All for one or one for all? An Investigation of Obstacles to Adoption of Decentralized Technologies in Supply Chains

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ABSTRACT

Digital transformation of supply chains changes how businesses operate and plan. While some businesses use data-driven methods to gain a competitive edge, others improve practices for efficiency. Businesses today need to decide between centralized and decentralized technologies to improve security and transparency. Therefore, organizational barriers often cause these technologies to fall short of their potential.

This study explores at the main obstacles to supply chain managements use of digital technologies. Eleven managers from small and medium-sized businesses (SMEs) and multinational corporations (MNCs) were interviewed as part of a qualitative study guided by the Gioia approach. Yet companies prioritize technologies based on their ease of integration, scalability, and efficiency, according to the research. While MNCs frequently use Enterprise Resource Planning (ERP) systems, SMEs still use manual tracking methods like Excel. Blockchain is recognized for its potential to enhance transparency, but the high costs, the technical complexity and low adoption rates show significant challenges.

To overcome these obstacles, businesses need to create comprehensive implementation strategies that go beyond technology and include organizational alignment and process adaption for staff training. Furthermore, rather than concentrating only on short-term efficiency improvements, companies should review performance evaluation frameworks to include long-term advantages like robustness.

This study contributes to existing literature by demonstrating that organizational and strategic misalignments rather than technical limitations are the primary obstacles to technology adoption in supply chains. By providing actionable insights this research supports companies in optimizing their digital transformation strategies to build more resilient and transparent supply chain networks.

KEYWORDS

Technology Adoption – Supply Chain Management – ERP Systems – Blockchain – Organizational Challenges – Digital Transformation – Resilience

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RESUMO

A transformação digital das cadeias de abastecimento redefine as operações empresariais. Enquanto algumas empresas adotam métodos baseados em dados para obter vantagem competitiva, outras priorizam eficiência. A escolha entre soluções centralizadas e descentralizadas impacta a segurança e a transparência, mas barreiras organizacionais frequentemente limitam o potencial dessas tecnologias.

Este estudo investiga os principais desafios enfrentados na adoção de tecnologias digitais na gestão da cadeia de abastecimento. Foram realizadas entrevistas qualitativas com onze gestores de PMEs e multinacionais, seguindo a abordagem Gioia. Os resultados mostram que a escolha tecnológica é guiada por fatores como facilidade de integração, escalabilidade e eficiência. Multinacionais utilizam predominantemente sistemas ERP, enquanto PMEs ainda dependem de planilhas manuais. O Blockchain é reconhecido por seu potencial em transparência, mas enfrenta desafios devido a custos elevados, complexidade técnica e baixa adoção.

Para superar esses desafios, as empresas devem desenvolver estratégias de implementação que integrem alinhamento organizacional e adaptação de processos, além do treinamento de pessoal. Em vez de focar apenas na eficiência de curto prazo, recomenda-se repensar os modelos de avaliação para incluir benefícios a longo prazo, como resiliência e transparência.

Este estudo contribui para a literatura ao demonstrar que desalinhamentos organizacionais e estratégicos, e não limitações técnicas, são os principais entraves à adoção tecnológica. Com insights acionáveis, a pesquisa apoia empresas na otimização de suas estratégias de transformação digital para cadeias de abastecimento mais resilientes, eficientes e transparentes.

PALAVRAS-CHAVE

Adoção de tecnologia - Gestão da cadeia de abastecimento - Sistemas ERP - Blockchain – Desafios organizacionais - Transformação digital – Resiliência

TÍTULO: “Todos por um ou um por todos? Uma Investigação dos Obstáculos à Adoção de Tecnologias Descentralizadas nas Cadeias de Abastecimento”

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Notes

This thesis was created with the assistance of OpenAI's ChatGPT. The AI tool was used to refine text and provide suggestions for structure, grammar, and phrasing. All content has been carefully reviewed, verified, and edited by the author. Moreover, Deepl was used for translation and writing structure checking. No content was originally generated by AI.

1. Introduction

Globalization has dramatically transformed the world economy, forging increasingly linked economic markets. Lowered tariffs and trade restrictions over the years have enabled supply chains to spread across multiple countries, connecting industries from different sectors and regions. International trade has been facilitated by free trade agreements and transportation improvements, allowing companies to set up large networks of manufacturers, distributors, and suppliers (Roscoe et al., 2022).

