Key Attributes, Challenges, and Success Factors in Digital Transformation Of Supply Chain - A Case Study Of 3PL Companies

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ABSTRACT

Digitalization is the key for businesses success in today's cutthroat business environments. Businesses are digitalizing their processes to improve the visibility and overall performance by implementing the digital systems. 3PL companies are responsible for providing logistics services to the manufacturers and therefore their key attribute is high volume and high variety. This high volume and high variety make it difficult for 3PL companies to sort the products and deliver it to the right person, and at the right time. Therefore, it is required for 3PL organizations to improve their supply chains by implementing the digital processes. The background of the study led us to design the purpose of the study which is, what are the challenges faced by 3PL companies while implementing digitalization in their processes. Key attributes of the digital supply chain, and what are the success factor of supply chain digital transformation. The strategy of this research is to answer these questions. This study is qualitative in nature, and Pakistan based for which we have collected data from a 3PL company to answer the research questions. The study investigates the key attributes, challenges, and success factors of digital transformation in 3PL companies, using the leading 3PL company, NLC, in Pakistan as a case study. The study found that improving visibility, monitoring systems, and product flow are key attributes of digital transformation in the supply chain. The critical success factors include top management support, strong leadership, and a learning and innovative culture. However, legacy systems and organizational resistance are the key challenges faced during the digital transformation of the supply chain. The study also concluded that digitalization improves the sustainability of the supply chain and provides a competitive edge in the form of customer satisfaction.

Keywords: Supply Chain; Digital Transformation; Leadership; Legacy systems, Sustainability; Digitalization
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Keywords

Supply Chain; Digital Transformation; Leadership; Legacy systems, Sustainability; Digitalization
CHAPTER 1: INTRODUCTION

1.1 Research Background

In a modern business environment, as discussed by Young and Reeves (2020) customers’ needs and demands are changing frequently, therefore businesses need to improve their response rate by bringing digital transformation. Businesses possessing digital technologies possess greater dynamic capabilities and based on that they can improve their sustainability as well as disruptive innovation which affect the businesses' market position and results in increasing market segmentation (Appio et al., 2021).

Moreover, as stated by Preindl et al. (2020), in this eruptive business environment, survival is the utmost problem faced by SMEs and large enterprises around the globe. The survival of business organizations significantly rely over supply chain efficiency and efficacy. The sustainable supply chains emphasize over business's longevity, and digital transformation is the key element that leads businesses to sustainable supply chains (Gezgin et al., 2017). According to Fachrunnisa et al (2020) businesses transform their supply chains to improve profit margins, increase their strategic flexibilities, and reduce the time they take to respond to market fluctuations. Digital transformation enables businesses to improve their daily operations and authorize them to have a leading position in the market and improve business sustainability (Ribeiro, 2021). According to the stats presented by MIT Sloan, review research report in 2013, 78% of the business stakeholders believe that the on-time digital transformation of their businesses led to competitive advantage and positive business growth. Further this statement is supported by Harvard Business Review Analytics Services in 2014 in which concluded that business organisations do not transform digitally are missing the market opportunities and it will lead to their failure of these businesses (HBR, 2014). As stated by Schiuma et al. (2022) digital transformation is enabling businesses to avoid strategic drift, and to bring on time changes in the existing systems to deal with external uncertainties. Bringing digital transformation into the business's supply chain enables businesses to have a competitive edge by bringing competitive advantage through attaining flexibility, supply chain agility, and creating value for the company as well as for the customers (Porter and Heppelmann, 2015)
According to Al Mashalah et al. (2022), e-commerce is the prime example of digital transformation. The e-commerce businesses are facilitating their customers by providing the product of their choice to their doorstep within minimal waiting time. The modern customers prefer to use e-commerce and other digital platforms as they can access the customized products with large variety. Furthermore, as stated by Preindl et al. (2020) the fourth industrial revolution brings a boost to the digital transformation of businesses and the advent of technologies, consumers are focusing on enhancing their tech-savvy. They analyze different functionality attributes, and quality attributes of products and compare different products to make the purchase decision. Therefore it can be stated that modern businesses need to integrate digital technologies in their supply chain operations to improve product quality and increase customer satisfaction levels (Bermen, 2012).

The above discussion reveals that digital transformation of businesses is having a positive influence on businesses performance, in terms of increasing profit margins, strategic flexibility, and reducing the time required by businesses to respond to market fluctuations, however, as stated by Hai et al. (2021) this digital transformation is the cutthroat challenge for modern businesses particularly the 3PL businesses. Digital transformation requires the involvement of higher and lower management and their active participation. Further, it also requires a strategic path to bring innovation in new processes and products which is quite difficult for large enterprises and global 3PL firms, as they have highly regulated structure which opposes the change (Wolf et al. 2018). On the other hand, for startups and new ventures, it is easy to bring digitalization into their supply chain processes as their processes are not so mature so they prefer to make changes to improve the businesses environment by focusing on long-term profit. Similarly, as stated by Carvalho et al. (2021), in addition to maturity of business organisations to adapt digital transformations, the culture is another challenge as well as the driver for bringing change in the systems and bring innovation and digitalization. According to Hanna (2016), Digital transformation is mostly fostered in enterprises that possess entrepreneurial orientation and entrepreneurial leadership. Entrepreneur leaders believe in bringing change and risk-taking behaviors to improve the business process efficiency. Entrepreneurial leadership always seeks opportunities and believes in the
phenomenon of continuous improvements, such as attribute influence or fostering digital transformation in a business. On the other hand, individuals with static thinking prefer not to change the existing systems and want to work in a comfortable environment that led to strategic drift and gradually reverses economic growth, sustainability, longevity, and overall business performance.

As stated earlier the role of digital transformation remains critical in the case of 3PL companies since the success of nature of the business significantly rely over an efficient supply chain process. According to Wu et al. (2022), these businesses needed to be more digitally oriented as they are dealing with different companies and individuals and providing services to deliver the product to the end customers. These businesses not only possess higher product variety as well as quantity and there is a higher probability of bottlenecks and challenges for these firms. These bottlenecks not only impact the service provider’s goodwill but also the individual or company that is taking services for the product delivery. The most popular examples of 3PL companies are Alibaba, Taobao, and Daraz, etc. which is 3PL companies that provide logistics services and possess high volume and high variety therefore it’s important for these to bring technological innovation in their businesses to design an error-proofing system. The current study also focuses on a similar objective and aims to analyses case studies on digital transformation, specific challenges faced by the businesses to bring change and the drivers that influence the change in a business.

1.2 Problem Statement

Digital transformation is the key determinant for businesses survival. According to Hönigsberg and Dinter (2019) businesses improve their supply chain by bringing digitalization and digital transformation enables businesses to avoid disruption in their supply chains and helps avoid bottleneck by smoothening the process of providing raw materials to the production systems. For instance, 3PL companies use ERP (Enterprise Resource Planning) and MRP (Material Resource Planning) to check the material inflow and outflow that results in the continuity of supply chain operation and improves the businesses’ productivity (Özkanlısöz and Akkartal, 2021). Similarly, SAP can also be identified as an effective digital platform that enables businesses to visualize their supply
chain to easily monitor the business processes and detect the bottleneck to make on-time changes that result in business improvements (Gaur and Mathar, 2020). Although these digital transformations improve the business performance but there are several challenges integrate them within the existing business environment. Therefore, the current research aims to address these challenges through analysis of the ways business firms can bring digital transformation into practices to improve their supply chain efficiencies and deal with environmental uncertainties.

1.3 Research Significance

The nature of current research is theoretical and the primary focus is to analyze the attributes of digital transformation, challenges, and success factors in digital transformation, specifically focusing on businesses operation i.e. supply chains. The overview of the literature reveals that empirical evidence can be found over the impact of digitalisation in supply chain. For instance, Alabdali and Salam (2022) targeted businesses performance while Gao et al. (2022) observed the impact of digitalisation over corporate innovation and corporate strategy. Similarly, Ku et al. (2022) discussed the relationship between digitalization and smart production. These studies were based on primary data collection and results were drawn based on the respondent’s opinions. However, this research will be fostering the previous studies’ conclusion by focusing on the practical examples of existing companies that face problems while transforming digitally and will be analyzing the factors that create hurdles in their digital transformation. Previous literature lags to provide evidence based on such practical examples, so this research will be adding value to the literature by presenting real cases.

1.4 Research Motivation

The exponential change in the technological environment, and inclination of businesses towards electronic commerce where 3PL logistics companies are providing services to deliver products to end customers, it became challenging for them to separate the product and make strategies to deliver the product at once in a specific region. Therefore, third-party logistics businesses require digital transformation to monitor the product flow and improve the visibility of their supply chains to enhance overall business efficiency. With every passing day, businesses are inclining towards electronic commerce
so it’s becoming challenging for the 3PL businesses to efficiently provide product delivery services in efficiency. This technological trend motivates the author to focus on the 3PL logistics digital transformation and analyze how these businesses can improve by bringing digitalization.

1.5 Research Aim and Objectives

The aim of the study is to observe attributes, challenges and success factors in digitalization of supply chain process in case of 3PL companies. The study further addresses following key research objectives.

- To identify the key attributes associated to digital transformation of supply chain in 3PL companies.
- To identify the key challenges associated to digital transformation of supply chain in 3PL companies.
- To identify the key success factors associated to digital transformation of supply chain in 3PL companies.
- To analyse the attributes, challenges and success factors associated to digital transformation of supply chain in 3PL companies.
- To provide recommendations for 3PL companies to address the challenges associated to digital transformation and adapt key attributes and success factors.

1.5 Research Question

The research on attributes, challenges and success factors in digitalization of supply chain process in case of 3PL companies addresses following key research questions.

- What are the key attributes associated to digital transformation of supply chain in 3PL companies?
- What are the key challenges associated to digital transformation of supply chain in 3PL companies?
- What are the key success factors associated to digital transformation of supply chain in 3PL companies?
• What are the attributes, challenges and success factors associated to digital transformation of supply chain in 3PL companies?
• How 3PL companies can address the challenges associated to digital transformation and adapt key attributes and success factors associated to it?
CHAPTER 2: LITERATURE REVIEW

In the modern era of digitalization, most of private and government organisations are focusing on digitalisation of processes. According to Chen et al. (2021) these organizations are integrating digitalization into their processes to make their processes more efficient and to have a good end user experience. As discussed by Sundaram et al. (2020) the main technologies mentioned in the literature in the context of digital transformation can be identified as Internet technologies, analytical technologies and Gartner technologies. These complementing technologies have advanced over the past few years because of cloud computing and significantly playing their role in different business sectors. The following paragraphs give a detailed overview of the literature available on digitalization and its relationship with supply chain process in 3PL companies.

