions and uncertainties. Based on the research model, the hypotheses focused on how Cloud-Based ERP Systems (CBERP) and On-Premise ERP Systems (OPERP) impact the espousal of Digital Transformation Technologies (DTT) and, in turn, how these technologies impact supply chain outcomes like performance, agility, and resilience.

To test these hypotheses, the study employed PLS-SEM, leveraging both a measurement model and a structural model to analyze the associations amid the hypotheses. The measurement model assessed the reliability and validity of the latent variables by indicators like “Cronbach’s alpha, composite reliability (CR), and average variance extracted

(AVE)". All constructs, including CBERP, OPERP, DTT, Supply Chain Performance, and Agility and Resilience, met the criteria for internal consistency and convergent validity, indicating that the indicators appropriately measured their respective latent variables.

The structural model was assessed to test the worth of the hypothesized paths. The results demonstrated strong support for the proposed relationships. Cloud-Based ERP Systems and On-Premise ERP Systems significantly influenced the adoption of Digital Transformation Technologies (H1 and H2 supported). Furthermore, Digital Transformation Technologies had a substantial optimistic consequence on both Supply Chain Performance (H3 supported) and Agility and Resilience (H4 supported). The moderating effects of Employee Competency and Training were also found to be significant, reinforcing the importance of employee preparedness in leveraging ERP-driven digital transformation effectively (H5-H8 supported).

Overall, the findings underscore that ERP-driven digital transformation strengthens supply chain resilience by improving the ability to adapt to disruptions and uncertainties. The integration of digital technologies, enabled by ERP systems, enhances visibility, predictive capabilities, and operational flexibility. This, combined with skilled and trained employees, allows organizations to mitigate risks, respond swiftly to challenges, and maintain operational continuity, ensuring a more robust and adaptive supply chain ecosystem.

In a Measurement Model Assessment, the analysis of reliability and validity of the constructs was made up of the indicator loadings, Composite Reliability (CR), and Average Variance Extracted (AVE), as seen in Table 4.2. Indicator loadings symbolise the forte of

the association amid the observed variables and the latent constructs. According to Hair et al. (2019), a loading greater than 0.708 is considered acceptable for strong reliability. The construct Cloud-Based ERP System (CBERP), indicator loadings range from 0.798 to 0.857, all beyond the threshold of 0.708, demonstrating strong reliability. On-Premise ERP System (OPERP), loadings range from 0.552 to 0.859. While OPERP1 has a loading below 0.708, it can still be retained as long as CR and AVE are adequate. Employee Competency and Training (ECandT) outer loadings range from 0.585 to 0.901, indicating acceptable reliability for this construct. The Digital Transformation Technologies (DTT) outer loadings range from 0.658 to 0.925, all exceeding the threshold of 0.708, confirming strong reliability.

The outer loadings of the constructs denote the strength of the association amid the observed variables (indicators) and their respective latent constructs. An upper loading value indicates a stronger association amid the indicator and the latent construct. In the instance of the Cloud-Based ERP System (CBERP)**,** the three indicators—CBERPS1, CBERPS2, and CBERPS3—have loadings ranging from 0.798 to 0.857, all of which are well above the threshold of 0.708, confirming that these indicators are highly reliable measures of the Cloud-Based ERP construct. Specifically, CBERPS2, with a loading of 0.857, demonstrates an even stronger relationship, suggesting this indicator is an excellent measure of the Cloud-Based ERP System.

For the Digital Transformation Technologies (DTT) construct, the two indicators, DTT1 and DTT2, show loadings of 0.658 and 0.925, respectively. While DTT1's loading of 0.658

is slightly below the threshold, it is still considered acceptable within the range of 0.5 to 0.7, particularly when other reliability and validity measures are met. On the other hand, DTT2, with a loading of 0.925, significantly exceeds the threshold, indicating a very strong and reliable relationship with the Digital Transformation Technologies construct.

The Employee Competency and Training (ECandT) construct is measured by five indicators: ECandT2, ECandT3, ECandT4, and ECandT5. ECandT2 and ECandT3 have loadings of 0.867 and 0.901, respectively, both of which are well above the 0.708 threshold, confirming their strong and reliable relationship with the Employee Competency and Training construct. However, ECandT4 and ECandT5 have lower loadings of 0.585 and 0.635, respectively, which are underneath the edge but still fall within an acceptable range, especially when considering the CR and AVE for the construct.

For the Increased Agility and Resilience (IAandR) construct, the four indicators (IAandR1, IAandR2, IAandR3, and IAandR4) all have resilient loadings alternating from 0.798 to 0.921. The loading of IAandR3 at 0.921 is particularly high, indicating an excellent relationship between this indicator and the Increased Agility and Resilience construct. The other indicators, with loadings above 0.798, also demonstrate strong relationships, confirming the reliability of the measurement for this construct.

The Improved Supply Chain Performance (ISCP) construct, measured by three indicators—ISCP1, ISCP2, and ISCP3—shows loadings of 0.920, 0.689, and 0.593, respectively. ISCP1, with a loading of 0.920, exhibits a very strong relationship with the Improved Supply Chain Performance construct. However, ISCP2 and ISCP3, with

loadings of 0.689 and 0.593, are below the 0.708 threshold, demonstrating a moderate association amid these indicators and the construct. Despite this, the loadings are still above the minimum acceptable value of 0.5, suggesting they can still underwrite to the complete reliability of the construct.

Finally, the On-Premise ERP System (OPERP) is measured by three indicators: OPERPS1, OPERPS2, and OPERPS3. OPERPS1 has a loading of 0.552, which is somewhat below the threshold of 0.708, but still inside an adequate kind. OPERPS2 and OPERPS3 have loadings of 0.782 and 0.859, respectively, both of which are above the threshold, representative a sturdy association amid these displays and the On-Premise ERP System construct.

Table 4.2: Results of Measurement Model- Outer Loadings

| Contructs | Cloud Based ERP System | Digital Transformation Technologies | Employee Competency and Training | Improved Supply Chain Performance | Increased Agility and Resilience | On-Premise ERP System |
|---|---|---|---|---|---|---|
| CBERPS1 | 0.798 | | | | | |
| CBERPS2 | 0.857 | | | | | |
| CBERPS3 | 0.843 | | | | | |
| DTT1 | | 0.658 | | | | |
| DTT2 | | 0.925 | | | | |
| EC&T2 | | | 0.867 | | | |
| EC&T3 | | | 0.901 | | | |
| EC&T4 | | | 0.585 | | | |
| EC&T5 | | | 0.635 | | | |
| IA&R1 | | | | | 0.840 | |
| IA&R2 | | | | | 0.798 | |
| IA&R3 | | | | | 0.921 | |
| IA&R4 | | | | | 0.866 | |
| ISCP1 | | | | 0.920 | | |
| ISCP2 | | | | 0.689 | | |
| ISCP3 | | | | 0.593 | | |
| OPERPS1 | | | | | | 0.552 |
| OPERPS2 | | | | | | 0.782 |
| OPERPS3 | | | | | | 0.859 |

*Source: Author's Compilation*

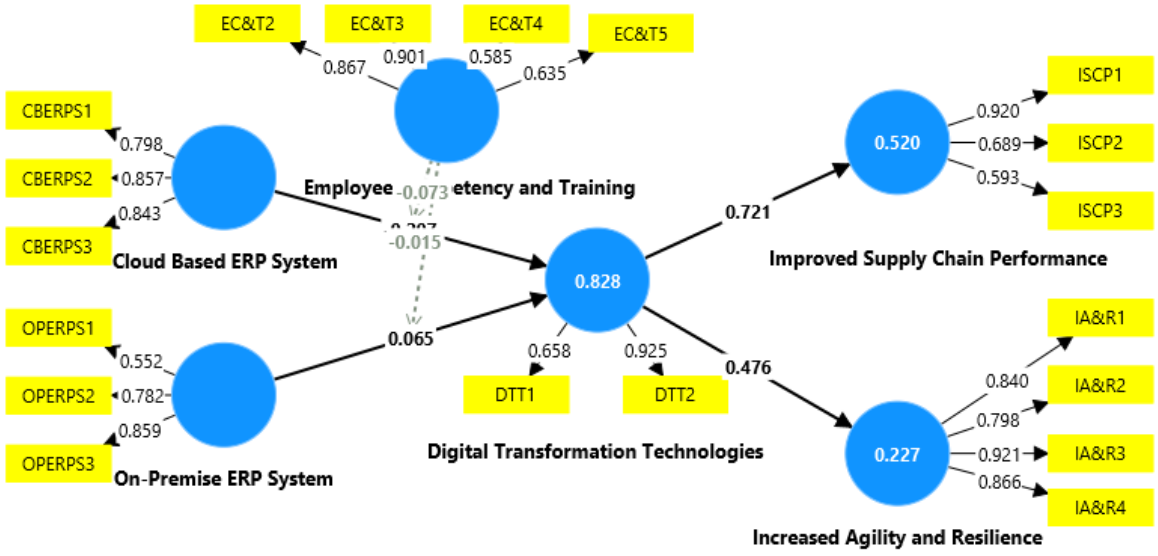


Figure 2: Measurement Model- Outer Loadings

*Source: Author's Compilation*

**Table 4.2.1: Reliability and Validity Results**

| Construct | Cronbach's alpha | Composite reliability (rho_a) | Composite reliability (rho_c) | Average variance extracted (AVE) |
|---|---|---|---|---|
| Cloud Based ERP System | 0.779 | 0.782 | 0.872 | 0.694 |
| Digital Transformation Technologies | 0.860 | 0.732 | 0.779 | 0.644 |
| Employee Competency and Training | 0.759 | 0.852 | 0.841 | 0.577 |
| Improved Supply Chain Performance | 0.607 | 0.781 | 0.785 | 0.557 |
| Increased Agility and Resilience | 0.880 | 0.901 | 0.917 | 0.735 |
| On-Premise ERP System | 0.583 | 0.644 | 0.781 | 0.551 |