While these connected supply chains reduce prices and generate new business opportunities, they also pose fundamental challenges (Lim & Tan, 2024). The demand for handling complex information flow and coordinating activities across many locations has increased (Kleindorfer & Saad, 2005). As supply networks grow and complexity increases, ensuring seamless coordination and effective information flow becomes progressively challenging. One network disruption can have a swift global effect on organizations. The COVID-19 pandemic, for example, revealed significant vulnerabilities of international supply chains resulting in blockage of shipments, and acute shortages of goods (Ivanov & Dolgui, 2020).

These challenges have accelerated the adoption of digital technologies like blockchain and Enterprise Resource Planning systems and revolutionized supply chain management (Oh & Pinsonneault, 2022). Using advancements in data processing and storage, these technologies improve efficiencies and enable real-time inventory tracking. Research shows that lead times can decrease by 30% while inventory levels can drop by as much as 24% by utilizing digital technologies (Banker, Bardhan, Chang, & Lin, 2006). No matter the potential of such technologies, they come with difficulties in deployment.

However, the decreasing costs of digital infrastructure have made more accessible solutions, like ERP systems, cloud platforms, and blockchain-based networks, which companies commonly find challenging for integration and implementation (McAfee, A., 2002).

A central distinction by the literature on the adoption of technology is between decentralized and centralized information-handling systems. Centralized solutions, such as ERP systems, enable organizational data management internally, resulting in increased control and optimization of processes (Kumar et al., 1998). Nevertheless, large enterprises typically underestimate the challenges of imposing large-scale IT systems, which lead to information systems that are delayed, over budget, and poorly implemented because they require substantial investments and organizational change (Oh & Pinsonneault, 2022). Moreover, research

indicated that the cause of failure for about 70% of technology adoption-related initiatives is inadequate organizational knowledge and incorrect strategy alignment (Venkatesh et al., 2022).

Unlike blockchain-based platforms, decentralized technology needs industry-wide acceptance to provide value. While increasing transparency, they are only as effective as the trust of the stakeholders involved and the consistency of processes (Adner, 2002). A good example is a so-called open blockchain shipping platform TradeLens developed by IBM and Maersk. While smart contracts can improve openness in international logistics, it failed as it did not gain approval from industry leaders and gained resistance (Leiblein et al., 2017). This is a classic issue with decentralized systems, their benefits only come to fulfillment after broad adoption.

These problems highlight the need to realize the organizational barriers that are blocking supply chain management from adopting digital technology. This thesis analyzes critical issues that enable successful implementation and how firms manage the tension between centralized and decentralized solutions.

2.Theoretical background

Global supply chains have provided businesses with access to a wider variety of suppliers, reshaping the way they operate. Such transformation allowed firms to capitalize on cost savings and efficiencies (Gereffi & Lee, 2024). By sourcing different materials needed from various countries where production costs are considerably lower, companies can achieve a stable supply of goods (Buonanno et al., 2005). This leads to effective and faster transportation in international shipping and storage (Roscoe et al., 2022).

Yet, at the same time, global supply chain management is becoming more complex. Companies must manage suppliers in multiple domains while dealing with geopolitical uncertainty. Resource-based theory explains this as firms need strong digital infrastructures that provide control and flexibility to remain competitive (Adner, 2002).

Technology is crucial to improving supply chain management. However, many companies still use only spreadsheet-based technologies such as Excel for shipment and inventory tracking. Although these techniques are easy to apply, as supply chains become larger and more complex, they lead to ineffectiveness (Srinivasan & Swink, 2023). Numerous companies are already installing digital traceability systems for real-time tracking of products to make operations more transparent (Srinivasan & Swink, 2023). Therefore, the implementation of ERP systems for inventory management and logistics as a single platform has been a significant contributor to

decreasing inefficiencies and enhancing coordination across the supply chain (Buonanno et al., 2005).

Even if digital tools have made them more efficient, supply chains remain open to disruption. As a result, Just-in-Time (JIT) inventory systems were created to decrease holding expenses. These systems depend on precise delivery schedules and reliable merchants, leading companies to be sensitive to unanticipated delays (Tomlin & Wang, 2022). Disruptions like the COVID-19 pandemic and natural disasters have caused shortages and major supply chain challenges. These unforeseen events prompt companies to consider trade-offs between efficiency and resilience (Choi et al., 2023).