2.1. Digitalisation

The widespread use of the Internet and the range of options provided by digital technologies, and have increased impact of digitization on consumers, businesses, and society. As discussed by Farber (2004) the nature of digital technologies has evolved with time and among the top key technologies for 2005, Gartner listed technologies including instant messaging, increased adoption of wireless local area networks (WLANs), and IP telephony can be identified as prominent examples of advancements in digitalisation. As discussed by Hartley and Sawaya (2019) a list of advanced technologies in the garner technology as reported in 2010 can be identified as featured mobile applications, cloud computing, and sophisticated analytics. Similarly as reported by Spender (2015), the convergence of the physical and virtual worlds, intelligence everywhere, and the emergence of a new information technology (IT) paradigm were three main concepts that Gartner recognized among its top 10 strategic advancements for 2015. A new stage of information and communication technology known as ubiquitous computing, which is defined by pervasive technologies that aid in the unification of physical and electronic spaces, started to emerge in the same time (Cascio & Montealegre, 2016). Further, Panetta (2019) stated that hyper automation, blockchain, and human enhancement are among the top 10 critical technology trends for 2020.
2.2. Digital Transformation Key Attributes

The success of every business depends on the satisfaction of the customers. Higher customer satisfaction led to the profitability of the organization and led to sustainable longevity. According to Abdullah et al. (2022), one of the key attributes of digital transformation is its focus on the customers’ demands and making efforts to keep customers satisfied which impacts business performance. Digital transformation continuously improves the client’s experience which is considered the “make or break” impact of digital transformation (Singh et al., 2022). For instance, in case of for 3PL companies as stated by Alzoubi et al., (2022) client experience depends on the ability of the firm to ensure on-time delivery of the right product to the customers. With the advent of technologies and businesses’ inclination towards e-commerce, it became challenging for 3PL companies to manage a high variety of products therefore this challenge could be overcome by adopting digitalization (Faruquee et al. 2021). As discussed by Natarajan et al. (2022), through digital transformation, businesses create value and increase the customers’ satisfaction level by improving the supply chain sustainability that smooths the transfer of product from manufacturers to the end customers. Further, digitalisation enables organizations to develop strategic decisions that result in smoothing the business’s operations and increasing the customer’s experience (Nayal et al., 2022).

As discussed by Hartley and Sawaya (2019), for successful implementation of digital transformation, it is required to have transparent and well-defined processes. Digital transformation increases the response rate of the business and increases the dynamic capabilities of businesses to enables them to make timely decisions by reorienting the resources to increase the probability of sustainability. Further, digital transformation enables the identification of the market opportunity and develop market strategies accordingly. According to Manfreda and Indihar (2019), one of the key attribute of digital transformation is that it improves the business’s policy implication, optimizes the existing business models, and integrates different processes that improve business performance. The overview of the literature on benefits of digitilisation reflects that digital transformation in an organization increases the rate of innovation in an organization and encourages higher management to take risky initiatives that could result in higher returns. Similarly, as stated by Centobelli et al. (2022), businesses’ digital transformation
optimizes future growth and Industrial revolution 4.0 is the prime example of digital transformation in business. With the fourth industrial revolution, businesses start growing at a good pace and keeping their customers satisfied by meeting their needs and demands, therefore digital transformation is considered the key gradient for businesses' growth.

According to Agrawal et al. (2020), digital transformation results in the digitalization of infrastructure of business firms. Businesses are improving their business infrastructure for digitilisation by integrating resources and providing a platform where communication among different management levels is smooth. For instance, businesses are using computers, system hardware, wire, and wireless platforms that improve digital transformation. Similarly, sensing, cloud, big data, AI, machine/electronic device control, biometric authentication can also be identified as key infrastructural development attributes associated to digital technologies. Velez-Lapao, (2019), stated that because of the exponential increase in population, the demand for products has increased, and therefore to fulfill that need businesses are required to transform their processes towards digitalization. So, one of the attributes of digital transformation is its ability to increase the production rate in an organization which has a positive impact on businesses' economic growth and overall performance. Implementing and integrating digital technologies results in the visibility of most of the internal and external processes that led to optimization of business activities in terms of removing the non-value-added activities.

### 2.3. Digital Transformation Challenges

The overview of the literature reveals that the challenges associated to digitilisation can be identified as security challenges, poor culture, and lack of technical expertise to adapt digital technology. In case of security challenges Stewart (2022), stated that adaption of digitalization results in exposure of the company data on online platforms where data is open to the threat of hacking and cyber-attacks. Similarly, Dutta et al. (2020) argued that a firm that possesses aged senior managers hesitates to change the methods they used to process and store data. Sometimes organizations possess digital capabilities and can access to all technical skills required for specific task but cannot succeed in digitally transforming the processes and the reason is the absence of digital
culture (Chang et al. 2020). According to Manfreda and Indihar (2019), organizations in which higher management have bossy behaviors and they did not show a willingness to change their systems or adapt digitilisation as higher management is well known to traditional methods and technologies that have been used by organizations in various processes and operations. For instance, old-age managers prefer to do the paperwork instead of using laptops and computers because they are well aware of paper documentation and believe computers and laptops to store data are not effective as they cannot learn those digital machines quickly. Such behaviors and barriers associated to top management create problems in bringing digital transformation to organizations. As suggested by Anthony (2021), digital culture or dynamic culture supports positive change in an organization and it requires quality leaders who are capable of giving the right direction to their teams. However in most of the contemporary organisations lack leadership with equipment and skills required to bring digital transformation leading to failure. Therefore, the presence of digital capabilities, along with leadership, and digital culture enhances the chances for the digitalization process. According to Teng et al. (2022) the lack of expertise or technical skills associated to digitilisation can also be identified as key challenge for digitilisation. The digital transformation of businesses required expertise and currently, 3PL businesses that are not mature and are less than 5 years old, have a lack of experience and cannot be transformed digitally within a short span of time. Furthermore, as stated by Novikov and Sazonov (2020), lack of technical skills creates hurdles in the adaptation of digitalization. Therefore, in case of 3PL businesses, it is required to hire talented individuals who have technical abilities and develop an employee workforce that can shape businesses in a better way as compared to those which are having less or no technical skills.

2.4. Digital Transformation in 3PL Companies

3PL companies are responsible for providing logistics services to the manufacturers. Therefore 3PL businesses mainly depend on how well they deliver the product to the customers and how long it takes them to deliver the product. Therefore, as stated by Zhang et al. (2023) 3PL businesses require continuous improvement in their business supply chain by implementation of digital technologies. The digital transformation leads to the visibility of supply chain processes and shows the bottleneck
in the supply chain processes. In the era of globalization, 3PL business structure has become more complex and it more challenging for new businesses to deal with supply chain uncertainties. Similarly, the increasing trends of digitalization specifically with the advent of e-commerce, have also contributed in making the supply chain process more challenging in 3PL companies without adaptation of digitilisation. Therefore it is important to analyze the 3PL business to transform their supply chains by implementing digital transformation.

2.4.1. Impact of Strong Leadership on Supply Chain Digitalization

In today's fast-paced and digitally-driven business landscape, supply chain digitalization has become a critical component of success. As discussed by Shi et al. (2023) primarily strong leadership is necessary to drive digital transformation initiatives and make them successful. This is especially true for third-party logistics (3PL) companies, which rely heavily on technology and data to provide effective and efficient supply chain solutions to their clients. A strong leader can effectively communicate the importance of digitalization to their team and clients. They can create a shared vision and a clear roadmap for digital transformation, making sure everyone understands the benefits and potential risks of such initiatives. Musari and Zaroni (2021) stated that strong leaders can also inspire and motivate employees to embrace change and learn new digital tools and technologies. This is particularly relevant to 3PL companies, where supply chain managers and customer service representatives must be proficient in handling complex technology platforms to provide accurate and timely information to clients.

According to Cichosz et al. (2020), a strong leader can make informed decisions based on data insights and analytics. By leveraging advanced analytics tools, supply chain leaders can identify patterns and trends in data and make informed decisions that optimize the supply chain and reduce operational costs. They can also use data to develop new business models and value propositions, such as offering predictive maintenance services or personalized customer experiences. For 3PL companies, data analytics is critical for improving warehouse management, transportation planning, and
inventory optimization, which can ultimately lead to better customer satisfaction and profitability.

Similarly, as argued by Angevine et al. (2021), a strong leader can foster a culture of innovation and experimentation. They can encourage their team to think outside the box and explore new digital technologies and solutions. This can include testing new software applications, experimenting with automation and robotics, or exploring blockchain-based supply chain management solutions. By fostering a culture of innovation, 3PL companies can stay ahead of their competitors and deliver cutting-edge solutions to their clients. According to Tiwari et al. (2023), a strong leader can build strategic partnerships with technology providers and other industry players. By collaborating with technology vendors, 3PL companies can gain access to the latest tools and platforms and stay up-to-date with the latest digital trends. They can also partner with other industry players, such as manufacturers or retailers, to create integrated supply chain ecosystems that leverage shared data and insights. These partnerships can lead to improved efficiency, cost savings, and customer satisfaction.

Conclusively, as stated by Andiyappillai (2020), it can be observed that strong leadership is critical to the success of supply chain digitalization initiatives, particularly for 3PL companies. Leaders, who can effectively communicate the benefits of digitalization, make informed decisions based on data, foster a culture of innovation, and build strategic partnerships with technology providers and other industry players can drive significant value to their organizations.

2.4.2. Impact of Innovative Culture on Supply Chain Digitalization

The digitalization of supply chains has become necessity for businesses of all sizes, including third-party logistics (3PL) companies. According to Rauniyar et al. (2022) by adopting new digital technologies and solutions, 3PL companies can optimize their supply chain processes, increase efficiency, and enhance the customer experience. However, the success of digitalization initiatives is largely dependent on the culture of innovation within the organization. As stated by Cichosz et al. (2020) an innovative culture is one that promotes creativity, experimentation, and risk-taking. It encourages employees to think outside the box and challenge the status quo. An innovative culture is
essential for 3PL companies because it allows them to develop and implement new technologies and solutions that can streamline their operations, reduce costs, and improve the overall customer experience. One of the key benefits of an innovative culture is that it fosters collaboration and teamwork. According to Sumrit (2021) when employees feel empowered to share their ideas and perspectives, they are more likely to work together to solve problems and develop innovative solutions. This collaboration can lead to a better understanding of the supply chain process, identify areas that need improvement, and promote more efficient workflows. As argued by Andersson et al. (2023) an innovative culture encourages employees to explore new digital technologies and solutions, such as artificial intelligence, blockchain, and the Internet of Things (IoT). These technologies have the potential to transform the supply chain by automating processes, improving visibility, and providing real-time data insights. By embracing these new technologies, 3PL companies can stay ahead of their competitors and deliver better supply chain solutions to their clients. Furthermore, an innovative culture promotes a continuous improvement mindset. Employees are encouraged to seek out new opportunities for improvement and implement changes that can optimize supply chain processes (Haasis and Hapsatou, 2022).