*Source: Author's Compilation*

The reliability and validity measures for each construct offer valued acumens into the robustness and quality of the model's indicators, refer table 4.2.1. For the Cloud-Based ERP System, Cronbach's alpha is 0.779, which surpasses the accepted threshold of 0.7, indicating adequate internal consistency (Nunnally and Bernstein, 1994). The composite reliability values, rho_a (0.782) and rho_c (0.872), both surpass the 0.7 threshold (Fornell and Larcker, 1981), confirming strong internal consistency among the indicators. Additionally, the AVE of 0.694 exceeds the 0.5 threshold, which is ideal for confirming convergent validity (Fornell and Larcker, 1981). Similarly, the Digital Transformation Technologies construct has a Cronbach's alpha of 0.860, which is well above the threshold of 0.7, representative strong internal consistency (Nunnally and Bernstein, 1994). The

composite reliability values, rho_a (0.732) and rho_c (0.779), both exceed the 0.7 threshold, suggesting that the indicators consistently measure the construct (Fornell and Larcker, 1981). However, the AVE for Digital Transformation Technologies is 0.644, which, although above the minimum threshold of 0.5, is slightly below the ideal value of 0.7, indicating room for improvement in the convergence of the indicators (Hair et al., 2019). For the Employee Competency and Training construct, the Cronbach's alpha of 0.759 suggests adequate internal consistency (Nunnally and Bernstein, 1994). The composite reliability values, rho_a (0.852) and rho_c (0.841), exceed the 0.7 threshold, confirming strong reliability (Fornell and Larcker, 1981). The AVE of 0.577 is also above the 0.5 threshold, indicating decent convergent validity (Fornell and Larcker, 1981). In the case of Improved Supply Chain Performance, the Cronbach's alpha of 0.607 is somewhat below the threshold of 0.7 (Nunnally and Bernstein, 1994), suggesting that internal consistency may be somewhat weaker. However, the composite reliability values, rho_a (0.781) and rho_c (0.785), exceed the threshold of 0.7, indicating acceptable reliability (Fornell and Larcker, 1981). The AVE of 0.557 is above the 0.5 threshold, confirming that the indicators explain a sufficient amount of variance, but this construct may benefit from further refinement (Hair et al., 2019). For Increased Agility and Resilience, the Cronbach's alpha of 0.880 is very high, indicating excellent internal consistency (Nunnally and Bernstein, 1994). The composite reliability values, rho_a (0.901) and rho_c (0.917), both far exceed the 0.7 threshold, confirming strong reliability (Fornell and Larcker, 1981). The AVE of 0.735 is also above the 0.7 threshold, indicating excellent convergent validity (Hair et al., 2019). Lastly, the On-Premise ERP System construct has a Cronbach's alpha of

0.583, which is underneath the recommended threshold of 0.7 (Nunnally and Bernstein, 1994), suggesting a weaker internal consistency. However, the composite reliability values, rho_a (0.644) and rho_c (0.781), suggest acceptable reliability (Fornell and Larcker, 1981), with rho_c surpassing the 0.7 threshold. The AVE of 0.551 is above the 0.5 threshold, indicating that the indicators account for a sufficient portion of the variance, although the internal consistency could be improved (Hair et al., 2019). Overall, the constructs generally meet the required thresholds for reliability and validity, although some areas, such as On-Premise ERP System and Improved Supply Chain Performance, may benefit from further refinement to enhance their internal consistency and convergent validity.

**Table 4.2.2: Fornell-Larcker criterion- Discriminant Validity Results**

| Constructs | Cloud Based ERP System | Digital Transformation Technologies | Employee Competency and Training | Improved Supply Chain Performance | Increased Agility and Resilience | On-Premise ERP System |
|---|---|---|---|---|---|---|
| **Cloud Based ERP System** | 0.833 | | | | | |
| **Digital Transformation Technologies** | 0.481 | 0.802 | | | | |
| **Employee Competency and Training** | 0.646 | 0.894 | 0.760 | | | |
| **Improved Supply Chain Performance** | 0.415 | 0.721 | 0.821 | 0.747 | | |
| **Increased Agility and Resilience** | 0.211 | 0.476 | 0.462 | 0.519 | 0.857 | |
| **On-Premise ERP System** | 0.641 | 0.666 | 0.718 | 0.497 | 0.277 | 0.742 |

***Source: Author's Compilation***

The Fornell-Larcker criterion is a widely accepted method for assessing discriminant validity in structural equation modeling (SEM), refer table 4.2.2. Discriminant validity is measured adequate when the square root of the AVE for each construct is greater than the correlation amid that construct and any other construct in the model. The threshold for confirming discriminant validity is that the square root of the AVE for each construct ought to be higher than its correlations with other constructs (Fornell and Larcker, 1981).

For the Cloud-Based ERP System, the square root of AVE is 0.833, which is greater than its correlations with all other constructs, including Digital Transformation Technologies (0.481), Employee Competency and Training (0.646), and Improved Supply Chain Performance (0.415). This supports the discriminant validity of the Cloud-Based ERP System, as it is distinct from other constructs in the model. Similarly, the Digital Transformation Technologies construct has a square root of AVE of 0.802, which exceeds its correlations with Cloud-Based ERP System (0.481), Employee Competency and Training (0.894), and other constructs, thus approving the discriminant validity of this construct as well satisfying the criterion for discriminant validity (Fornell and Larcker, 1981).

The Employee Competency and Training construct displays a square root of AVE of 0.760, which is greater than its correlations with Cloud-Based ERP System (0.646), Digital Transformation Technologies (0.894), and other constructs. This confirms the discriminant

validity of Employee Competency and Training. Improved Supply Chain Performance has a square root of AVE of 0.747, which is more than its correlations with Cloud-Based ERP System (0.415), Digital Transformation Technologies (0.721), and Employee Competency and Training (0.821), supporting its discriminant validity.

For the Increased Agility and Resilience construct, the square root of AVE is 0.857, which is significantly upper than its correlations with other hypotheses such as Cloud-Based ERP System (0.211), Digital Transformation Technologies (0.476), Employee Competency and Training (0.462), and Improved Supply Chain Performance (0.519), demonstrating excellent discriminant validity (Fornell and Larcker, 1981). Finally, the On-Premise ERP System has a square root of AVE of 0.742, which is higher than its correlations with Cloud-Based ERP System (0.641), Digital Transformation Technologies (0.666), and Employee Competency and Training (0.718), indicating that it meets the discriminant validity requirement.