The effects of such vulnerabilities can be seen in the 2024 Kumamoto earthquake. Natural disasters, like those above, forced semiconductor suppliers such as Toshiba and Micron to stop operations. This disruption impacted Malaysian auto parts manufacturers, heavily reliant on component supply, forcing production halts and big financial losses (Lim & Tan, 2024). This case underscores the exposure of supply chain dependencies and the increasing demand for technologies that enable resilience (Adner, 2002).

2.1 Technology Adoption

With technology developing at prompt speed, technology adoption has become a necessary element in modern supply chain management. It relates to how individuals or organizations accept, adopt, and incorporate new technology into their daily activities (Klein & Rai, 2009). That is why it has become significantly important to adopt new technologies to sustain for an extended period in this highly competitive marketplace.

Since supply networks depend on the smooth transfer of information and transparency, technology innovations are key for operational efficiency (Lee et al., 2024).

Globalization has expanded supply chains, reduced costs, and increased productivity, but it also now raises new challenges. At this point, coordinating activities between multiple parties and managing flows of information has never been more challenging. The COVID-19 pandemic revealed significant vulnerabilities in global supply chains and highlighted the need for digitally transforming supply networks using blockchain & ERP systems (Ivanov & Dolgui, 2020; Oh & Pinsonneault, 2022).

These technologies are promising, but their practical implementation remains challenging. They imply high investment and rearrangement, better control, and refinement of the

procedures (Kumar et al., 1998). Though decentralized technologies such as blockchain foster greater transparency, their impact also relies on acceptance across the sector (Adner, 2002).

While the technology may have some advantages, an important lesson learned from the failure of TradeLens. A blockchain based platform for supply chain use case built on IBM and Maersk, is that the limited adoption can be caused by opposition from the actors involved in the process to be digitized (Leiblein et al., 2023).

The first aim of this study is to explore the general barriers that hinder supply chains from adopting decentralized technologies. But during the research, it became clear that these issues are heavily influenced by the size of a company. While multinational companies have more resources at their disposal, they often struggle with bureaucratic issues and slow decision-making. SMEs, however, are much more flexible but often confront both financial and technical difficulties. This distinction was a key realization that emerged through data analysis and from interviews and was not part of the original research design.

Given these findings, this thesis explores the research question: *"What organizational issues exist that hinder the implementation of information processing and exchange-oriented technologies, depending on their extent of centralization?"* By identifying key barriers and enablers, this study aims to clarify how organizational factors impact decentralized technology adoption and whether these challenges differ between SMEs and large corporations.

2.1.1 Strategic Goals of Technology Adoption

Companies require a clearly defined strategy that aligns with their business goals to fully realize the potential of new technologies. Specific goal setting enables organizations to integrate technology to maximize their competitive edges and improve internal system efficiencies (Bakhary, Azman & Elabjani, 2024).

Strategic goals help an organization sustain long-term success by ensuring sustainable growth and competitive advantage (Dewett & Jones, 2001). Sales growth through innovation is one of the strategic goals beyond competitive positioning. Advanced technologies are used by companies to optimize and automate most of the processes in their sales department. However, the ability to stand out among the competition also hinges on the timing of integration. Being an early adopter of these technologies is fundamental to remaining competitive in the long run. Those that early adopt technology advancements are industry leaders, innovators, and stand out against their industry (Alneyadi, 2023).

Also, the strategic deployment of new technology has a huge impact on supply chains. Digital solutions, rather than traditional methods, are increasingly used by businesses to manage supply chain disruptions and optimize processes (Gayialis et al., 2022). Hence, the adoption of new technology in supply chains is critical to achieving strategic goals. Over the past year, businesses increasingly rely on digital solutions to better manage supply chain outages and streamline operations (Gayialis et al., 2022). But new technologies alone are not creating an adaptive supply chain. An additional point to consider is the extent to which these technologies are integrated into existing processes, and whether they contribute to increasing transparency and decreasing inefficiencies.

ERP systems are technologies that assists organizations in improving their internal processes and collaborating better with external partners. Such systems automate manual processes and allow for centralized data management (Adner, 2006). This technology adoption leads to enhanced effects on operational performance and helps achieve sustainable growth as part of the long-term plan of a business (Dewett & Jones, 2001). In effect this leads to lower communication costs and enhances the productivity of an organization. ERP systems also contribute to increasing a business adaptability (Adner, 2006).