According to Arora et al. (2022) an innovative culture can also help 3PL companies attract and retain top talent. In today’s competitive job market, candidates are looking for employers that value innovation and creativity. By promoting an innovative culture, 3PL companies can position themselves as forward-thinking organizations that are committed to delivering cutting-edge solutions to their clients. This can help them attract and retain talented individuals who are passionate about digital transformation and supply chain optimization. As suggested by Li, et al. (2023) an innovative culture is essential for 3PL companies that want to successfully navigate the digitalization of the supply chain. 3PL companies can develop and implement new digital technologies by promoting creativity, collaboration, and a continuous improvement mindset, and solutions that can streamline their operations, reduce costs, and enhance the customer experience. An innovative culture remains equally significant for 3PL companies to stay ahead of their competitors, attract and retain top talent, and position themselves as leaders in the
industry. Ultimately, an innovative culture is a key driver of success in the digital age, and 3PL companies must embrace it to thrive in the years to come (Wang and Pettit, 2022).

2.4.3. Impact of Continuous Learning on Supply Chain Digitalization

The digitalization of supply chains has become a key focus for many third-party logistics (3PL) companies, as they seek to optimize their operations and enhance the customer experience. However, as argued by Tiwari et al. (2023) the success of digitalization initiatives is not just about adopting new technologies and solutions, it also requires a commitment to continuous learning. As stated by Angevine et al. (2021) continuous learning is the process of acquiring new knowledge and skills on the base of observation of existing knowledge and skills. It is a vital component of any digitalization strategy because it allows 3PL companies to stay up-to-date with the latest technologies, trends, and best practices. By continuously learning, employees can identify new opportunities for optimization, develop new solutions to problems, and remain competitive in the market.

According to Faridi and Malik (2020) one of the key benefits of continuous learning is that it promotes a culture of innovation. When employees are encouraged to learn and experiment, they are more likely to develop new ideas and approaches to supply chain digitalization. This can lead to the adoption of new technologies, the development of new workflows, and the implementation of new solutions that can optimize supply chain operations. According to Zhang et al. (2023) continuous learning also helps employees understand the impact of digitalization on the supply chain. Digitalization can have far-reaching effects on the entire supply chain process, from procurement and inventory management to transportation and delivery. By continuously learning about these effects, employees can identify new opportunities for improvement and develop more effective strategies for implementing digital solutions.

As discussed by Tay and Loh (2021) one of the key benefits of continuous learning is that it helps employees adapt to change. Digitalization is a rapidly evolving field, and new technologies and solutions are being developed all the time. By continuously learning, employees can stay ahead of these changes and adapt their skills and knowledge to meet the needs of the organization. This can help 3PL companies remain
agile and responsive to changing market conditions, as well as evolving customer needs and expectations. Similarly, continuous learning also helps 3PL companies attract and retain top talent. In today’s competitive job market, candidates are looking for employers that value learning and development. By providing opportunities for continuous learning, 3PL companies can position themselves as organizations that are committed to helping their employees grow and develop. This can help them attract talented individuals who are passionate about digital transformation and supply chain optimization (Tardieu et al. 2020).

According to Andiyappillai (2020) continuous learning is a key driver of innovation and growth and when employees are continuously learning, they are more likely to identify new opportunities for improvement and develop new solutions that can optimize supply chain operations. This can lead to cost savings, increased efficiency, and improved customer satisfaction – all of which can help 3PL companies grow and expand their business. Similarly, as stated by Vlachos (2021) continuous learning is essential for 3PL companies that want to successfully navigate the digitalization of the supply chain. By promoting a culture of innovation and understanding the impact of digitalization on the supply chain, adapting to change, attracting top talent, and driving growth, 3PL companies can develop and implement new digital technologies and solutions that can streamline their operations, reduce costs, and enhance the customer experience. Ultimately, continuous learning is a key component of any successful digitalization strategy, and 3PL companies must embrace it to thrive in the years to come.

2.4.4 Impact of Legacy System on Supply Chain Digitalization

Legacy systems or the traditional means of doing business negatively impact on the digitalization of processes involved in 3PL companies. As stated by Angevine et al. (2021) legacy systems refer to outdated or obsolete software, hardware, or processes that are still in use in 3PL firms. In the context of supply chain management, legacy systems can hinder the adoption of digitalization in 3PL (third-party logistics) companies for several reasons. Firstly, as stated by Kern (2021) legacy systems may lack the flexibility required to integrate with new digital technologies. This can result in difficulties when attempting to incorporate new tools and technologies, such as blockchain, IoT
As a result, 3PL companies may hesitate to invest in digitalization due to concerns over the compatibility of legacy systems with emerging technologies. Secondly, Healy (2022) argued that legacy systems may have limited data storage and processing capabilities, making it difficult to handle large volumes of data generated by digitalization. In today's data-driven environment, data management is critical to supply chain efficiency and optimization. However, legacy systems may not be equipped to handle the sheer volume and complexity of data generated by new technologies, leading to inefficiencies and errors. Thirdly, as stated by Faridi and Malik (2020) legacy systems may be vulnerable to cyber security threats, which can put sensitive supply chain data at risk. As digitalization becomes more widespread, the risk of cyber-attacks increases. Legacy systems may lack the necessary security measures to protect against modern cyber threats, leading to concerns about the safety and security of critical supply chain data. Conclusively, the hesitancy of 3PL companies to adopt digitalization in their supply chain management is often due to the challenges posed by legacy systems. To overcome these challenges, 3PL companies may need to invest in upgrading or replacing legacy systems with more modern, flexible, and secure technologies that can support digitalization.

2.4.5 Impact of organization Resistance on Supply Chain digitalization

Digitalization has the potential to revolutionize supply chain management, enabling companies to optimize processes, improve efficiency, and reduce costs. However, as stated by Sumrit (2021), the adoption of digitalization in the supply chain is often met with resistance, particularly in 3PL (third-party logistics) companies. Organizational resistance is a common obstacle that can impact the success of supply chain digitalization initiatives in 3PL companies.

According to Lai et al. (2023), organizational resistance refers to the opposition, reluctance, or even active sabotage of new initiatives or changes within an organization. In the context of supply chain digitalization, organizational resistance can manifest in several ways in terms of fear of change, lack of understanding, inertia, and cost concerns. As stated by Shashi et al. (2020) in case of fear of change, digitalization requires changes in the way supply chain operations are carried out. Some employees may fear that these
changes will result in loss of job or that they will be unable to adapt to new technologies. Similarly, in case of lack of understanding digitalization technologies can be complex, and not everyone may fully understand their benefits or how they work. This can lead to a lack of buy-in or enthusiasm for digitalization initiatives (Rauniyar et al. 2022). Raza et al. (2023) stated that in some cases employees may resist digitalization simply because they are used to doing things a certain way. This can create inertia, making it difficult to introduce new technologies and processes. Similarly as stated by Wang et al. (2019) in case of cost concerns, implementing digitalization technologies can be expensive, and some organizations may resist digitalization initiatives due to concerns about the cost of implementation and maintenance.

The impact of organizational resistance on supply chain digitalization in 3PL companies can be significant in term of the ways in which it can impact supply chain digitalization in 3PL companies. For instance, Rusakova and Saychenko (2021) stated that resistance to change can slow down the adoption of digitalization in the supply chain. This can result in missed opportunities to improve efficiency, reduce costs, and gain a competitive advantage. Similarly, even when digitalization technologies are implemented, they may not be used to their full potential if employees are resistant to change. This can result in poor adoption rates, rendering the implementation of digitalization technologies ineffective (Rao et al. 2021). According to Ghahremani-Nahr et al. (2022), organizational resistance can also result in incomplete or partial implementation of digitalization technologies. This can lead to a fragmented supply chain, with some processes digitalized and others still relying on manual processes. Similarly, the resistance to change can increase the time and cost of implementing digitalization technologies, which can reduce the return on investment (ROI) of these initiatives.

2.5 Theoretical Framework

A report published by goals World Economic Forum, (2018) anticipated that businesses organisations that emphasis on digital technology will continue to increase at two-digit annual rates, driven by efficiency and growth goals (Junge and Straube, 2020). The digital transformation has emerged as a result of the variety of digital technologies that have been created over time and allowed for constant connectivity between people
and objects as well as new methods of producing and processing data. As stated by Nayal et al. (2022) once the necessary infrastructure has been constructed, digital technologies offer unparalleled replication potential at nearly no marginal cost. However, all actors must adapt to the new laws of competition and cooperation to maintain or restore their competitiveness as a result of these advancements. Additionally, as stated by Greenstein et al. (2013), new access methods to knowledge and data have been made accessible to individuals businesses, and governments, changing social interactions and opening up new commercial opportunities. Digital technology has also changed the way corporations and markets interact as well as the way market participants behave (Lamberton and Stephen, 2016). According to Peladeau (2017), Digital transformation is a practically driven method that is based on making changes to the existing system and replacing the traditional methods with advanced and digital methods. With the increases in competitive intensity, firms need to incline towards digitalization by making structural changes. The following lines discuss the key attributes associated to digital transformation.

A wide range of theoretical frameworks discussed in the literature refer to the relationship between digitilisation and supply chain in 3PL companies. However, the current study is inspired by the digital supply chain model presented by Garay-Rondero et al. (2020). As reflected in Figure 1, The digital supply chain model highlights key components required for a digital supply chain both in terms of digital and physical supply chain network structure. The model also conveys the benefits of the digitilisation for 3PL companies across its value chain. These benefits can be identified in terms of value chain creation, better product and service flows and real time information and knowledge of the products, services and resources.
2.6 Research Gap

The overview of the literature reveals the fact that the impact of digitilisation on supply chain management is a widely discussed topic and key focus of the researchers and academicians. However, as argued by Vlachos (2021), the critical analysis of the recent literature on the relationship between digitilisation and supply chain reveals that a very few studies have referred to the case of 3PL companies while discussing digitilisation in supply chain. The impact of digitilisation on 3PL companies can be identified as a key area of concern since business structure of these companies significantly rely over their supply chain functions. Thus, as stated by Vlachos and Polichronidou (2023)
improvement in supply chain mechanisms of 3PL companies strengthens the business operations and enhance business sustainability. Therefore, a discussion on the key attributes challenges and opportunities associated to digitilisation of 3PL companies can be identified as a significant research gap. In the light of these arguments the current study will address some key research questions that have been rarely discussed in the literature. These questions can be stated as: Why digital transformation is a crucial element for successful businesses and specifically for 3PL companies?”, “How does digital transformation foster the efficiency of 3PL performances?”, and “What are the challenges faced by the 3PL and other companies to adopt digital technologies?”
CHAPTER 3: RESEARCH METHODOLOGY

This research methodology refers to set of choices made by the researcher while evaluating the different research approaches that best suit the research topic. The methodological choices that guide the research as discussed by Thambinathan, V. and Kinsella (2021) can be identified as research philosophy, research approach, research design, data collection and data analysis. The different methodological choices available for a researcher can be better demonstrated with the help of Saunder’s research Onion as reflected in Figure 1. The following paragraphs discuss each of the methodological choices with reference to relevance to the current research.