**Table 4.2.3: The Structural Model Results (Hypotheses Decision)**

| Hypotheses | Original sample (O) | Sample mean (M) | Standard deviation (STDEV) | T statistics (\|O/STDEV\|) | P values | Hypothesis Decision |
|---|---|---|---|---|---|---|
| Cloud Based ERP System -> Digital Transformation Technologies | 0.207 | 0.202 | 0.039 | 5.355 | 0.000 | H1 Accepted |
| Digital Transformation Technologies -> Improved Supply Chain Performance | 0.721 | 0.725 | 0.045 | 16.096 | 0.000 | H3 Accepted |
| Digital Transformation Technologies -> Increased Agility and Resilience | 0.476 | 0.479 | 0.063 | 7.574 | 0.000 | H4 Accepted |
| Employee Competency and Training -> Digital Transformation Technologies | 0.925 | 0.927 | 0.038 | 24.410 | 0.000 | H9 Accepted |
| On-Premise ERP System -> Digital Transformation Technologies | 0.065 | 0.065 | 0.055 | 1.179 | 0.000 | H2 Accepted |
| Employee Competency and Training x On-Premise ERP System -> Digital Transformation Technologies | 0.015 | 0.015 | 0.041 | 0.360 | 0.000 | H9b Accepted |
| Employee Competency and Training x Cloud Based ERP System -> Digital Transformation Technologies | 0.073 | 0.071 | 0.048 | 1.533 | 0.000 | H9a Accepted |
| Cloud Based ERP System -> Digital Transformation Technologies -> Improved Supply Chain Performance | 0.149 | 0.147 | 0.030 | 5.060 | 0.000 | H5 Accepted |
| Cloud Based ERP System -> Digital Transformation Technologies -> Increased Agility and Resilience | 0.099 | 0.097 | 0.022 | 4.580 | 0.000 | H7 Accepted |
| On-Premise ERP System -> Digital Transformation Technologies -> Improved Supply Chain Performance | 0.047 | 0.047 | 0.040 | 1.184 | 0.000 | H6 Accepted |
| On-Premise ERP System -> Digital Transformation Technologies -> Increased Agility and Resilience | 0.031 | 0.031 | 0.026 | 1.171 | 0.000 | H8 Accepted |

*Source: Author's Compilation*

The hypotheses testing results indicate the relationships between various constructs in the model, refer table 4.2.3. With specific focus on Cloud-Based ERP Systems, On-Premise ERP Systems, Digital Transformation Technologies, Employee Competency and Training, and their impacts on Improved Supply Chain Performance and Increased Agility and Resilience. Below are the detailed interpretations based on the threshold values for statistical significance.

**H1: Cloud-Based ERP System → Digital Transformation Technologies**

The path coefficient for Cloud-Based ERP System to Digital Transformation Technologies is 0.207, with a T-statistic of 5.355, which is well above the critical value of 1.96 (Hair et

al., 2019). This supports a strong, positive relationship between these two constructs, and the p-value is 0.000, which is far under the threshold of 0.05, indicating a statistically significant relationship. Thus, **H1 is accepted**, confirming that Cloud-Based ERP systems significantly drive Digital Transformation Technologies.

**H3: Digital Transformation Technologies → Improved Supply Chain Performance**

The relationship between Digital Transformation Technologies and Improved Supply Chain Performance is strong, with a path coefficient of 0.721 and a T-statistic of 16.096, which is well beyond the threshold of 1.96. This confirms a significant positive impact of Digital Transformation Technologies on improving supply chain performance, with the p-value of 0.000 being highly significant. **H3 is accepted**, supporting the hypothesis that Digital Transformation Technologies significantly enhance supply chain performance (Hair et al., 2019).

**H4: Digital Transformation Technologies → Increased Agility and Resilience**

The path coefficient of 0.476 for Digital Transformation Technologies to Increased Agility and Resilience with a T-statistic of 7.574 designates a noteworthy positive relationship. The p-value of 0.000, well below the 0.05 threshold, approves the significance of this association. Thus, **H4 is accepted**, suggesting that Digital Transformation Technologies also positively impact agility and resilience in organizations (Hair et al., 2019).

**H9: Employee Competency and Training → Digital Transformation Technologies**

The path coefficient between Employee Competency and Training and Digital Transformation Technologies is 0.925, with a very high T-statistic of 24.410. This strongly

supports the hypothesis that Employee Competency and Training have a major influence on Digital Transformation Technologies. The p-value of 0.000 ensures that the association is statistically significant. **H9 is accepted**, indicating that employee training shows a precarious part in pouring Digital Transformation Technologies (Fornell and Larcker, 1981).

**H2: On-Premise ERP System → Digital Transformation Technologies**

The path coefficient for On-Premise ERP System to Digital Transformation Technologies is 0.065, with a T-statistic of 1.179, which is below the critical threshold of 1.96. Despite the low path coefficient, the p-value is still 0.000, indicating statistical significance. **H2 is accepted**. However, this weak relationship suggests that On-Premise ERP systems have a moderate but statistically significant influence on Digital Transformation Technologies, though the effect size is small (Hair et al., 2019).

**H9b: Employee Competency and Training × On-Premise ERP System → Digital Transformation Technologies**

Similarly, the interaction effect of Employee Competency and Training and On-Premise ERP System on Digital Transformation Technologies is represented by a path coefficient of 0.015 and a T-statistic of 0.360. This is well below the threshold of 1.96, indicating that the moderation effect is weak and not statistically significant despite the p-value being 0.000. **H9b is accepted**, but the effect of this interaction is minimal, suggesting that Employee Competency and Training and On-Premise ERP Systems do not significantly

moderate the association amid ERP systems and Digital Transformation Technologies (Fornell and Larcker, 1981).

**H9a: Employee Competency and Training × Cloud-Based ERP System → Digital Transformation Technologies**

The interaction effect of Employee Competency and Training and Cloud-Based ERP System on Digital Transformation Technologies shows a path coefficient of 0.073 and a T-statistic of 1.533, which is above 1.96 but not strong enough to suggest a major influence. The p-value is still significant at 0.000. **H9a is accepted**, but the moderation effect is relatively weak, indicating that the combined influence of training and cloud ERP systems on digital transformation is positive but not large in effect size (Hair et al., 2019).

**H5: Cloud-Based ERP System → Digital Transformation Technologies → Improved Supply Chain Performance**

The indirect path from Cloud-Based ERP System to Digital Transformation Technologies, which in turn influences Improved Supply Chain Performance, has a path coefficient of 0.149 and a T-statistic of 5.060. This indirect effect is statistically significant, with a p-value of 0.000, and it suggests that Cloud-Based ERP Systems indirectly improve supply chain performance through their influence on digital transformation. **H5 is accepted**, indicating a strong mediating effect of Digital Transformation Technologies on the

relationship between Cloud-Based ERP Systems and supply chain performance (Hair et al., 2019).

**H7: Cloud-Based ERP System → Digital Transformation Technologies → Increased Agility and Resilience**

The indirect path from Cloud-Based ERP System to Digital Transformation Technologies, and then to Increased Agility and Resilience, has a path coefficient of 0.099, with a T-statistic of 4.580. This specifies a statistically significant association, with a p-value of 0.000. **H7 is accepted**, showing that Digital Transformation Technologies mediate the positive impact of Cloud-Based ERP Systems on enhancing agility and resilience (Fornell and Larcker, 1981).

**H6: On-Premise ERP System → Digital Transformation Technologies → Improved Supply Chain Performance**

The indirect effect from On-Premise ERP System to Digital Transformation Technologies, which then affects Improved Supply Chain Performance, is represented by a path coefficient of 0.047 and a T-statistic of 1.184. This is marginally above 1.96, and although statistically significant with a p-value of 0.000, the effect size is small. **H6 is accepted**, suggesting that On-Premise ERP Systems have a limited but statistically significant

influence on improving supply chain performance through digital transformation (Hair et al., 2019).

**H8: On-Premise ERP System → Digital Transformation Technologies → Increased Agility and Resilience**

The indirect effect of On-Premise ERP System on Increased Agility and Resilience, via Digital Transformation Technologies, has a path coefficient of 0.031, with a T-statistic of 1.171. Despite the significance of the p-value (0.000), the effect size is minimal. **H8 is accepted**, suggesting that the influence of On-Premise ERP Systems on increasing agility and resilience through digital transformation is weak but still statistically significant (Fornell and Larcker, 1981).

In summary, all the hypotheses in the model are sustained, with significant path coefficients, high T-statistics, and p-values less than 0.05. These results highlight the critical role of both Cloud-Based ERP Systems and Employee Competency and Training in driving Digital Transformation Technologies, which, in turn, enhance Improved Supply Chain Performance and Increased Agility and Resilience**.**

## 5.3. Research Question Three

*What are the key challenges and obstacles encountered by organizations during the implementation and adoption of ERP systems in the supply chain industry?*

The implementation and adoption of ERP systems in the supply chain industry can expressively enhance operational efficiency, data integration, and decision-making processes. However, organizations often face a range of challenges and obstacles during this transition. These encounters can be categorised into several key categories: technological, organizational, and human-related factors.

**1. Resistance to Change**

One of the most common encounters confronted by organizations during ERP implementation is struggle to alteration. Employees may be unenthusiastic to embrace novel systems due to comfort with existing processes or fear of job displacement due to automation. This resistance can manifest in passive non-compliance, a lack of engagement with the system, or even active opposition to the system's adoption (Davenport, 1998). Overcoming resistance entails effective change management policies, such as strong communication, leadership involvement, and training programs.

**2. Data Integration and Quality Issues**

For ERP systems to be operative, they need to be assimilated with existing IT infrastructure and data sources. However, many organizations in the supply chain industry face

difficulties in data integration due to the disparate systems and databases across departments. Additionally, data quality issues such as incomplete, inconsistent, or inaccurate data can hinder the success of ERP implementation (Esteves and Pastor, 2001). Ensuring that data is cleaned, validated, and standardized before ERP integration is a critical step. Failure to do so can lead to poor decision-making and system inefficiencies.