To succeed, businesses need to rapidly adapt in response to market changes and disruptions in the supply chain. However, businesses often overlook just how difficult it is to align ERP functions with existing business processes. Moreover, workflows require adjustment, and employees need time to adjust. Otherwise the predicted efficiency gains may not come to achievement (Adner, 2006).

The adoption of technology also has strategic goals of increasing organizational resilience against external disruptions. Thus, resilience has emerged as a key differentiator in a corporate environment that finds itself more volatile. While efficiency is key for businesses to thrive, flexibility in the face of uncertainty is equally important.

2.1.2 Reliability and resilience

Technology is proposed for long-term growth through strategic adoption, while reliability and resilience look at the broader picture of stability of supply chains. These are principles that serve different aims yet are tightly linked.

As Linnenluecke (2017) states, reliability ensures that procedures perform reliably over time and reduces disruptions and maintains stable supply flows. This aspect is particularly relevant in Just in Time (JIT) manufacturing systems where precision in coordinating supplier and

manufacturer is a key determinant in efficiency. Because components and materials are delivered exactly when needed, any variation such as a delay can cause immediate disruptions. In this regard, Linnenluecke (2017) notes that businesses rely on strict quality control, relationships with suppliers, and advanced forecasting to ensure reliability within such a system.

On the other hand, resilience measures the degree to which a supply chain could adapt and recover from unanticipated shocks (Ayoko, 2021). Resilience is key in the face of unexpected disruptions, such as natural disasters affecting suppliers. Unlike reliability, whose focus is on maintaining stability under normal conditions, the fact that these JIT systems are very efficient does not imply they are well-suited for a company. Therefore, businesses should embrace strategies that will enable fast responses, such as expanding supply chain visibility or diversifying supplier networks to boost resilience in JIT frameworks (Vogus & Sutcliffe, 1997).

At face value, reliability and resilience may sound like competing priorities, but they are fundamentally linked. A very reliable supply chain will work well under steady conditions but collapse when disruptions occur (Ayoko, 2021). In contrast, a system that was built with the principle of resilience in mind but is only working some of the time creates a lot of waste, which leads to overall performance degradation. Due to this problem, companies are trying to find a way to mix both parameters. Consequently, they strive to use just-in-time principles wherever practicable and apply focused supplementary security measures in particularly vital places to react flexibly to the uncertainties of disruptions (Linnenluecke, 2017).

2.1.3 Improving Prediction of Changes in Business Context

Businesses faces various ways to respond to uncertainties a business environment provides. One potential approach is to lead with data-driven decisions with accurate predictions. This approach has been characterized as based on what is called the planning school (Brews & Hunt, 1999). In the so-called planning school, firms try to predict future developments more accurately.

A second approach leans less on precise forecasts but on the capacity to adjust urban assets as things change and do so quickly. In this context, Mintzberg and Waters (1985) refer to adaptive strategies, in which companies access the processes so that they can respond to unforeseen developments at short notice. Here, the focus is on rapid decision-making and agility to remain competitive in the face of unforeseen events.

When companies use data and form it into actionable insights, predictive models are key to gaining foresight around supply chain disruptions and supplier risks. Nevertheless, Wiltbank et al. (2006) oppose heavy reliance on forecasting and support decision-making on strategy.

2.1.4 Preparation Time and Operational Adaptation

Companies that succeed in turning forecasts into action by encouraging redundancy and flexibility are more resistant to shocks (Chopra, Sodhi, & Lücker, 2021).

Lücker et al. (2024) state that supply chains should also find a balance between streamlined and resilient approaches to avoid sacrificing crisis response capacity to keep processes affordable. To their knowledge, businesses that maintain redundant supplier networks and emergency plans perform better in the face of unanticipated disruptions than those employing lean, just-in-time strategies.

Moreover, supply chain resilience is protected by product diversity and dynamic inventory control (Biçer, Lücker, & Boyacı, 2022). By extending their supplier base and flexibly rerouting production lines, companies enhance their capacity to respond to changes in demand.