![Saunder's Research Onion](Source: Sahay, 2016)

3.1 Research Philosophy

The research philosophy refers to the background of a research in terms of the philosophical foundations of the research. The positivism and interpretivism can be identified as two well-known categories of research philosophy. According to Adom et al.
(2016) positivism philosophy relies over the empirical assessment of the natural phenomena through scientific experiments and survey questionnaires. On the other hand, the interpretivism philosophy refers to the theoretical assessment of research phenomena through expert opinions and existing research on the research phenomena. In the context of the current research since the research aims to explore the impact of digitilisation on the supply chain of 3PL companies, therefore opinions from the individuals from 3PL companies remains significant. In this regard, it can be argued that the interpretivism research philosophy remains a valid methodological choice for the current research. As argued by Huang, (2002) the interpretivism research philosophy enables the researcher to get and in-depth understanding of the research topic by exploration of all the theoretical aspects associated to research.

3.2 Research Approach

The research approach refers to the logical reasoning sequence adapted by the researcher to connect the research objectives with research outcomes. In the context of the research approach as reported by Muhammad et al. (2021) the two well-known research approaches can be identified as deductive and inductive reasoning approach. In case of inductive approach researcher focuses on the development of new theory based on the expert opinion and arguments presented in the literature regarding the relationship between research variables. On the other deductive approach focuses on the testing and validity of the existing literature available on the relationship between the researches variables. In the context of the current research the inductive research approach can be identified as a valid methodological choice since the researcher aims exploration of the existing literature available on digitilisation in supply chain of 3PL companies and aims to refer to the opinions of the individual from 3PL companies regarding the way digitilisation have influenced their supply chain functions. As discussed by Mohajan and Mohajan (2022) the use of inductive approach will further help researcher to adapt a flexible research strategy by modification of the research topic and techniques base on the nature of data. It will allow the exploration of new concepts related to the digital transformation of the supply chain in 3PL companies that have not been communicated in previous research.


3.3 Research Design

Research design refers to the methodological framework used to carry out a research study. It involves the systematic and structured process of collecting, analyzing, and interpreting data to generate new knowledge or validate existing knowledge. There are various research approaches, and the choice of approach depends on the research question, the nature of the data, and the research design. There are two main research designs which are quantitative approach and qualitative research design. As discussed by McMeekin et al. (2020) the choice of research depends on the research question, the nature of the data, and the research design. Researchers should carefully consider the strengths and limitations of each approach and choose the one that best suits their research objectives. This study is aims to investigate the digitalization of the supply chain processes that required ideas and experience of the higher management; therefore it's important to be in contact with the higher management of the company to get their opinion and to analyze the verbal and non-verbal responses of the management. Therefore, qualitative research design can be identified as a valid approach for the current research.

3.4 Justification for Qualitative Research Method

According to Ritchie and Spencer (2002), qualitative research is a method of inquiry that focuses on exploring and understanding social phenomena through subjective interpretations of experiences, attitudes, and behaviors. Unlike quantitative research that relies on numerical data and statistical analysis, qualitative research emphasizes on gaining insights and understanding of the underlying reasons, motivations, and emotions that drive human behavior (Zheng et al., 2015). Qualitative research is often used in social sciences, humanities, and other fields where understanding human experience is essential (Given, 2008). Qualitative research involves a variety of methods for data collection, such as interviews, observation, focus groups, case studies, and document analysis. The data collected through these methods are analyzed through various techniques such as content analysis, narrative analysis, and thematic analysis. The goal
of qualitative research is to gain a deep understanding of the subject matter and identify patterns and themes that emerge from the data.

According to Abowitz and Toole, (2010) one of the significant advantages of qualitative research is its ability to capture complex and nuanced aspects of human behavior that cannot be easily quantified. Qualitative research is well-suited for exploring complex social phenomena and understanding the underlying social, cultural, and psychological factors that drive human behavior. For instance, in case of current research qualitative research can be used to explore the lived experiences of individuals from 3PL logistics remains significant, to understand the impact digitilisation on the supply chain of 3PL companies. Furthermore, Vears and Gillam (2022), the advantage of qualitative research is its flexibility and adaptability. Qualitative research methods can be customized to fit the needs of the research question, the nature of the data, and the context of the study. It allows the researcher to be flexible and responsive to the data and adapt their methods and approach accordingly. This flexibility also allows researchers to gain a deeper understanding of the research participants from different 3PL companies and their experiences, leading to more meaningful insights on impact of digitilisation on supply chain.

The current study aims to investigate the success factors, key attributes of a 3PL company to digitalise its supply chain to make it more reliable and sustainable. For which the direct contact with the higher management is necessary, and this qualitative approach has been adopted author to achieve the research objective. As this research study is based on digitalization of 3PL supply chains, which is a very complex process. Therefore, it’s important to ask the open ended questions regarding the challenge they face during the digitalization changes, and what were the key factors, and success factors to get unlimited information about these elements.

3.5 Data Collection

Exploratory research design is a method of research that is used to gather information about a topic or issue that is not well understood (Pinsonneault and Kraemer, 1993). It is a preliminary study that helps to identify the key issues that need to be investigated further. The primary purpose of exploratory research is to gain a deeper
understanding of a phenomenon and to develop new ideas or hypotheses for further research. Exploratory research design is often used in situations where the researcher is not sure about the research questions or where there is limited knowledge about the topic (Kalpokaite and Radivojevic, 2019). This type of research design is generally used in the initial stages of a research project to develop a better understanding of the problem. Exploratory research design can also be used to test new ideas, concepts, or theories. Exploratory research design includes the interviews and we have selected this method. As discussed by Ruslin et al. (2022) exploratory design is based on two types of data, primary and secondary. Primary data collected from individuals and groups while the secondary data is collected through existing reports, and academic journals. In this research study secondary and primary data has been utilized. Secondary data extracted from academic journals and primary data collected via interview from the higher management of the company.

As mentioned earlier, this research aim to investigate the digital transformation in supply chain of 3PL companies, and these information could be provided by the higher management therefore instead of asking the close ended questions via questionnaires, the researcher have decided to get in contact the higher management of the 3PL companies to get time for online interviews to ask open ended questions.

Based on the research objectives and the research design, this study adopted the interview method to collect data from the respondents. The achievement of research objectives is to have the in depth analysis of the research questions, and there must be a discussion on focused factors that having positive or negative impact on the digitalization of supply chain in 3PL companies. Moreover, respondent were ask to openly indicate the challenges they faced to digitalize the supply chain, and what were the fostering elements which make it easy for them to adopt the digitalization in their supply chain. Interview is the most flexible approach to collect data from respondents and to get insights which may not be considered at the start of the interviews.

3.6 Interview Design – Semi-Structured

Semi-structured interviews are a popular method of data collection in social science research. They are used to collect qualitative data from research participants by
allowing them to express their experiences, opinions, and attitudes towards a particular subject. Unlike structured interviews, semi-structured interviews are more flexible in terms of the type and range of questions that can be asked. Researchers typically use a pre-designed set of questions, but they are free to ask follow-up questions or to explore certain topics in greater detail.

One of the benefits of using semi-structured interviews as conveyed by Gregory (2020) is that they allow the researcher to gather detailed information about a specific topic or phenomenon. Participants are given the opportunity to provide in-depth descriptions and explanations of their experiences, which can provide valuable insights into complex issues. Additionally, in the context of the current study on digital transformation of supply chain functions in 3PL companies, semi-structured interviews allow researchers to compare and contrast the perspectives of different participants, which can help to identify patterns or themes across the data. Here, the researcher have applied this approach to get information related to the factors which are incorporated in the research conceptual framework and as well as the additional information regarding the challenges, attributes, and success factors. Moreover, the common key elements identified during interviews from different participant allow researcher to draw a more generalize solution and to draw the practical contribution of this research study.

### 3.7 Summary of Interviews

<table>
<thead>
<tr>
<th>Case Expert</th>
<th>Interviewee</th>
<th>Role</th>
<th>Date of Interview</th>
<th>Interview Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1</td>
<td>Interview 1</td>
<td>National Logistic Cell (NLC)</td>
<td>11.02.2023</td>
<td>56 min</td>
</tr>
</tbody>
</table>

Table 1: Summary of the interviews, including time duration and role description
<table>
<thead>
<tr>
<th>Interview</th>
<th>Managers</th>
<th>Date</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td>11.02.2023</td>
<td>79 min</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>15.02.2023</td>
<td>41 min</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>15.02.2023</td>
<td>88 min</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>16.02.2023</td>
<td>65 min</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>16.02.2023</td>
<td>49 min</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>17.02.2023</td>
<td>40 min</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>17.02.2023</td>
<td>45 min</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>19.02.2023</td>
<td>30 min</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>19.02.2023</td>
<td>35 min</td>
</tr>
</tbody>
</table>

### 3.8 Sample Size

As the research is focused on the digitalization of supply chain in 3PL companies, therefore, the respondents from the respective departments were chosen. We requested the warehouse manager who deal with the product flow, the supply chain manager at the head office at case study firm and two individuals from the lower managements were selected. Another limitation that we have considered is the experience. We have requested who have experience of at least 5 years in this field and having educational background related to software and managerial sciences. This filtration enable us to get in contact with the participant who best meets our requirements and that will help us to achieve our objective. Ultimately the final sample size was 10. Participants must have the following characteristics.

- Must know how 3PL industry works.
- At least 5 years’ experience in the field under study.
- Should have a relevant position that makes decision regarding the digital transformation.
3.9 Data Analysis Technique

The well-known qualitative analysis techniques as reported in the literature can be identified as thematic analysis and content analysis. However, as discussed by Kalpokas and Radivojevic (2022) while conducting a qualitative research if the research instrument is interview then thematic analysis can be identified as a valid methodological choice. The thematic analysis allows the researcher to extract different themes from the responses of the authors and observe their relevance with research questions. As discussed by Daniel (2019) the thematic analysis can be identified as a relatively quick method to understand and apply. In the current research the thematic analysis allows the researcher to explore the opinions of the individuals in 3PL companies and develop themes that connect with the objective of the research.

3.10 Ethical Considerations

According to Adler (2022), there are four principles of trustworthiness in qualitative research. The first principle of trustworthiness is credibility, which refers to the degree to which the research accurately represents the experiences and perspectives of participants. To ensure credibility, researchers must establish a rapport with participants, use multiple sources of data, and engage in reflexivity by acknowledging their own biases and assumptions. To ensure the credibility of the data collected we have requested to check the guidelines and if they believe any answer is not complete or led to confusion then give explanation in which context they reacted.

The second principle is dependability, which relates to the consistency and stability of the research findings over time. As suggested by Roudsari, (2019) researcher enhances dependability by using clear and consistent research methods, documenting their procedures, and engaging in member checking, where participants review and provide feedback on the research findings.

The third principle is transferability, which refers to the degree to which the findings of the research can be generalized to other contexts or populations. Researchers can enhance transferability by providing detailed descriptions of the research methods and context, and by using purposive sampling to ensure that participants represent a range of experiences and perspectives. To ensure the data dependability, the researcher have
compared the participant’s answers with other extant literature and there is a coherence which indicates the data is dependable.