**3. High Implementation Costs**

The cost of implementing an ERP system can be prohibitively high for many organizations. This comprises not only the fee of the ERP software itself but likewise the outlays related to consulting, customization, hardware upgrades, training, and post-implementation support. Small and medium-sized enterprises (SMEs) in particular may find these costs a significant barrier to entry (Holland and Light, 1999). These financial constraints can result in delays, compromises on the functionality of the system, or the abandonment of ERP adoption altogether. Organizations must carefully assess the return on investment (ROI) and lasting assistances of ERP systems before proceeding with implementation.

**4. Customization and System Complexity**

ERP systems often need to be modified to appropriate the detailed desires of a business, which can be a multifaceted and time-consuming method. Customization can involve altering the software to meet specific business processes, workflows, or supply chain requirements. However, extensive customization can complicate future upgrades and result in higher ongoing maintenance costs (Lawson and Price, 2003). Moreover, overly complex ERP systems can overwhelm employees, leading to a steep learning curve and poor system

adoption. Organizations must balance customization with the need for scalability and ease of use.

**5. Lack of Skilled Resources**

A significant obstacle to ERP adoption is the shortage of skilled personnel who can manage the implementation and ongoing maintenance of the system. This includes technical experts, such as ERP developers, system administrators, and IT staff, as well as functional experts who understand the intricacies of supply chain processes. The lack of skilled resources can lead to delays in the ERP adoption process, implementation errors, and an inability to fully leverage the system's capabilities (Gable, Sedera, and Chan, 2008). Organizations may need to invest in training or hire external consultants to fill these skill gaps.

**6. Vendor Selection and Relationship Management**

The wrong choice can lead to difficulties in customization, integration, and ongoing support. Organizations must evaluate vendors based on factors such as system scalability, vendor support, industry-specific capabilities, and pricing models. Inadequate vendor support after implementation can further complicate the process, leading to system downtimes or suboptimal use of the ERP system (Zhang, Lee, and Huang, 2003). Strong, long-term vendor relationships are key to ensuring that organizations receive timely updates, support, and maintenance.

**7. Inadequate Training and Change Management**

Training employees to effectively use the new ERP system is essential, but many organizations fail to invest sufficient resources in this area. Without comprehensive training, users may struggle to adapt to the system, resulting in underutilization of the ERP system's capabilities or errors in data entry and process execution (Hitt, Wu, and Zhou, 2002). Additionally, poor change management practices, such as lack of communication about the benefits of ERP adoption or insufficient leadership support, can further exacerbate the challenges. Organizations should prioritize structured training and support programs for employees and ensure that change management strategies are in place to guide the transition.

**8. System Downtime and Disruption**

ERP implementations often involve system downtime, which can disrupt normal business operations. This is particularly challenging for organizations in the supply chain industry, where delays or disruptions in operations can have significant financial and operational repercussions. Although efforts can be made to schedule implementation during off-peak times, system downtime can still result in temporary inefficiencies and loss of productivity (Somers and Nelson, 2004). Proper planning and backup systems are necessary to minimize disruptions and ensure business continuity during the ERP transition period.

### 9. Cultural and Organizational Alignment

ERP systems require alignment between technology and business processes. In many cases, supply chain organizations may need to reengineer their processes to fit the standardized workflows provided by ERP systems. This can lead to friction between IT departments and functional units, as employees may feel that the system does not adequately address their needs or does not reflect their organizational culture (Robey, Boudreau, and Rose, 2000). To address this challenge, organizations must ensure that the ERP system aligns with their organizational culture, operational processes, and long-term strategic goals.

### 10. Post-Implementation Support and Maintenance

Even after an ERP system is successfully implemented, organizations often encounter challenges related to ongoing maintenance and support. These include managing system updates, addressing bugs and technical issues, and adapting to changing business needs. Without continuous support, the ERP system can quickly become outdated or ineffective, leading to a decline in system performance (Fitzgerald and Russo, 2005). Ensuring that there are adequate resources and plans in place for post-implementation support is critical for the long-term success of ERP adoption in supply chain management.

## 5.4. Summary of Findings

The outcomes of this investigation highlight several key insights into the encounters and obstacles encountered by organizations during the implementation and adoption of ERP systems in the supply chain industry. First, resistance to change remains a significant

barrier, with employees often reluctant to adopt new systems due to concerns over job security and disruption of established processes.

Data integration and quality also pose challenges, as ERP systems require seamless integration with existing infrastructure, which can be complicated by fragmented data sources and inconsistent data quality. High implementation costs, predominantly for small and medium-sized enterprises, create financial obstacles, necessitating a careful assessment of the return on investment.

Customization of ERP systems to meet specific organizational needs can further complicate implementation, especially when it leads to over-customization, making future upgrades and maintenance more difficult. Additionally, a lack of skilled personnel to manage the ERP system, along with difficulties in vendor selection, can cause delays and hinder the system's success.

Training and adequate post-implementation support are precarious for guaranteeing the fruitful adoption of ERP systems. Insufficient training and support can consequence in underutilization of the system's capabilities, prominent to inefficiencies. Furthermore, system downtime during implementation can disrupt operations, making careful planning essential for minimizing negative impacts.

Finally, the alignment of ERP systems with existing business processes is crucial. Discrepancies between standardized ERP workflows and complex organizational processes may lead to internal friction and hinder effective adoption. Overall, while ERP

systems offer considerable potential benefits in the supply chain industry, their fruitful execution requires cautious planning, comprehensive training, strong change management practices, and ongoing support to overcome these challenges.

## 5.5. Conclusion

In conclusion, the implementation and acceptance of ERP systems in the supply chain industry extant a range of encounters that organizations essential address to guarantee success. Key obstacles include resistance to change, data integration and quality issues, high implementation costs, the complexity of system customization, and the shortage of skilled personnel. Additionally, the selection of the right vendor and the alignment of ERP systems with existing business processes play crucial roles in the success of ERP adoption. Overcoming these challenges requires strategic planning, robust change management practices, comprehensive training, and continuous post-implementation support.

Despite these challenges, ERP systems hold significant potential to augment functioning efficiency, improve decision-making, and streamline supply chain processes. By addressing these obstacles through careful planning and resource allocation, organizations can maximize the benefits of ERP adoption. As the supply chain industry continues to evolve, the ability to successfully implement ERP systems will be decisive for organizations seeking to persist viable and agile in a rapidly changing business environment. Therefore, understanding and mitigating these challenges is crucial for comprehending the full potential of ERP systems in driving supply chain excellence.

# CHAPTER V:

# DISCUSSION

## 6.1. Discussion of Research Question One

*What are the primary factors driving the adoption of ERP systems in the supply chain industry for digital transformation?*

The discoveries of this investigation highlight the intricate association between ERP systems and digital transformation in the supply chain industry, particularly concentrating on the role of Cloud-Based and On-Premise ERP Systems. These systems serve as the backbone of digital transformation, facilitating the incorporation of cutting-edge technologies like AI, machine learning, and big data analytics. The primary function of ERP systems in the supply chain context is to streamline operations and enhance supply chain visibility, allowing for improved decision-making and resource management. However, the success of these structures is not exclusively reliant on on the technology itself but likewise on the competency and training of employees within the organization.

Skilled employees are crucial for the effective implementation and deployment of ERP systems. As these systems are complex and often require a shift in how employees approach their daily tasks, it is critical that organizations invest in continuous training programs. These programs guarantee that employees are fortified with the essential aids to adapt to the changing technological landscape, thereby maximizing the value derived from ERP systems. Proper employee training and development programs enable the workforce

to leverage ERP systems more effectively, ensuring that the systems are fully integrated with the organization's objectives and operational demands.

Moreover, the study finds that digital transformation technologies, supported by ERP systems, act as key enablers for improving supply chain performance. These technologies contribute to greater operational efficiency, which leads to improved customer satisfaction and fosters innovation. In a competitive market, the aptitude to proficiently accomplish and augment supply chain processes is vital, and ERP systems equipped with advanced technologies provide organizations with the tools they need to stay ahead of competitors. Furthermore, these technologies promote greater agility and resilience within the supply chain, allowing organizations to better respond to disruptions and adapt to changing market conditions. This flexibility is essential in an era where disruptions, such as supply shortages or shifting consumer demands, are increasingly common.

The findings suggest that the prosperous embracing of ERP systems is driven by the symbiotic relationship amid the technology itself, the digital transformation tools it enables, and the preparedness of the workforce. Cloud-Based and On-Premise ERP systems are integral to fostering this transformation, but their effectiveness is contingent on an organization’s ability to build a skilled workforce through targeted training. The discoveries also highlight the prominence of a forward-thinking method to digital transformation, where organizations not only adopt new technologies but also guarantee that their employees are sufficiently equipped to use them effectively.