2.1.5 Competitive advantage

Supply chains function in an environment highly connected in which companies are closely tied to their customers, suppliers, and logistics partners (Teece et al., 1997). Companies are being forced to increasingly update their customers technological standards to be able to meet the competition. Most clients require integration into their own systems, such as standardized ERP interfaces. Companies that lack access to the necessary technological infrastructure may face inefficient processes, delays, and ultimately lose customer relationships (Ivanov et al., 2021).

This pressure is intensified by growing demands for transparency and efficiency throughout the supply chain. Christopher (2016) explains this by saying that customers want relevant information on stock levels in real time to maintain optimal control over their own processes. Businesses that are not positioned to provide this information or still utilize legacy systems face the risk of losing business to competitors that have seen the benefits of a more sophisticated technology (Cirik & Makadok, 2023).

However, early adopters are likely to acquire long-term competitive advantages by leveraging innovative technology in their supply chains to improve transparency and set industry standards (Christopher, 2016). The First-Mover Advantage (FMA) benefits a firm gain by being the

pioneer of the latest supply chain technology over its competition (Lieberman & Montgomery, 1988).

Early digitization of supply chains creates operational effectiveness, and ultimately technical leadership, allows advantage in competition (Ivanov et al., 2021). According to Teece (1997) sustainable competitive advantage in supply chains relies upon a firm being able to exhibit dynamic capabilities that is, its ability to continuously adapt to technological changes.

Pioneers in the transformation of the digital supply chain secure the rewards of network effects (Cirik & Makadok, 2023) owing to their early adoption defining industry standards (Cirik & Makadok, 2023). Adoption of early blockchain technology in supply chains, for instance, enhances traceability, leading to higher consumer and supplier trust(Lieberman & Montgomery, 1988).

The supply networks first-mover strategy, however, comes with serious risks too. It is possible for early adopters to experience the trouble of coping with integration issues and not having product systems, and the costs of implementation are significant if the industry is not widely adopted (Lieberman & Montgomery, 1988). In addition, if the established system is subsequently replaced by a different technology, technological uncertainty can lead to stranded investments.

So before investing heavily, businesses should be very cautious about the technological feasibility and long-term cost implications (Teece et al., 2019).

3 Challenges of Technology Adoption

When new technologies are introduced, businesses face many obstacles that go beyond simple technical deployment. Strategic and organizational challenges that hinder the seamless integration of new systems are frequently the cause of adoption issues (Bardhan et al., 2013). A weaker competitive position and financial inefficiencies might result from these challenges if they are not effectively handled. To successfully manage these complications and guarantee a smooth transition, a proactive approach is consequently crucial (Taylor, 2010).

3.1 Strategic Challenges

Management team often block implementation of technology due to high costs. Similarly, organizations know the promise that new technologies hold but tend to seriously underestimate all the organizational and structural change that will be required.

Adner (2006) notes that to implement technology, stakeholders must completely reconfigure their interactions and activities within the industry. These disagreements emerge at an interesting time when companies underestimate how much structural change, they need to make to adopt new technology successfully (Furr, Ozcan, and Eisenhardt, 2022).

This misinterpretation results in poorly targeted allocation of resources and timescales for changeover that take longer than anticipated. Companies tend to believe that with the right managerial support, new technology can be absorbed into existing structures, but moving to digital models requires a more comprehensive operational and strategic readjustment. For example, the challenges involved in these tasks, if not appropriately considered, could lead to delays of projects and critical cost overruns (Furr et al., 2022).

This misunderstanding is also served by the notion that there is a linear trajectory of tech adoption. Adner (2006) states that organizations attend to the complexity of intermediaries in their innovation ecosystem. Technologies should confer a seamless match with external networks and compelling infrastructures to achieve integration. Failure to acknowledge these interdependencies results in inefficiencies that affect the business as a whole.

Additionally, businesses are also undergoing a transition from traditional product-based business models to ever more complex platform-oriented ecosystems (Furr et al., 2022). The impact of this shift warrants a broader review of strategic priorities. Many organizations have thought no more of it than the still speculative efficiency advantages they think technology will bring, but the truth is those changes will be far-reaching.