The fourth and final principle is confirmability, which relates to the objectivity and neutrality of the research findings. Researchers can enhance confirmability by using a systematic and transparent approach to data analysis, acknowledging their own biases, and using peer review or an audit trail to ensure that the findings are grounded in the data. We have double check the questions and ask follow up questions to confirm the reliability of the data.
CHAPTER 4: FINDINGS OF THE RESEARCH

This chapter is based on the data collected via interviews, and exact information is quoted in the similar manners, while the conclusion and summary of that information has been added to increase the in-depth understanding of arguments given by respondents. Further to draw a conclusion based on the interviews it was required to cluster the interviews data for which author have classified into different themes.

4.1 Themes Identification

Table 2: Identification of Themes and their description

<table>
<thead>
<tr>
<th>Themes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept of Digitalization and its integration in Supply Chain</td>
<td>To identify how well respondents are aware with the concept of digitalization of Supply Chain.</td>
</tr>
<tr>
<td>Digitalization is in Demand in 3PL companies</td>
<td>Why business needs to make their processes digitalized?</td>
</tr>
<tr>
<td>Barriers</td>
<td>Identify the key barriers which create hindrance in the process of digitalization in 3PL companies.</td>
</tr>
<tr>
<td>Drivers</td>
<td>Identify the key drivers which create hindrance in the process of digitalization in 3PL companies.</td>
</tr>
<tr>
<td>Digitalization and Sustainability</td>
<td>To analyze how digitalization shapes the sustainability of supply chain in 3PL companies</td>
</tr>
<tr>
<td>Business Success</td>
<td>Digitalization cause the business success specifically for 3PL companies</td>
</tr>
</tbody>
</table>

4.2 Concept of Digitalization and its integration in Supply Chain

Digitalization in supply chain is critical for success, and after collecting data from the interviewees it’s been clear that every respondent is well aware of the digitalization and the fruitful outcomes of digitalization on supply chain and overall business. When we asked about their opinion towards digitalization of supply chain in 3PL companies then
respondent 1 replies that, “not only the 3PL companies, supply chain of every sectors needs to be digitalized, because it make you able to visualize the ongoing supply chain process and one can keep improving the process to make the supply chain more reliable and sustainable”. Further, respondents elaborates that, “in our sector, 3PL, supply chain is very complex, we are providing services to the companies, that are responsible for manufacturing the perishable products and ass well as to the nonperishable product manufacturers, therefore we need to make sure the proper sorting of the products and their onetime delivery to the customers” By extending the argument, “we are possessing high volume and high variety which make the sorting process more difficult for us, therefore we need to implement the digitalization in our supply chain”

Further, one of the question we have added is how do you integrate digital process in your traditional supply chain process and one of the respondent states that “It’s difficult, especially when the workforce is not well aware of digital processes, when the workforce is prefer to work on traditional means of supply chain, but recently our HR is doing a great job by hiring the employees from CS and SE backgrounds which are integrating the digital processes in our supply chain to make the processes more smoother” [Respondent 3]

Further we discussed about the awareness of the management about the current trends in the world about digitalization and so ask the following question “do you know about a specific trend in the world about digitalization or strategy?” in response to this stated one of the respondent states the followings “Off course, we are well aware of industry 4.0 which includes the IoT, internet of things to make systems digitalized and also following the SOPs available to implement the digitalization in our systems” [Respondent 2]

Till here, the importance of digitalization has been discussed during interviews, but then we move towards analyzing the techniques been adopted by the management to implemented and in analyzed their understanding about the current trends about the digitalization so we asked, is they any specific strategy you are implementing in your systems or just implementing hiring the individuals to implement the digitalization? In response to this question respondent 1 states that “We are analyzing west and China, we know as far as the 3PL companies are concerned China is ahead of world and we can
learn from them, not only to improve our systems but also to detect the flaws in our systems, so right now the strategy is to analyze the Chinese and western supply chain digitalization and then try to hire individuals having ability to make a replica that improves our supply chain” [Respondent 4]. This response from respondent clarify their interest towards digitalization and making supply more reliable and agile. Further to get knowledge about the specific models we asked the following question “is there any specific company or model you are following to make your company sustainable?” In response to this question,” [Respondent 5] stated that “not a single one, for instance we talk about China, we are analyzing Taobao, Pinduoduo, and globally amazon, these are the company’s which are having proven sustainable and agile supply chains and we are following these organizations applications, the services they provide to the customers to improve our supply chain”

From these arguments from managers of NLC clarify that they are well aware of the concept of digitalization, and integration of digitalization is the key challenge faced by the organization recently. To overcome this challenge, NLC managers are following the Chinese model to improve their business supply chains.

4.3 Digitalization is in Demand

Digitalization has become a critical component for businesses across all industries, and the logistics sector is no exception. The increasing demand for third-party logistics (3PL) services has put pressure on logistics companies to adopt digitalization to remain competitive and meet customer expectations. Digitalization in 3PL companies refers to the use of technology to streamline and optimize logistics processes. It involves the integration of various digital tools and platforms, such as transportation management systems (TMS), warehouse management systems (WMS), and enterprise resource planning (ERP) software, among others. One of the most significant benefits of digitalization in 3PL companies is improved visibility and transparency across the entire supply chain. With digital tools such as TMS and WMS, logistics companies can track shipments in real-time, from origin to destination, providing customers with accurate and timely information about their cargo. This real-time tracking also helps logistics companies
to anticipate and address any issues that may arise during transit, ensuring that shipments arrive on time and in good condition.

Another benefit of digitalization in 3PL companies is increased efficiency and productivity. Automation of various logistics processes, such as order processing, invoicing, and document management, reduces the time and resources required to complete these tasks manually. This automation also reduces the likelihood of errors and eliminates the need for manual data entry, freeing up logistics personnel to focus on more critical tasks such as customer service and problem-solving. Digitalization in 3PL companies also facilitates collaboration and communication across the supply chain. With digital tools such as cloud-based platforms and mobile apps, logistics companies can easily communicate with customers, suppliers, and carriers in real-time, enabling them to respond quickly to changing circumstances and adjust logistics operations accordingly. This collaboration and communication also enhance customer service and satisfaction, as customers can track their shipments and communicate with logistics personnel easily.

Digitalization in 3PL companies enhances data analytics capabilities. With digital tools such as ERP systems and business intelligence software, logistics companies can collect and analyze data from various sources, such as customer orders, supplier performance, and carrier performance, among others. This data provides valuable insights into logistics operations, enabling logistics companies to identify areas for improvement, optimize routes and schedules, and reduce costs.

Digitalization is in demand, but its requirement in 3PL companies is quite higher, therefore we have asked the following to the question to the respondents “Digitalization is a universal trend, but its seems more important for 3PL supply chains, why?” in response to this question interviewee states that “It’s simply because of 2 elements, volume and variety, 3PL companies are possessing high volume and high variety, moreover the responsibility of the 3PL companies is to deliver perishable products within given time, and also to separate the products having probability to be broken, if not taken with good care, because of these responsibility it’s important to visualize the products and their safe delivery. Moreover, other companies reputation is based on their products quality, and mainly the price, but in our case, the reputation of the manufacturers as well
as ours, is in our hand because most of the population in Pakistan is still not aware the manufacturer and delivering companies are different therefore we have to be more efficient to keep our reputation and manufacturers reputation higher. To summarize, our responsibility is double, first to keep our relationship with our client strong by delivering the right product to the right customers at the right time, and secondly by satisfying the end user by delivering his product on time, these dual responsibilities make digitalization in 3PL companies more important” [Respondent 6]

These arguments from respondents clarify that the digitalization in supply chain of 3PL companies is very important, but further to clarify, study aim to identify the specific impact of digitalization on 3PL companies efficiency so author ask the following question to the respondents “how digitalization implementation in organization will improve the efficiency of the whole system?”. Responding to this question, respondent states that “by implementing the digitalization in our systems we are improving the visually, monitoring, and the product flow of the system, that will enable us to calculate the total time required to deliver product to end customers, through this we can improve the product flow which will ultimately influence the customers satisfaction. Moreover, recently one of the challenge we faced is to deliver the right product to the right customers during peak seasons i.e. summer, the demand for the product is very high, product sorting is the challenge and secondly the delivery of the products according to the location, through digitalization, a cluster will be made according to customers and strategies will be developed so that most of the customers can get their products at once instead of sending product to a single area individually” [Respondent 7]. Further [Respondent 8] stated that “recently, we have identified that there are number of non-value added activities because of absence of digitalization, for instance, in Punjab, we have to deliver products very frequently, but because of manually intensive process, it took three to five visits of delivery person to deliver every product, but through digitalization we can calculate the total order and all at once can be delivers to the customers without paying any extra visit, it will have two benefits for us, first is the cost saving by delivering products at once to the customers and secondly keeping customers satisfy as they can have their products even before time”
These reactions by respondents clarify one thing that the need of digitalization is more required than 3PL and the professionals are well aware of the need. Most of the respondent clearly states that they are facing problems in the product sorting process, which create hindrance in their product distribution systems. Moreover, they also know that the digitalization is the key to overcome these difficulties. From the interviewees point of view it’s been clear that the digitalization is in demand for 3PL companies because it can provide the permanent solution to them.

Supply chain digitalization is transforming the way that 3PL (third-party logistics) companies operate, and is having a significant impact on their efficiency. By leveraging digital technologies, 3PL companies can streamline operations, enhance visibility, and improve collaboration with customers and partners. One key way that supply chain digitalization is impacting the efficiency of 3PL companies is through the use of real-time data and analytics. With the help of digital platforms and tools, companies can gather and analyze data from across the supply chain, allowing them to make more informed decisions and optimize their operations. This can lead to improved efficiency, reduced costs, and enhanced customer experiences.

Another important impact of supply chain digitalization on 3PL companies is the ability to automate routine tasks and processes. By automating tasks such as order processing, invoicing, and inventory management, companies can free up their staff to focus on more strategic and value-added activities. This can result in greater efficiency, improved accuracy, and faster response times. Supply chain digitalization also enables better collaboration and communication between 3PL companies and their customers and partners. By leveraging digital platforms, companies can share information and data in real-time, leading to improved visibility and better decision-making. This can lead to enhanced trust and stronger relationships with customers and partners. Supply chain digitalization is having a significant impact on the efficiency of 3PL companies. By leveraging real-time data and analytics, automating routine tasks, and improving collaboration and communication, 3PL companies can optimize their operations and stay competitive in the digital age.
4.4 Barriers

Digitalization is in demand for the 3PL companies but still companies are facing problems in implementing digitalization in their systems that means organizations are not fully capable to make their systems ready to adopt digitalization. To understand the major barriers that are faced by the businesses and organizations We have asked our respondents question regarding these barriers.