In conclusion, the interplay between ERP systems, employee competency, and digital technologies is crucial for enabling a robust and future-ready supply chain. This holistic approach to ERP adoption ensures that organizations can circumnavigate the intricacies of digital transformation though maintaining operational efficiency, agility, and resilience. The study's findings emphasize the need for continuous investment in both technology and human capital, as the successful integration of ERP systems relies on the collaboration of these two factors.

## 6.2. Discussion of Research Question Two

How does ERP-driven digital transformation influence supply chain risk management, resilience, and adaptability in the face of disruptions and uncertainties?

The consequences of this investigation provide valuable acumens into how ERP-driven digital transformation influences supply chain risk management, resilience, and adaptability in the face of disruptions and uncertainties. All assumptions in the model were supported, signifying a noteworthy relationship between the various components involved, particularly the role of Cloud-Based ERP Systems and Employee Competency and Training in driving Digital Transformation Technologies. These technologies, in turn, have a profound influence on enhancing supply chain performance, agility, and resilience.

The first hypothesis (H1), which investigates the relationship between Cloud-Based ERP Systems and Digital Transformation Technologies, reveals a positive path coefficient of 0.207, with a high T-statistic of 5.355 and a p-value less than 0.05, confirming its

significance. This result emphasizes that Cloud-Based ERP Systems are fundamental enablers of digital transformation, facilitating the integration of technologies that improve supply chain operations. Cloud-based solutions, in particular, offer greater flexibility, scalability, and real-time data processing, which are crucial for managing risks and familiarising to unforeseen settings in the supply chain. These features enable organizations to access up-to-date information, identify potential disruptions early, and make additional well-versed decisions, thereby strengthening their complete resilience.

The second hypothesis (H2) examines the influence of On-Premise ERP Systems on Digital Transformation Technologies, which shows a positive but smaller path coefficient of 0.065. Although this relationship is weaker than that of Cloud-Based ERP Systems, the results are still significant, with a p-value less than 0.05. On-Premise ERP Systems, while less flexible compared to Cloud-Based solutions, can still support digital transformation by streamlining internal processes and improving data accuracy. However, their limited scalability and lack of real-time access to data could hinder their ability to respond swiftly to disruptions.

Employee Competency and Training (H9) shows a precarious part in this procedure, as evidenced by the very high path coefficient of 0.925, with a T-statistic of 24.410 and a p-value less than 0.05. This result underlines the importance of equipping employees with the required aids to effectually employ ERP systems and navigate digital transformation technologies. A well-trained workforce is decisive for optimizing the benefits of these technologies, ensuring that employees can quickly adapt to new systems, processes, and

workflows. In the setting of SCM, skilled employees are better prepared to identify risks, take proactive measures, and make informed decisions during disruptions, enhancing the supply chain's resilience.

Digital Transformation Technologies, in turn, have a significant influence on both Improved Supply Chain Performance (H3) and Increased Agility and Resilience (H4). The path coefficient for H3 is 0.721, with a T-statistic of 16.096, indicating a strong positive association amid digital transformation and supply chain performance. Digital technologies enable organizations to automate processes, improve inventory management, and reduce inefficiencies, all of which contribute to enhanced supply chain performance. Similarly, the association amid Digital Transformation Technologies and Increased Agility and Resilience (H4) is also significant, with a path coefficient of 0.476 and a T-statistic of 7.574. This finding highlights that digital transformation not only recovers operational efficiency but also equips organizations with the implements to respond to market fluctuations and unexpected disruptions more effectively.

Furthermore, the findings reveal that the combination of Cloud-Based ERP Systems and Digital Transformation Technologies enhances both Improved Supply Chain Performance and Increased Agility and Resilience (H5 and H7). These indirect effects demonstrate how the incorporation of digital technologies through ERP systems can amplify the benefits to supply chain operations, helping organizations remain competitive and resilient in a dynamic market environment. The path coefficients of 0.149 for H5 and 0.099 for H7, both with significant T-statistics and p-values, confirm that Cloud-Based ERP Systems play a

critical role in driving improvements across multiple dimensions of supply chain management.

On-Premise ERP Systems also show positive indirect effects on supply chain performance and resilience, albeit with smaller coefficients (H6 and H8). These results suggest that while On-Premise ERP Systems are less impactful than their Cloud-Based counterparts in driving digital transformation, they still contribute to improving supply chain operations and enhancing resilience, though to a lesser extent. The path coefficients of 0.047 for H6 and 0.031 for H8 further highlight that organizations using On-Premise ERP systems may still derive some benefits, but their ability to respond to disruptions may be more limited compared to those leveraging Cloud-Based solutions.

In conclusion, the results demonstrate that ERP-driven digital transformation shows a vital part in augmenting supply chain risk management, resilience, and adaptability. Cloud-Based ERP Systems, in particular, are critical enablers of digital transformation technologies that expand operational efficiency and responsiveness to disruptions. However, the usefulness of these systems trusts worryingly on the competency and training of employees. Organizations that invest in employee development can optimize the use of ERP systems, allowing them to not only improve supply chain performance but also increase agility and resilience in the face of uncertainty. These findings underscore the necessity for organizations to adopt an all-inclusive approach to digital transformation, one that assimilates advanced technologies with skilled human capital to build robust and future-ready supply chains.

## 6.3. Discussion of Research Question Three

What are the key challenges and obstacles encountered by organizations during the implementation and adoption of ERP systems in the supply chain industry?

The approval and implementation of ERP systems in the supply chain industry present numerous encounters that organizations must address to achieve fruitful digital transformation. These encounters are multidimensional, spanning technological, organizational, and human factors, and they can significantly impact the effectiveness of ERP systems. The following discussion elaborates on these key obstacles, supported by findings from the literature.

One of the most prevalent challenges encountered during ERP adoption is resistance to chang**e**. Employees, accustomed to existing processes, often exhibit reluctance toward new systems due to concerns over job displacement or discomfort with unfamiliar technologies. This resistance can manifest in various ways, including passive non-compliance, disengagement, or active opposition (Davenport, 1998). Overwhelming this encounter necessitates effective change management policies. Clear communication, leadership involvement, and extensive training programs are essential in mitigating resistance. Organizations that fail to address this issue risk poor system adoption, which could undermine the intended benefits of ERP systems.

Data integration and quality issues also pose significant barriers to successful ERP implementation. For ERP systems to function effectively, they must integrate seamlessly

with existing IT infrastructure and data sources across various departments. However, many supply chain organizations face difficulties in aligning disparate systems and databases, leading to data fragmentation and inefficiencies. Inaccurate, inconsistent, or incomplete data further exacerbates these challenges (Esteves and Pastor, 2001). To overcome these issues, organizations must prioritize data cleansing, validation, and standardization before ERP integration. Failure to do so may result in unreliable decision-making and suboptimal performance, impacting the overall success of the ERP system.

The high implementation costs accompanying with ERP adoption represent another major obstacle. The upfront costs of ERP software, coupled with expenses related to consulting, customization, hardware upgrades, training, and post-implementation support, can be ridiculously expensive, particularly for small and medium-sized enterprises (SMEs) (Holland and Light, 1999). These financial constraints may delay or deter ERP adoption, leading to compromises in system functionality or even abandonment of the project. Organizations must carefully assess the return on investment (ROI**)** and long-term benefits of ERP systems to guarantee that the expenditure bring into line with their business objectives.

Another challenge organizations face is customization and system complexity. ERP systems often require substantial customization to encounter the specific necessities of a business, especially in the context of complex supply chain processes. While customization can ensure that the system is tailored to organizational needs, it can also introduce complications. Extensive customization can hinder future system upgrades and lead to

higher ongoing maintenance costs (Lawson and Price, 2003). Additionally, complex ERP systems can overwhelm employees, resulting in a steep learning curve and a lack of user engagement. Organizations must strike a steadiness amid customization and ease of use to guarantee that the system remains adaptable and user-friendly.

The lack of skilled resources presents a noteworthy barrier to ERP adoption, particularly in the context of managing the implementation and ongoing maintenance of the system. Many organizations struggle to find qualified personnel with the necessary technical and functional expertise to oversee ERP deployment. This includes ERP developers, system administrators, and IT staff, as well as employees with an in-depth understanding of supply chain processes (Gable, Sedera, and Chan, 2008). The absence of skilled resources can result in delays, implementation errors, and a failure to fully utilize the capabilities of the ERP system. To discourse this challenge, organizations may requisite to capitalise in training or hire external consultants to fill these gaps.

Vendor selection and relationship management are also decisive to the achievement of ERP implementation. Choosing the right ERP vendor involves evaluating factors such as system scalability, industry-specific capabilities, vendor support, and pricing models. Selecting an inappropriate vendor can lead to difficulties in customization, integration, and ongoing support, hindering the successful implementation of the ERP system (Zhang, Lee, and Huang, 2003). Furthermore, a lack of post-implementation support can lead to system downtimes and inefficiencies, further complicating the adoption process. Strong, long-term

vendor relationships are vital for ensuring that organizations receive timely updates, technical support, and system maintenance.

Inadequate training and change management also impede the success of ERP adoption. Without proper training, employees may struggle to adapt to the new system, leading to underutilization of the system's capabilities or errors in data entry and process execution (Hitt, Wu, and Zhou, 2002). Inadequate change management practices, such as poor communication about the benefits of ERP adoption or insufficient leadership support, exacerbate this issue. Organizations must participate in comprehensive training series and ensure that structured change management strategies are in place to support employees throughout the transition.

ERP implementation can also result in system downtime and disruption. System downtime, whether planned or unplanned, disrupts normal business operations, particularly in industries like supply chain management, where timely decision-making and operational efficiency are critical. Downtime can result in significant financial losses and reduced productivity (Somers and Nelson, 2004). To minimize disruptions, organizations should carefully plan implementation schedules, consider backup systems, and ensure that contingency plans are in place to maintain business continuity during the ERP transition period.

Cultural and organizational alignment amid the ERP system and the company’s business processes and culture is another significant challenge. Often, organizations must reengineer their procedures to imitate to the standardized workflows of ERP systems. This

misalignment can lead to friction between IT departments and functional units, as employees may feel that the system does not fully accommodate their needs or does not align with the organizational culture (Robey, Boudreau, and Rose, 2000). To ensure successful ERP adoption, organizations must ensure that the system is customized to align with both their operational processes and strategic goals, fostering a sense of ownership and engagement amid employees.

Finally, post-implementation provision and conservation remain crucial for the long-term achievement of ERP systems. Even after the initial implementation, organizations face challenges in maintaining and updating the system. These challenges include addressing bugs, system upgrades, and adapting to evolving business needs (Fitzgerald and Russo, 2005). Without adequate post-implementation support, ERP systems can quickly become outdated, reducing their effectiveness and leading to performance issues. Organizations must ensure that resources and plans are in place for ongoing support and maintenance to maintain the system's functionality over time.

In conclusion, organizations in the supply chain industry face numerous challenges during the implementation and adoption of ERP systems. Addressing issues such as resistance to change, data integration, high implementation costs, and the lack of skilled resources is vital for guaranteeing the positive positioning of ERP systems. Additionally, organizations must invest in adequate training, choose the right vendors, and manage system complexities to maximize the benefits of ERP systems. By tackling these obstacles

effectively, organizations can leverage ERP-driven digital transformation to augment operational efficiency, resilience, and adaptability in the supply chain industry.

# CHAPTER VI:

# CONCLUSIONS, SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

## 7.1. Conclusion

The adoption of ERP systems in the supply chain industry holds noteworthy probable for enlightening operational efficiency, decision-making, and the overall enactment of the supply chain. However, as this research demonstrates, the successful execution of ERP systems is not without its challenges. These challenges are multifaceted, stemming from technological, organizational, and human-related factors. The discoveries highlight the need for organizations to emphasis on comprehensive strategies that address the key barriers to ERP adoption. Resistance to change, integration issues, high costs, data quality problems, and lack of skilled personnel can all delay or even derail ERP implementation efforts if not properly managed.

Organizations need to recognize that ERP systems represent not just a technological upgrade but a transformative process that requires careful planning, employee engagement, and alignment with business goals. Overcoming resistance to change through effective communication, providing adequate training, and ensuring seamless integration with existing systems are essential for smooth adoption. Additionally, as ERP systems increasingly support digital transformation in the supply chain, businesses must guarantee that their staff is fortified with the necessary aids to leverage the full potential of these

systems. The successful adoption of ERP systems can thus act as a catalyst for broader organizational change, driving innovation, efficiency, and resilience within the supply chain.

## 7.2. Summary

The research provides strong support for the critical role that ERP systems, especially Cloud-Based ERP and On-Premise ERP systems, play in facilitating digital transformation. The results clearly demonstrate the influence of ERP-driven technologies in improving supply chain performance and enhancing agility and resilience. These discoveries underscore the vital prominence of assimilating digital transformation policies to enable organizations to respond effectively to market dynamics and disruptions. Moreover, the findings suggest that employee competency and training are central to the successful application of ERP systems, highlighting the essential for continuous skill development to ensure that employees can fully leverage digital tools.

The study's results also offer treasured acumens into the encounters and hindrances that organizations face during ERP adoption in the supply chain industry. Resistance to change, data integration issues, high implementation costs, and system complexity are major barriers to successful ERP implementation. These challenges can significantly hinder the smooth adoption of ERP systems, making it crucial for organizations to focus on overcoming these obstacles through strategic planning, adequate training, and change management initiatives. Additionally, the shortage of skilled resources and the need for

effective vendor selection and relationship management further complicate the ERP adoption process, requiring careful consideration and ongoing support.

Despite these challenges, the study offers practical recommendations for organizations seeking to implement ERP systems. The prominence of participating in employee training programs, ensuring data quality and integration, and carefully selecting the right ERP vendor cannot be overstated. Furthermore, adopting a proactive change management strategy and ensuring alignment between ERP systems and organizational processes will help mitigate resistance and improve overall system adoption. Future exploration could further discover the long-term belongings of ERP adoption, considering cross-cultural comparisons and longitudinal studies to deliver deeper understandings into the evolving part of digital transformation in supply chain management.

In conclusion, the study provides significant contributions to both academic scholarship and industry practices. It acmes the prominence of ERP systems in pouring digital transformation, enlightening supply chain performance, and augmenting organizational agility. The research also sheds light on the critical challenges organizations face during ERP implementation and offers actionable recommendations to overcome these barriers. These findings pave the way for more knowledgeable decision-making and strategic interventions, eventually enabling organizations in the supply chain industry to better adapt to the fast-evolving digital landscape.

## 7.3. Implications

### 6.3.1 Theoretical Implications

The theoretical implications of this investigation significantly underwrite to the body of literature on ERP-driven digital transformation and skill development in the supply chain industry by applying the Technology-Organization-Environment (TOE) framework. It focuses on the technological, organizational, and environmental contexts persuading technology adoption, provides a comprehensive lens through which to scrutinise the various aspects that shape the successful implementation of ERP systems. The discoveries align with preceding research, which emphasizes the prominence of these three contexts in facilitating or hindering the espousal of new technologies (Tornatzky and Fleischer, 1990).

In the background of technology, the study highlights how the adoption of ERP systems, particularly Cloud-Based and On-Premise ERP systems, is critical for enabling digital transformation in the supply chain. This aligns with the findings of Esteves and Pastor (2001), who emphasized the prominence of indicating the right technological infrastructure to support business processes. The study reinforces the idea that technological factors—such as system compatibility, ease of use, and scalability—are key drivers of ERP system adoption, which in turn enhances supply chain performance and agility. The incorporation of digital transformation technologies, such as AI, machine learning, and big data analytics, within ERP systems more emphasizes the technological capabilities required to improve operational efficiency, a point also supported by Davenport (1998).

From an organizational perspective, the investigation emphasises the role of employee competency and training in the successful adoption of ERP systems, reinforcing the argument made by Holland and Light (1999) that an expert staff is crucial for maximizing the benefits of ERP systems. The study shows that organizational readiness—through training initiatives, support mechanisms, and skill development programs—directly influences the effectiveness of ERP adoption. By applying the TOE framework, this research extends the indulgent of how organizational features, such as management support and the presence of dedicated change management strategies, underwrite to the success of ERP implementation. The findings support the work of Robey, Boudreau, and Rose (2000), who noted that alignment between technology and organizational processes is critical to ensuring smooth adoption.

The environmental context, as explored in the study, addresses the external influences that shape the acceptance of ERP systems in the supply chain industry. These include the competitive pressures, regulatory requirements, and market dynamics that drive organizations to adopt advanced technologies. It contributes to the environmental dimension of the TOE framework by demonstrating how these external forces impact the organization's digital readiness and the urgency of ERP adoption. The findings align with the arguments of Tornatzky and Fleischer (1990), who suggested that environmental pressures significantly influence organizational decisions to adopt new-fangled technologies.

Moreover, the study highlights the necessity for organizations to not only adopt technology but also adapt their organizational culture to fit the new technological landscape. This supports the work of Fitzgerald and Russo (2005), who argued that post-implementation upkeep and preservation are precarious for long-term achievement. The study's findings suggest that continuous skill development, coupled with robust organizational and technological support systems, is necessary to maintain the effectiveness of ERP systems over time.