“So, have you, higher management, or the team working under you have tried to implemented the digitalization in your systems?” responding to this question Respondent 9] stated that “Yes, in 2019 we started working on a project “The Digital Leap” with four members, 1 stakeholder from higher management directly involved in that project while 3 employees from engineering background were working with me on that. But, due to some internal and external uncertainties we were not able to complete that project at that time, as it was the first attempt and quite challenging for us to complete the project”. Further extending this question and to get in depth knowledge about the projects digitalization we have put another question infront of them which is “what were the key challenges that you have faced or which create problems in successful completion of that project” Responding to this question [Respondent 10] stated that “see, we are facing challenges from within the organisations and outside. Our managers who are working in this organizations for more than 10 years are very well known of the traditional processes and these tasks became one of the integrated part of their life so its became challenging to convince them about it, they are satisfied and happy with their daily routines and even knowing the demand has been changed, they preferred to increase the workforce rather than changing the systems digitally to improve the overall efficiency. Along with these internal challenges we have also faced the problems from the outside as well, for instance the government is not supporting the digitalization processes of an organisations, for instance getting license for the digital platform we are trying design is a difficult process and it create hindrance for us. Moreover, the barriers are not limited to this only, we also having limited resources to design such platforms and to integrate the new systems or to replace new systems here. Though our HR department is making efforts to hire new employees with background in digitalization, and software”
Extending this argument to the organizational level, and related it to the conceptual framework designed for this study, following question were asked to the respondents “This resistance towards the digitalization is from the individual entities or it is at the organizational level?” Respondents states that “basically, most of the higher management employees were resistive to this change till 2021, and at that moment, it was considered to be the organizational resistance, but with time this resistance gradually start decreasing. The major reasons for this decrease is the efforts made to present the successful business models to the higher management, for instance, we have presented the business model of Taobao, SF, Amazon, Pinduoduo to the higher managements because the core functions of those organizations are completely in line with ours. We presented annually reports of those companies to our higher management those reflects the annual profits, and revenue streams of those companies. These stats influence the behavior of higher management towards the digitalization, therefore now we are moving in that direction” [Respondent 7, 4]

From these arguments it’s clear that the two major barriers that included in conceptual framework were also identified by the respondents as well. Legacy systems and the organizational resistance, both barriers were faced by the companies and along with these two lag of technical expertise led to the poor implementation of digitalization in the systems. From these arguments of respondents it’s clear that for business digitalization support from the higher management is critical. Absence of support from higher management led to problems in transforming firms digitally

4.5 Drivers

Besides the barriers, we also aim to identify the drivers that influences the supply chain transformation, so we ask the following question to the respondents “what are the factors which influence the digital transformation?” [Respondent 8] responded to this question this way “Yes, there are few factors which influence the digital transformation in the industry. For instance, when the higher individuals support the transformation it smoothen the process, in 2019 it seems really difficult because most of the board director were not in the favor of bringing digital transformation in the systems, but within next few years, when the higher management realize the importance of digital transformation, and
start supporting the efforts by hiring the technical experts and provide moral supports to the employees make the transformation process more smoother and now our processes are digitalized, and we have the fruitful results indeed, so the support from the higher management is really a crucial driver for the digital transformation of the company”

From these arguments from higher management clarified that the most important factor is the support from higher management, once that support is missing than it will not be possible to transform the systems. It is obvious that the company’s goals are in line with their stakeholders, so when stakeholders are willing to transform their business that it seems possible otherwise it will not be an easy process. Further relating it to the individual’s role following question were asked to the respondents “So, every individual from the higher management has equal role in influencing the digital transformation in your systems” [Respondent 7, 9] reacted to this questions quite differently. For instance one of them states that “Everyone is important but not equally. Because this process of digital transformation required time to time motivation and incentives and the right directions, so the one who have these qualities will be more important compare to the rest of the lot. In other words we can say that, leader of the pack is having higher duties and have some extra duties comparing to the rest of management which impact the digital or any kind of transformation in an industry. For instance, in 2021, when we were completely transforming our project Mr. Rizwan who is director supply chain, with two years’ experience in 3PL companies were having a completely different approach and he lead us to the right direction. When we started this process, he clearly states that planning is more important than its execution, and in this planning process the main focus should be the end customers and its satisfaction, so first we enlist the outcomes which we could have at the end of transformation and how it will be beneficial for us and then keeping in mind those outcomes we started the processes of brainstorming where everyone participated and an adequate plan were designed to start the process of digital transformation of the process. Moreover, with every passing time when we feel demotivated or face managerial or technical uncertainties Mr. Rizwan keep motivating us which results in successful transformation of our supply chain digitally. So, from our experience, it’s important that every stakeholders and higher management individuals
should accept the changes and it will reflects the organization readiness but every individual is not important equally” [Respondent 5]

The role of leadership is critical in driving digital transformation of 3PL (third-party logistics) companies. As the logistics industry continues to evolve and adapting digitilisation, leaders must embrace and drive change to stay competitive and meet the evolving needs of their customers. Leaders must have a clear understanding of the potential benefits of digital transformation, such as improved efficiency, enhanced customer experiences, and increased agility. They must also have a strategic vision for how digital technologies can be leveraged to drive business growth and stay ahead of the competition. Secondly, leaders must lead by example and foster a culture of innovation and experimentation. This involves empowering employees to explore new ideas and take risks, while also providing the necessary resources and support to implement digital solutions.

Thirdly, leaders must be willing to invest in technology and digital talent. This includes developing and recruiting the right talent with the necessary digital skills, as well as investing in the infrastructure and systems needed to support digital transformation. Leaders must have strong communication skills and be able to effectively communicate the vision and benefits of digital transformation to all stakeholders, including employees, customers, and partners. They must also be able to navigate and overcome any resistance to change and ensure that everyone is aligned and committed to the digital transformation journey.

By embracing and driving change, fostering a culture of innovation, investing in technology and talent, and effectively communicating the vision and benefits of digital transformation, leaders can position their companies for success in the digital age.

Next respondent extended the argument of the first respondent in the following way “one who has the knowledge about the processes is more important comparing to others. For supply chain’s digital transformation the role of the supply chain experts were way more critical than the others. When complete support provided by the higher management it will only motivate the employees, but we need technical guidance and expertise for the successful completion of the projects which required an individual having
expertise and experience in that field and therefore supply chain managements experts were more important in this transformation comparing to the others” [Respondent 4]

From these responses, two drivers extracted which influences the digital transformation. These factors are organizational readiness, leadership, and expertise. In our model we have also incorporated the innovative culture, though none of the respondents states about it but from their answers it’s clear that when the innovative culture was not in company during 2019 and higher management prefers to work with tradition means of operations, it seems difficult but when they adapt the change, and accepting the demand by bringing innovation in their systems, it indicates that there is innovative culture is a critical element for the successful transformation. Or in other it can be stated that the innovative culture influence the digital transformation and it’s the crucial drivers for the change implementation in the systems. Innovation culture plays a critical role in driving digital transformation in companies. As technology advances and digital disruption continues to reshape industries, businesses must embrace an innovation mindset to stay competitive and meet evolving customer needs.

An innovation culture is one that values experimentation, creativity, and risk-taking. It encourages employees to think outside the box, challenge the status quo, and constantly look for ways to improve processes and products. With this culture, companies can foster a culture of innovation that drives digital transformation. Digital transformation involves the integration of digital technologies into all areas of a business, fundamentally changing how companies operate and deliver value to customers. This requires a mindset shift and a willingness to embrace change. An innovation culture can help companies achieve this by empowering employees to identify and implement digital solutions that drive business growth. Furthermore, a culture of innovation can help companies stay ahead of the curve by anticipating and responding to disruptive trends in their industry. This can lead to new business models, revenue streams, and improved customer experiences. It enables businesses to adapt and thrive in a rapidly changing digital landscape by fostering a culture of experimentation and continuous improvement. By embracing innovation, companies can create new opportunities for growth and maintain a competitive edge in the digital age.
4.6 Digitalization and Sustainability

Further the conceptual framework we have stated that the digitalization impacts the digitalization process of the companies. The digitalization of supply chain operations can have a significant impact on the sustainability of 3PL (third-party logistics) companies. Here are some potential ways that digitalization can contribute to a more sustainable supply chain:

Digitalization can help 3PL companies optimize their resource utilization, such as reducing fuel consumption by optimizing delivery routes or improving warehouse space utilization through automated inventory management. This leads to a reduction in carbon emissions and waste. Digitalization can improve transparency and traceability across the supply chain, allowing companies to identify areas of inefficiency and waste. This information can be used to optimize processes and reduce waste, leading to a more sustainable supply chain.

Digitalization can facilitate collaboration and communication between different parties in the supply chain, such as suppliers, manufacturers, and retailers. This can lead to better coordination and planning, reducing waste and improving efficiency. Digitalization can provide 3PL companies with data and analytics to make more informed decisions about their operations. This can help companies identify areas for improvement, such as reducing energy consumption or minimizing waste, leading to a more sustainable supply chain. Overall, digitalization has the potential to improve the sustainability of supply chain operations in 3PL companies by optimizing resource utilization, improving transparency and traceability, facilitating collaboration and communication, and enabling data-driven decision making.

One of the advantages of digital transformation of supply chain is its sustainability. To relate the digitalization with the sustainability of supply chain we asked the following questions “do you think there is a link between the digitalization of supply chain and its sustainability?” Respondent reacts to this question in the following manner:

Respondents stated that “When considering the positive impact of supply chain digitalization on the supply chain, I would say that it has been truly transformative. As someone who has worked in the industry for years, I have seen firsthand the many
benefits that come from embracing digital technologies. For one, digitalization has allowed for greater transparency throughout the supply chain. With the use of tools like blockchain, it is now easier than ever to track goods from their origin to their final destination, giving companies and consumers alike greater peace of mind about the products they are buying. In addition, digitalization has made it possible to optimize many aspects of the supply chain, from inventory management to logistics. By automating certain processes, companies can save time and money while improving efficiency. Overall, I believe that supply chain digitalization is a critical step forward for the industry, and I am excited to see how it continues to evolve in the coming years.” [Respondent 1, 2, 9]

From these arguments, it’s been clear that there is a strong impact of digitalization of supply chain on its sustainability.

4.7 Business Success

Digitalization has the potential to influence the business success by improving the business operational capabilities and it improves the overall performance. So, author make efforts to analyze the importance of digitalization in shaping business success through a real case study instead of relying on extant literature. Therefore, following question were asked to the respondents “do you believe the success of 3PL companies highly dependent on the digitalization of supply chains?”