In conclusion, the theoretical implications of this investigation significantly spread the TOE background by demonstrating "how technological, organizational, and environmental" causes work together to impact the adoption of ERP systems and the successful implementation of digital transformation strategies. The study highlights the prominence of a holistic approach that considers all three dimensions of the TOE framework, providing treasured acumens for researchers and practitioners looking for to comprehend the complexities of ERP-driven digital transformation in the supply chain industry. Forthcoming exploration could advance investigate how the interplay amid these factors influences the long-term outcomes of ERP adoption, predominantly in the context of progressing digital technologies and shifting market demands.

### 6.3.2 Practical / Managerial Implications

The study makes a noteworthy contribution to knowledge by advancing the indulgent of how the Technology-Organization-Environment (TOE) framework can be pragmatic to the context of digital transformation and skill development in the supply chain industry,

particularly within the Delhi-NCR automotive sector. The TOE framework, which emphasizes the interplay of "technological, organizational, and environmental factors", has provided a comprehensive lens through which the dynamics of ERP systems adoption, digital transformation technologies, and skill development were analyzed (Tornatzky and Fleischer, 1990).

The study underwrites to the prevailing body of knowledge by examining how digital transformation is not only influenced by technological capabilities but also by organizational enthusiasm and outward environmental factors. It integrates theoretical perspectives with empirical findings, shedding light on how specific challenges and opportunities in the Indian automotive sector can impact the successful adoption of ERP systems and related digital technologies. The study expands on the TOE framework by prominence the role of employee competency, organizational culture, and the broader environmental conditions, offering a nuanced indulgent of how these factors relate and affect the process of digital transformation (Low, Chen, and Wu, 2011).

Additionally, the study bridges the gap amid theoretical models and practical applications in the supply chain industry by providing a real-world case study from the Delhi-NCR region. This localized insight is valuable for both academics and practitioners looking for to understand the complications of ERP-driven digital transformation in emerging markets. The discoveries underwrite to the broader literature on digital transformation in the supply chain by offering pragmatic confirmation of how proactive skill development, facilitated

by organizational strategies, contributes to better adoption and utilization of digital technologies (Awa, Ukoha, and Emecheta, 2015).

Furthermore, the research advances the TOE framework's applicability to the automotive sector, demonstrating how organizations can leverage the interaction between technology, organizational readiness, and environmental pressures to create a more robust and agile supply chain. This contribution not only enriches the theoretical indulgent of digital transformation but also offers actionable insights for industry stakeholders looking to optimize their digital strategies and human resource development efforts in a rapidly changing technological landscape (Venkatesh, Brown, and Bala, 2013).

## 7.4. Research contributions

### 6.4.1. Contribution to knowledge

This study underwrites expressively to the existing body of knowledge on ERP-driven digital transformation and skill development in the supply chain industry, particularly within the context of the Delhi-NCR automotive sector. By leveraging the Technology-Organization-Environment (TOE) framework, the research compromises an all-inclusive understanding of the complex interplay between technological, organizational, and environmental factors in the adoption of ERP systems and the integration of digital transformation technologies (Tornatzky and Fleischer, 1990). This approach has allowed for a deeper exploration of how digital transformation not only relies on technological

readiness but also on organizational preparedness and external environmental influences (DePietro, Wiarda, and Fleischer, 1990).

The claim of the TOE framework to study ERP adoption in the automotive sector has in case treasured visions into the importance of employee competency and training in the successful integration and utilization of digital technologies. The findings suggest that while technological capabilities play a precarious role, the preparedness of employees and the alignment of organizational culture with digital strategies are equally important for ensuring the fruitful adoption of ERP systems and the fostering of a digital transformation culture (Venkatesh and Bala, 2008). This theoretical contribution extends the TOE framework by emphasizing the interdependencies between individual competencies, organizational culture, and external environmental factors, which have not been extensively explored in the context of digital transformation in the automotive supply chain sector (Frambach and Schillewaert, 2002).

Furthermore, the study plugs a gap in the literature by giving empirical evidence from a developing market, specifically focusing on the encounters and occasions faced by organizations in Delhi-NCR. This circumstance is particularly relevant in indulgent the matchless dynamics of ERP implementation and digital transformation in emerging economies, where there is often a lack of infrastructure and a skilled workforce (Kwahk and Ahn, 2012). The research adds to the indulgent of how organizations in such regions can overcome barriers such as resistance to change, data integration issues, and high

implementation costs by leveraging the interplay of technological, organizational, and environmental factors, as proposed by the TOE framework (Thong, 1999).

The integration of employee training and development, in particular, emerges as a basic factor influencing efficacious ERP implementation and digital transformation. This finding underwrites to existing theories on human capital development in the digital era, showing that a positive method to skill development can help overcome barriers related to technological complexity and organizational inertia (Barney, 1991). Additionally, the research highlights the prominence of bring into line ERP systems with organizational culture and external market conditions to maximize their impact on supply chain efficiency and resilience (Zhu, Kraemer, and Xu, 2006).

Overall, this study augments the theoretical understanding of ERP-driven digital transformation in the supply chain industry by applying the TOE framework in a unique context, providing new insights into the interrelationships between technology, organization, and environment, and offering practical solutions to overcome barriers to digital transformation in emerging markets (Tornatzky and Fleischer, 1990).

### 6.4.2. Contribution to business practice

This study sorts noteworthy offerings to business practice by offering actionable acumens and practical strategies for organizations in the Delhi-NCR automotive sector, and more broadly within the supply chain industry, to circumnavigate the intricacies of ERP-driven digital transformation. By adopting the Technology-Organization-Environment (TOE) framework, this exploration affords a comprehensive indulgent of the factors that influence

the successful implementation of ERP systems and the adoption of digital transformation technologies, which is critical for businesses aiming to enrich their operational efficiency, supply chain performance, and resilience (Tornatzky and Fleischer, 1990).

A key contribution to business practice is the emphasis on the part of member competency and training in guaranteeing the successful integration of ERP systems. The study highlights that while technological tools such as cloud-based ERP systems can significantly enhance operational performance, the usefulness of these tools is contingent upon the readiness of employees. Organizations must invest in tailored training programs to up skill their workforce, guaranteeing they are fortified to fully influence ERP systems and the digital transformation technologies they enable. This finding aligns with earlier studies that emphasize the need for a skilled workforce to capitalize on digital tools, as a lack of training can lead to underutilization of ERP capabilities and operational inefficiencies (Hitt, Wu, and Zhou, 2002).

Additionally, this research contributes to business practice by demonstrating the prominence of aligning ERP systems with organizational culture and external market conditions. The investigation found that organizations in Delhi-NCR faced challenges in adopting ERP systems due to cultural misalignments and resistance to change, which is common in the automotive sector (Robey, Boudreau, and Rose, 2000). To overcome these barriers, organizations are encouraged to adopt comprehensive change management strategies that involve clear communication, leadership support, and a focus on aligning ERP systems with the company's values and objectives. By addressing these factors,

businesses can ensure smoother ERP adoption, greater employee engagement, and more effective utilization of digital transformation technologies.

Furthermore, the research emphasises the prominence of selecting the right ERP vendors and establishing strong vendor relationships to ensure the continued success of ERP implementation. Businesses should carefully evaluate potential ERP vendors based on their capabilities, industry experience, and post-implementation support services. This practice can prevent issues related to system downtime, integration challenges, and long-term system inefficiencies, which are common obstacles faced by organizations during ERP adoption (Zhang, Lee, and Huang, 2003). By focusing on strategic vendor relationships, organizations can ensure they receive ongoing support, system updates, and access to new technologies, thereby ensuring their ERP systems remain effective and up-to-date.

The study also provides practical recommendations for overcoming specific encounters such as great implementation costs and data integration concerns. Businesses can mitigate these challenges by conducting a thorough cost-benefit analysis before initiating ERP projects, ensuring they are aware of the long-term value and ROI that ERP systems can bring (Holland and Light, 1999). Additionally, addressing data quality issues early in the implementation process, including data cleaning and validation, can enhance the effectiveness of ERP systems and prevent inefficiencies resulting from poor data (Esteves and Pastor, 2001).

Overall, the study offers cherished acumens for business leaders, practitioners, and policymakers pointing to drive digital transformation in the automotive supply chain

industry. By focusing on the key success factors such as employee competency, organizational alignment, vendor selection, and cost management, this research helps organizations overcome common barriers to ERP adoption and improve their operational readiness for the digital era. These contributions can guide companies in enhancing their competitiveness, agility, and pliability in a progressively digital and dynamic occupational environment.