Respondent states that “As a supply chain manager, I strongly believe that the success of 3PL (third-party logistics) companies is highly dependent on the digitalization of supply chains. With the increasing complexity and dynamism of today’s global supply chains, it has become imperative for companies to adopt digital technologies to remain competitive and ensure customer satisfaction. Digitalization of supply chains involves the use of advanced technologies such as cloud computing, big data analytics, the internet of things (IoT), and artificial intelligence (AI) to improve visibility, transparency, and efficiency in supply chain operations. By leveraging these technologies, 3PL companies can gain a competitive edge by providing faster, more accurate, and more cost-effective logistics services to their clients. One of the key benefits of digitalization for 3PL companies is increased visibility into supply chain operations. With the use of digital tools,
companies can track shipments in real-time, monitor inventory levels, and optimize routes for maximum efficiency. This visibility enables 3PL companies to proactively identify and address potential supply chain disruptions, reducing the risk of delays and other issues that could impact customer satisfaction. Digitalization also allows 3PL companies to analyze large amounts of data in real-time, enabling them to make more informed decisions about inventory management, transportation planning, and other key aspects of supply chain operations. This data can also be used to identify areas for cost savings and process improvements, helping 3PL companies to operate more efficiently and pass on cost savings to their clients.” [Respondent 9]

Another interviewee states that “digitalization for 3PL companies is the ability to provide customers with a seamless, Omni channel experience. With the rise of e-commerce and the increasing importance of customer experience, it has become critical for 3PL companies to provide a seamless experience across all channels, including online and offline. By leveraging digital technologies, 3PL companies can provide customers with real-time visibility into the status of their shipments, automated notifications, and other value-added services that enhance the overall customer experience. Digitalization also enables 3PL companies to collaborate more effectively with their partners and suppliers. By using digital tools to share data and insights, 3PL companies can work more closely with their partners to optimize supply chain operations, reduce lead times, and improve overall efficiency. This collaboration can help to reduce costs and improve customer satisfaction, ultimately driving greater success for 3PL companies. As a supply chain manager, I strongly believe that the success of 3PL companies is highly dependent on the digitalization of supply chains. By leveraging advanced digital technologies, 3PL companies can gain greater visibility into supply chain operations, analyze large amounts of data in real-time, provide a seamless Omni channel experience for customers, and collaborate more effectively with partners and suppliers. Ultimately, these benefits can help 3PL companies to operate more efficiently, reduce costs, and deliver higher levels of customer satisfaction, driving greater success in today’s competitive market. So, yes it really does” [respondent, 4]
When we asked this question to first respondent, he replies with some practical examples “We are having example of Daraz, which is 3PL company and start its operation in last decade but honesty today they are doing way better than, and the reason is their digital and high quality supply chain which keep its customers satisfied”

4.8 Summary

After conducting this interview with the practitioners, it’s been concluded that the drivers which influence the supply chain digital transformation is leadership, innovative culture, and organizational readiness. For considering the barriers, respondents states that the organization higher management resistance is the major barriers that create hindrance in the digitalization of supply chain agility. Moreover, during these interviews, We have also focused on drivers, and respondents states that the innovative culture, influence the digital transformation of supply chains. Moreover, this study aims to investigate how does the digitalization impacts the sustainability and interviews data concluded that there is a strong impact of digitalization on the sustainability of the data set. Moreover, it is also been considered to evaluate the efficiency of the supply chain after implementation of digitalization and results indicates that the digitalization improves the visually, and monitoring process of the product flow which improves the customers satisfaction. Further, we have also focused on the impact of digitalization on company’s success and according to the respondent’s point of views, the aim saturation in market has been increasing which required improving the customer’s experiences as it is directly related to business success and digitalization is the key to get success in 3PL companies as it provides competitive edge.
CHAPTER 5: DISCUSSION

This chapter includes the discussion on the key themes identified in the previous chapter. We make efforts to link the key themes with the research objectives, research questions, and problem statement of the study. After analyzing the interviews data the researcher have extracted the following themes i.e. Digitalization is in Demand in 3PL companies, Barriers (Organization resistance, legacy systems), Drivers (top management support, leadership, innovative culture, and expertise), digitalization and sustainability, and business success.

5.1 Supply Chain Digitalization and 3PL companies

Digitalization has become increasingly important in the logistics industry, particularly in third-party logistics (3PL) companies. According to Hennelly et al. (2020) with the rapid development of technology and the ever-increasing demand for faster and more efficient logistics solutions, 3PL companies are finding that digitalization is no longer just an option, but a necessity. One of the key benefits of digitalization in the 3PL industry is the ability to improve operational efficiency. By using technology to streamline processes, 3PL companies can reduce the time and resources needed to complete tasks. This can help to minimize costs, increase productivity, and improve the overall quality of service provided to customers.

As stated by Zhang and Li (2023) digitalization can also help 3PL companies to better manage their inventory and warehouse operations. By using advanced tracking and monitoring systems, companies can gain real-time visibility into their inventory levels, which can help to prevent stock outs, reduce waste, and improve order fulfillment times. In addition to operational efficiency, digitalization can also improve the customer experience. With the rise of e-commerce and online shopping, customers expect fast, accurate and transparent delivery services. By using digital technologies such as GPS tracking and real-time order updates, 3PL companies can provide customers with a better delivery experience, which can help to build customer loyalty and increase repeat business. Another benefit of digitalization in the 3PL industry is the ability to leverage data analytics to gain insights into customer behavior and market trends. As suggested by Tiwari et al. (2023) analyzing data on customer preferences and buying habits, 3PL
companies can develop more targeted marketing strategies, improve product offerings, and make more informed business decisions. However, digitalization also presents some challenges for 3PL companies. One of the biggest challenges is the need for investment in technology and infrastructure. Upgrading existing systems and implementing new technologies can be costly and time-consuming, which can be a barrier for smaller or less financially stable companies. Marcon et al. (2019) argued that a key challenge in digitilisation of supply chain in 3PL companies is the need for skilled labor. While digitalization can improve efficiency and reduce the need for manual labor, it also requires a workforce with the skills and expertise to operate and maintain complex systems. Finding and training skilled workers can be a challenge, particularly in regions where there is a shortage of qualified personnel.

Finally, digitalization also raises concerns about data privacy and security. With the increasing amount of data being generated and stored by 3PL companies, there is a risk of data breaches and cyber-attacks. Companies must invest in robust security measures and ensure that they are in compliance with data protection regulations. Digitalization is in demand in 3PL companies due to the many benefits it provides, including improved operational efficiency, better inventory and warehouse management, enhanced customer experience, and the ability to leverage data analytics for business insights. However, as stated by Rusu et al. (2020) it also presents challenges such as the need for investment in technology and infrastructure, the need for skilled labor, and concerns about data privacy and security. Overall, companies that are able to successfully navigate these challenges and embrace digitalization are likely to be well-positioned for success in the rapidly evolving logistics industry.

5.2 Barriers

Digitalization has transformed the way businesses operate, and supply chain management is no exception. According to Hofmann and Osterwalder (2017) the integration of technology into supply chain processes has the potential to streamline operations, improve efficiency, and reduce costs. However, for third-party logistics (3PL) companies, there are several barriers to digitalization that need to be overcome.
One of the main barriers to digitalization in the supply chain of 3PL companies is legacy systems (Cheung et al., 2021). Many 3PLs have been in operation for several years, and their IT infrastructure may be outdated or incompatible with newer systems. These legacy systems can hinder the adoption of newer technology, making it difficult to implement digital solutions that require data integration or real-time communication. As stated by Cheung et al., (2021) upgrading or replacing these legacy systems can be costly and time-consuming, which can deter 3PL companies from investing in digitalization. The current study also identified this barrier for the digitalization of supply chain those are working as third party logistics.

Gupta (2018) stated that a major barrier is organizational resistance. Previous literature states that the static organisations, those are not willing to adapt change cannot transform digitally. Implementing new technology requires changes to existing business processes, and this can be met with resistance from employees who are used to working in a certain way. For example, Cichosz et al., (2020) argued that, if a 3PL company introduces a new digital platform for managing inventory, employees may be resistant to using it because they are used to using manual processes. This resistance can be further compounded by a lack of training and support, which can result in employees feeling overwhelmed or frustrated with the new technology. After conducting interviews of third party logistics employees also states that the organizations which are not accepting the change are facing challenges in developing their strategies and integrating latest technologies in their systems. These outputs were also supported by the literature, but as this study is based on real case which make it more authentic and reliable.

According to Borisoglebskaya et al. (2020), resistance to digitalization can also come from management, who may be hesitant to invest in new technology without clear evidence of the benefits. This can be especially true for smaller 3PL companies that may not have the resources to implement digital solutions on a large scale. In such cases, a lack of investment can lead to a lack of progress in digitalization efforts, which can further widen the gap between 3PLs that have embraced digitalization and those that have not.
5.3 Drivers

Innovative leadership is essential for driving digital transformation in an organization. According to the literature, innovative leaders have the ability to create a vision for the future of the organization and are willing to take risks to achieve it. They are also able to identify and leverage emerging technologies that can help the organization to achieve its goals. Research by Ruthramathi and Sivakumar (2022) found that innovative leadership has a significant positive impact on the digital transformation process in organizations. They suggest that innovative leaders who are able to create a culture of innovation and experimentation can help organizations to overcome the barriers to digital transformation.

In addition to innovative leadership, a learning culture is also crucial for digitalization. A learning culture is one that emphasizes continuous learning and development for all employees. According to a study by Shi et al. (2022), a learning culture can promote digital transformation by providing employees with the necessary skills and knowledge to use new technologies effectively. A learning culture also encourages experimentation and risk-taking, which are essential for innovation and digital transformation. Employees who are encouraged to learn and experiment are more likely to embrace new technologies and contribute to the digitalization process. Moreover, a learning culture can also facilitate organizational change. As organizations embrace digital technologies, they need to be able to adapt to changing market conditions and customer needs. A learning culture can help organizations to become more agile and responsive to change. According to a study by Obeidat et al. (2019), a learning culture is essential for organizations that want to achieve digital transformation. They suggest that organizations need to create a culture that values experimentation, learning, and continuous improvement to succeed in the digital age.

After getting data from the interviews, and analyzing it, author also concluded the same, the digital transformation highly dependents on the top managements supports, and when a leader from the top management support the process of digitalization it make the process more simple and able teams working on digitalization project to achieve their objectives more effectively by dealing with uncertainties. Moreover, the literature
suggests that innovative leadership and a learning culture are critical factors that can impact the digitalization process of an organization. Innovative leaders who are able to create a culture of innovation and experimentation can help organizations to overcome the barriers to digital transformation. A learning culture that emphasizes continuous learning and development for all employees can promote digital transformation by providing employees with the necessary skills and knowledge to use new technologies effectively. A learning culture can also facilitate organizational change and help organizations become more agile and responsive to change. Therefore, organizations that prioritize innovative leadership and a learning culture are more likely to succeed in the digital age (Krasnov et al. 2019).

5.4 Digitalization and Supply Chain Sustainability

Supply chain digitalization refers to the use of digital technologies to streamline and automate various processes along the supply chain, such as inventory management, logistics, and communication (Parhi et al. 2022). This transformation has had a significant impact on supply chain sustainability, helping to reduce waste, improve efficiency, and promote responsible practices throughout the supply chain. As discussed by Junge (2019) one of the primary benefits of supply chain digitalization is improved visibility. By using digital technologies to monitor and track products and materials as they move through the supply chain, companies can gain real-time insights into their operations. This visibility enables them to identify inefficiencies and areas for improvement, such as reducing energy consumption or optimizing transportation routes, which can help reduce their environmental impact. Furthermore, Jhon (2021) highlighted the fact that automating processes such as order fulfillment and inventory management, companies can streamline their operations and reduce waste. This, in turn, helps to minimize their carbon footprint and conserve natural resources. For instance, a company that implements digital inventory management software can better track its inventory levels and reduce the amount of excess stock it holds, which can help reduce waste and lower its overall environmental impact. Additionally, Krikigianni et al. (2022) argued that supply chain digitalization can help improve supply chain transparency and traceability. The use of digital technologies to track products and materials as they move through the supply chain enable companies to ensure that they are using responsible sourcing practices and avoid
materials that are harmful to the environment. This helps to promote sustainability throughout the supply chain and ensure that companies are operating in an environmentally responsible manner.

Digitalization has had a significant impact on the sustainability of supply chains in recent years. The use of digital technologies has the potential to improve supply chain efficiency, reduce waste, and promote sustainability. Respondents of this research also states that the sustainability of the supply chains is highly dependent on the digitalization of the processes. Digitalization improves the visually of the systems that ultimately impacts the sustainability by removing the sudden bottlenecks from the system. According to Parhi et al. (2022), one of the key ways through which digitalization has impacted the sustainability of supply chains is by enabling greater visibility and transparency. The use of digital technologies such as RFID tags, barcodes, and sensors can provide real-time data on the movement of goods, enabling organizations to track their supply chains more effectively. This increased visibility can help organizations to identify inefficiencies and areas where they can reduce waste, thereby promoting sustainability. Moreover, as suggested by Klötzer and Pflaum (2017) digital technologies can also help to reduce the environmental impact of supply chains. For example, the use of digital platforms can enable organizations to collaborate more effectively with their suppliers and customers, reducing the need for physical transportation and thereby reducing greenhouse gas emissions. Digital technologies can also help organizations to optimize their logistics processes, reducing the amount of fuel consumed and minimizing the carbon footprint of their operations.

Furthermore, digitalization can also promote circularity in supply chains. According to a study by (Parhi et al., 2022), digital technologies can help organizations to close the loop in their supply chains by enabling the sharing of information and resources. For example, digital platforms can enable organizations to share surplus inventory, reducing waste and promoting sustainability. Digital technologies can also facilitate the recycling and reuse of materials, thereby reducing the need for new resources and promoting sustainability.
According to Wang et al. (2021) supply chain digitalization can also help promote social responsibility within the supply chain. The use of digital technologies to monitor supplier performance and ensure compliance with labor and human rights standards enable companies to ensure that they are operating ethically and promoting fair labor practices. This helps to promote sustainability throughout the supply chain and ensure that companies are doing their part to promote social responsibility. Thus, it can be stated that supply chain digitalization has had a significant impact on supply chain sustainability, helping to reduce waste, improve efficiency, promote responsible practices, and ensure that companies are operating in an environmentally and socially responsible manner. As more and more companies recognize the benefits of digitalization, we can expect to see even greater progress towards a more sustainable and responsible supply chain.

In conclusion, the use of digital technologies has had a significant impact on the sustainability of supply chains. Digitalization has enabled greater visibility and transparency, reduced the environmental impact of supply chains, and promoted circularity by facilitating the sharing of information and resources (Hennelly et al., 2020). Therefore, organizations that prioritize digitalization in their supply chains are more likely to promote sustainability and contribute to a more sustainable future.

5.5 Business Success and Digitalization

One of the key ways that digitalization can impact business success for 3PL companies is by improving operational efficiency. According to a study by van Hoek and Peters (2017), digital technologies such as RFID, GPS, and cloud computing can enable 3PL companies to optimize their logistics processes, reduce lead times, and improve delivery reliability. This increased efficiency can help 3PL companies to reduce costs, improve service quality, and increase customer satisfaction. Moreover, as stated by Parhi et al. (2022) digitalization can also help 3PL companies to differentiate themselves in a crowded marketplace. The use of digital platforms and tools can enable 3PL companies to offer new and innovative services to their customers, such as real-time tracking and tracing, predictive analytics, and supply chain visibility. According to a study by Akaah et al. (2017), 3PL companies that embrace digitalization are more likely to attract and retain customers, and to achieve a competitive advantage in the market.
Furthermore, digitalization can also enable 3PL companies to adapt to changing market conditions and customer needs more effectively. According to a study by Happonen, A. and Minashkina (2019), digital technologies can help 3PL companies to anticipate changes in demand, respond to disruptions in the supply chain, and adapt their operations to meet new requirements. This agility can help 3PL companies to stay ahead of the competition and to achieve long-term business success. The use of digital technologies has a significant impact on business success for 3PL companies. Digitalization can improve operational efficiency, enable companies to differentiate themselves in the market, and facilitate adaptation to changing market conditions. Therefore, 3PL companies that prioritize digitalization are more likely to achieve business success, improve customer satisfaction, and achieve a competitive advantage in the market.

5.6 Summary of Discussion

After analyzing the case data and relating it to the previous studies, author have concluded that the organizations that are having strong leadership, innovative culture and an environment of continuous learning will be more capable of digitalizing their supply chain processes, while the organizations possessing the challenges like legacy systems in which they higher management hesitates to take initiative that led to successful adaption of technologies, or absence of top management support, led organizations to strategic drift and such companies lost their competitive edge with passing time and failed to sustain. While organizations that are transforming themselves with time are more likely to make their business sustainable and successful.
CHAPTER 6: CONCLUSION

This chapter is based on two sections, firstly it presents the conclusion of the study and in second section, and this chapter will be presenting the limitation and future aspects of this research study

6.1 Conclusion

This study is based on two important aspects, i.e. digital transformation and 3PL companies. It aims to investigate key attributes, challenges, and success factors in supply chain digital transformation. To achieve these objectives, author have conducted interviews on one of the leading 3PL company in Pakistan named as NLC and information regarding challenges, key attributes, and success factor of digital transformation has been collected via interviews. After getting information and its qualitative analysis, it’s been concluded that the key attributes of the supply chain digital transformation is it improves the visually and monitoring systems, and product flow in supply chain while digital transformation is a critical process. Top management support, strong leadership, learning and innovative culture, are the critical success factors in digital transformation of supply chains. While, legacy systems and organizations resistance are the key challenges faced by the organization when transforming their supply chains digitally. Moreover, analysis states that the digitalization of supply chain led to its sustainability and it improves the overall performance of the business by providing a competitive edge in the form of customer’s satisfaction.

6.2 Limitations

This research is based on Pakistan which is an underdeveloped nation and still digitalization is in its initial phases, therefore the challenges and difficulties identified during the interviewees were limited to the process of transforming, and these cannot reflect the challenges faced by the organizations after complete transformation of systems, or the challenges faced by the firms while running the digital platforms. Moreover, this study is qualitative and the results cannot be presented in numbers, therefore in future the same model can be adopted by the authors to get data via questionnaires and then statistical tools i.e. regression analysis by employing the software’s i.e. SPSS or STATA can be used to statistical prove these relationships.
6.3 Future Implications and Recommendations

The findings of research on the digitilisation of supply chain functions in supply chain functions of 3PL companies in terms of barriers, opportunities significantly contributes in evolution of the supply chain functions in 3PL companies. The key business state holders in 3PL companies can grasp the knowledge on the way digitalisation can be integrated with their supply chain functions and the nature of challenges they might face during digitalisation of supply chain functions. Similarly, the outcomes of the study remain helpful for the top management of the 3PL companies in design and development of future policies that support the integration of digitalization in business operations. The research also expands the ways for future researchers to observe the impact of digitilisation on individual functions of the supply chain such as sourcing of products, their processing, warehousing and delivery to end consumers. The future researcher can also focus on the impact of digitalisation on other business functions of the 3PL companies in terms of human resource management and supplier selection etc. The research concludes with the following key recommendations of the 3PL companies.

- The role of leadership is critical in driving digital transformation of 3PL (third-party logistics) companies. Leaders must have a clear understanding of the potential benefits of digital transformation, such as improved efficiency, enhanced customer experiences, and increased agility.

- By analyzing data on customer preferences and buying habits through digitilisation 3PL companies can develop more targeted marketing strategies, improve product offerings, and make more informed business decisions.

- 3PL companies need to create a culture that values experimentation, learning, and continuous improvement to succeed in the digital age.

- The support from the higher management is critical. Absence of support from higher management led to problems in digitally transforming the supply chain functions of 3PL companies.

- Digital culture or dynamic culture supports positive change in an organization; therefore, adaption of digital culture can be identified as a key pre-requisite
for digitalisation of supply chain functions. Therefore, 3PL companies must focus on the adoption of digital culture.
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APPENDIX

Appendix 1: Interview Questionnaire

Concept of Digitalization and its integration in Supply Chain

How do your perceive digitalization of supply chain in 3PL companies?

How do you integrate digital process in your traditional supply chain process?

Do you know about a specific trend in the world about digitalization or strategy?

Is there any specific company or model you are following to make your company sustainable?

Digitalization is in Demand

Digitalization is a universal trend, but its seems more important for 3PL supply chains, why?

How digitalization implementation in organization will improve the efficiency of the whole system?

Barriers

Have your, higher management, or the team working under you have tried to implemented the digitalization in your systems?

If yes,

What was the nature of resistance towards the digitalization is from the individual entities or at the organizational level?

Drivers

What are the factors which influence the digital transformation?

Do you think there is a link between the digitalization of supply chain and its sustainability?
Do you believe the success of 3PL companies highly dependent on the digitalization of supply chains?
Appendix 2: GDPR Thesis Study Consent Form and Participant Information Sheet

Participant Information Sheet

Thank you for considering taking part in a thesis study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

What is the purpose of the study collecting personal data?

Since the pandemic occurred, it has shown that a more resilient supply chain is necessary to overcome the consequences that have negatively affected manufacturers’ just-in-time strategy. Disruptive technologies are continuously improving and the researchers want to do a master thesis on investigating if disruptive technologies (3D-printing; internet of things; Big data) has been a contributing factor to make a more resilient supply chain. The interview will contribute to shed light into this matter. This is a case study on multiple manufacturers.

Information about the interview

The duration of the interview is approximately 1 hour and will be recorded throughout the whole interview to later be transcribed. The interview has a semi-structured design which means that there is an interview questionnaire that the researchers use to somewhat structure the interview, but is not limited to follow its structure and will ask follow-up questions where necessary.

Confidentiality and data storage

It is entirely up to you to decide whether or not to take part. If you decide to do so, you will be given this information sheet to keep and will be asked to give your consent. All the information that we collect about you during the course of the research will be kept strictly confidential. You will not be able to be identified in any ensuing reports or publications. The data will be kept secure and saved on Google drive where only the researchers will have access to it. After the completion of the thesis the data will be permanently erased.

Under GDPR you have the following rights over your personal data:

- **The right to be informed.** You must be informed if your personal data is being used.
- **The right of access.** You can ask for a copy of your data by making a ‘subject access request’.
- **The right to rectification.** You can ask for your data held to be corrected.
- **The right to erasure.** You can ask for your data to be deleted.
- **The right to restrict processing.** You can limit the way an organisation uses your personal data if you are concerned about the accuracy of the data or how it is being used.
- **The right to data portability.** You have the right to get your personal data from an organisation in a way that is accessible and machine-readable. You also have the right to ask an organisation to transfer your data to another organisation.
- **The right to object.** You have the right to object to the use of your personal data in some circumstances. You have an absolute right to object to an organisation using your data for direct marketing.

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