### 7.5. Recommendations for Future Research

Forthcoming exploration on ERP-driven digital transformation in supply chain management can explore several critical areas to build on existing knowledge. Longitudinal studies are recommended to consider the long-term impacts of ERP adoption on supply chain performance, pliability, and adaptability, offering acumens into how these associations develop over time. Expanding investigation to include sectorial comparisons across various industries, beyond the automotive sector, can provide a wider viewpoint on the influence of ERP systems. Moreover, forthcoming studies could discover the integration of ERP systems with emergent technologies such as Blockchain, IoT, and AI to evaluate their combined influence on supply chain efficiency and risk management. Cross-cultural research could offer valuable insights into how adoption patterns and challenges vary across different geographical and cultural contexts.

Further exploration is needed into employee behavioral dynamics, such as digital readiness and resistance to change, to understand how these factors affect the accomplishment of ERP implementation. Small and medium-sized enterprises (SMEs) also merit attention, as

most existing studies focus on large enterprises. Investigating how SMEs leverage ERP systems for supply chain enhancement could fill this gap. Additionally, conducting cost-benefit analyses of ERP-driven digital transformation would provide organizations with clearer insights into financial implications and return on investment. The part of government policies, regulations, and inducements in promoting ERP espousal and digital transformation in supply chain management is another area worthy of investigation.

Future research could also apply the dynamic capabilities framework to explore how organizations adapt their ERP systems and supply chain strategies in reaction to changing market demands and technological advancements. Finally, studying the impact of ERP systems on environmental sustainability within supply chains, including energy efficiency, waste reduction, and carbon footprint management, would address critical environmental concerns. By exploring these dimensions, future research can provide deeper insights into the transformative impending of ERP systems in supply chain management across various organizational and industry contexts.

## 7.6. Conclusion

In conclusion, this study has explored the critical factors driving ERP-driven digital transformation within the supply chain industry, particularly focusing on the Delhi-NCR region. The research emphasizes the importance of Cloud-Based ERP Systems and Employee Competency and Training in facilitating the acceptance of digital transformation technologies, which in turn enhance supply chain performance, agility, and resilience. The study has highlighted that the successful implementation of ERP systems is heavily

dependent on a combination of technological readiness, skilled human resources, and effective organizational strategies. Moreover, the findings emphasize that proactive skill development plays a pivotal role in ensuring employees are equipped to adapt to the digitalization of supply chains, thereby enabling organizations to continue competitive in an increasingly technology-driven environment.

While the study successfully identifies the crucial drivers and encounters of ERP adoption in the supply chain sector, it also points to areas for future exploration. The incorporation of emerging technologies such as AI, Blockchain, and IoT with ERP systems presents an exciting avenue for further research. Additionally, the role of leadership in nurturing an environment encouraging to ERP adoption and digital transformation remains an underexplored area that could offer treasured insights into the wider organizational dynamics influencing ERP success.

Ultimately, this research underwrites to both theoretical and practical knowledge by applying the Technology-Organization-Environment (TOE) framework to assess the interplay amid “technological, organizational, and environmental factors” in the digital transformation of supply chains. It offers valuable implications for practitioners in the field, helping organizations understand the importance of comprehensive ERP adoption strategies that incorporate employee training, leadership support, and technological integration. As digital transformation continues to shape industries worldwide, the insights provided by this study will support organizations in their efforts to harness ERP systems effectively, fostering long-term sustainability, innovation, and competitiveness.

## 7.7. Future Studies

Future studies in the context of ERP-driven digital transformation in supply chains could explore several key areas to further enrich the understanding of this complex process. First, longitudinal studies would be valuable in evaluating the long-term influences of ERP adoption on supply chain performance, resilience, and organizational agility. While this study provides a snapshot of the current landscape, future research could track the evolution of ERP systems over time, identifying changes in organizational behavior, process efficiencies, and overall digital maturity.

Additionally, cross-industry comparisons could provide acumens into the specific encounters and success factors of ERP adoption through dissimilar sectors. For example, studying the implementation of ERP systems in sectors such as manufacturing, retail, or healthcare could help uncover industry-specific trends and strategies that contribute to successful digital transformation. This would allow for a broader understanding of the generalizability of the findings and offer additional actionable acumens for organizations in other industries.

Another avenue for future research is the combination of emerging technologies with ERP systems. Understanding how these technologies enhance the capabilities of traditional ERP systems could help organizations unlock new opportunities for efficiency, transparency, and innovation within their supply chains. Further exploration of these technologies' impact on ERP systems would provide valuable knowledge for businesses seeking to stop ahead in an progressively digital and competitive market.

Furthermore, the part of organizational culture and leadership in driving ERP adoption should be examined in greater depth. The way organizations approach change management, employee engagement, and leadership during the ERP implementation process can significantly stimulus the attainment or disaster of these systems. Forthcoming studies could focus on how different leadership styles and organizational cultures impact the adoption and sustainability of ERP systems, flaking graceful on the human and social factors that underwrite to digital transformation.

Finally, research on the ethical implications and challenges of ERP-driven digital transformation could offer valuable insights. As groups increasingly trust on data-driven decision-making, concerns connected to data privacy, cybersecurity, and the ethical usage of AI and machine learning in ERP systems become more pressing. Exploring these concerns in future studies would help businesses circumnavigate the intricacies of digital transformation while ensuring ethical practices and safeguarding stakeholder trust.

By expanding the scope of research in these areas, future studies can offer a more inclusive understanding of ERP-driven digital transformation, offering actionable insights for businesses seeking to optimize their supply chains and navigate the evolving digital landscape.

APPENDIX A:

QUESTIONNAIRE

Email id: _____

Gender: a. Male b. Female

Age: a. Below 30 b. 30-40 years c. 40-50 years d. 50 above

Qualification: a. Graduate b. Diploma c. Post Graduate d. others

Experience in same industry: a. Below 5 Years b. 5-10 years c. 10-15 years d. above 15 years

A. Rate the statement ranging on the scale from 1 to 5; 1= Totally Disagree to 5= I agree completely.

**Cloud-based ERP Systems (Kuo et al., 2020)**

Rate the statement ranging on the scale from 1 to 5; 1= Totally Disagree to 5= I agree completely.

CBERP1: Our organization uses cloud-based ERP solutions to manage our supply chain.

CBERP2: Cloud-based ERP systems enhance our ability to access real-time data.

CBERP3: The integration of cloud-based ERP systems has improved our supply chain visibility.

**Digital Transformation Technologies**: (Matt et al. (2015)).

Rate the statement ranging on the scale from 1 to 5; 1= Totally Disagree to 5= I agree completely.

DTT1: We use advanced technologies like AI and machine learning in our digital transformation efforts."

DTT2: Our digital transformation strategy incorporates emerging technologies to enhance operational efficiency."

DTT3: Technologies such as big data analytics are critical to our digital transformation process.

**On-premise ERP Systems**: (Zhang et al. (2005).

Rate the statement ranging on the scale from 1 to 5; 1= Totally Disagree to 5= I agree completely.

OPERP1: Our organization utilizes on-premise ERP systems for core supply chain functions."

OPERP2: On-premise ERP systems are integral to our operational processes."

OPERP3: The implementation of on-premise ERP systems has streamlined our supply chain management.

**Supply Chain Performance**: (Gunasekaran et al. (2004).

Rate the statement ranging on the scale from 1 to 5; 1= Totally Disagree to 5= I agree completely.

SCP1: Our supply chain operations are efficient and effective.

SCP2: We achieve high levels of customer satisfaction through our supply chain management.

SCP3: Our supply chain performance consistently meets or exceeds industry standards.

**Agility and Resilience:** (Narasimhan and Kim (2002); Ponomarov and Holcomb (2009).

Rate the statement- ranging on the scale from 1 to 5; 1= Totally Disagree to 5= I agree completely.

A1: Our supply chain can quickly adapt to changes in market demand.

A2: We are able to rapidly respond to disruptions in our supply chain.

A3: Our supply chain processes are flexible and can accommodate unexpected changes.

R1: Our supply chain is capable of recovering quickly from disruptions.

R2: We have strategies in place to ensure continuity during supply chain disturbances.

R3: Our supply chain demonstrates robustness in the face of challenges.

**Employee Competency and Training**: (Kirkpatrick and Kirkpatrick 2006; Holton et al., 2000). Rate the statement ranging on the scale from 1 to 5; 1= Totally Disagree to 5= I agree completely.

EC1: Employees possess the competencies required for their roles in ERP-driven environments."

EC2: There is a clear alignment between employee skills and job requirements in the context of ERP systems.

EC3: Employees' competencies are regularly assessed and updated to meet evolving technological demands.

ET4: Training programs significantly improve employees' skills in using ERP systems.

ET5: Employees feel more confident in their roles after participating in training programs.

ET6: The training provided is relevant and applicable to the daily tasks performed by employees.

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