However, unless organizational processes are transformed, the anticipated promises of adopting technology may not be realized. Another reason for low evaluations of the effort to implement judgments is the tendency to follow previous judgments (Li, 2024). A firm investing in some technical project, not getting the results they hoped for, continues to spend time and money on it. This is largely due to the failure to accept sunk costs. Instead of addressing problems early and iterating on their approach, businesses use potentially ineffective solutions (Adner, 2006). The consequence is that the anticipated advantages of the technology may never be realized, and the adoption process stalled.

This calls for a more complete technology adoption process for businesses to mitigate these risks. One that considers both the technical considerations of execution and the other, broader organizational and strategic factors. Companies that understand interdependencies (Adner,

2006). And which systemic adjustments are needed for successful platform-based transitions can better cope with the adoption problems (Furr et al., 2022).

3.2 Technological challenges

Technological hurdles are the challenges arising from incompatibility, rapid technology maturation, and inefficient infrastructure. These issues lead to businesses not being able to realize the full potential of new technologies, slowing adoption, increasing costs, and generating inefficiencies (Burford et al., 2022).

One of the issues with technical barriers is backward compatibility, the ability of new technologies to interact with obsolete technology (Kretschmer & Claussen, 2016). Incompatibility leads to user rejection of businesses. The issue primarily impacts supply chains that rely on networked systems and require suppliers, partners, and customers to coordinate technical updates. The architecture of a company's technology ecosystem determines the extent to which it will react to incompatibilities and technological disruptions. Maintaining technological flexibility better prepares businesses to respond to sudden technology transformations (Burford et al., 2022).

Businesses whose operations rely too closely upon interdependent systems, however, can become too reliant on technological aspects, leaving them vulnerable to breakdowns when even one incompatibility finds itself in the way. But even today's modern technologies could soon be obsolete. This will require companies to be constantly updating their systems, just to remain competitive. When faced with this rapid shift, without a formal plan in place to manage what kind of technology they implement, businesses run the risk of investing in technologies that are rendered obsolete before they can provide long-term benefits.

As Tushman and Anderson (1986) note, technology often progresses through disruptive breakthroughs rather than stepwise enhancements. This can result in confusion in organizational contexts. Without prior prediction and adaptation to such changes, it would therefore be difficult for businesses to remain competitive (Oh & Pinsonneault, 2022).

3.3 Organizational challenges

Architectural innovation was initially introduced by Henderson and Clark (1990), who argued that although firms excel at refining existing technologies, they at times struggle to adapt innovations that overwrite the links between components of a system. These structural discrepancies can severely prevent the effective adoption of new technology within businesses.

Galunic and Eisenhardt (2001) take this further by exploring how modular corporate forms may assist with the reconfiguration of organizational resources in the face of architectural change. Look beyond but within because businesses can have greater capacity for disrupting technological waves only if they adopt dynamic capabilities and values that emphasize flexibility. Conversely, organizations characterized by rigid hierarchies and routines are more likely to encounter internal pushback. As both managers and employees struggle to adapt to new workflows and decision-making processes.

The second challenge is the innovative choice of technology (Park et al., 2021). When transferring an architectural breakthrough from its primary market context to a new context, organizations make sub-optimal design sourcing decisions. This means that to maintain technological performance across different business scenarios. Firms must not only overcome the resistance from their own organization but also closely align their sourcing strategy. This imbalance may postpone company-wide innovation and worsen organizational ineffectiveness.

3.4 Centralized and Decentralized Technologies

In supply chain management, centralized and decentralized technologies provide alternative approaches to data coordination and management. Their implementation has a great impact on supply chain members transparency and operational efficiency.

Centralized systems, such as Enterprise Resource Planning (ERP) platforms, which integrate data and streamline workflows (Goyat et al., 2019), rely on a single, business-controlled database. This structure is the most suitable form for the organization when someone wants to avoid disturbance in the internal procedures because it increases internal efficiency and simplifies decision-making. ERP systems ensure that information can flow consistently across departments and allow businesses to manage financial planning, logistics, and procurement under a single system framework (Černý et al., 2021).

In addition, since centralization performs operations very fast and there is no necessity for process of consensus, which is needed in decentralized systems, centralized databases are very efficient (Goyat et al., 2019). Still, centralized systems have some disadvantages like dependence on central power and less transparency beyond the company (Černý et al., 2021). These shortcomings are particularly significant in complex supply chains where many parties are involved.

Conversely, decentralized technologies, such as blockchain, distribute information across many nodes, reducing dependence on a single authority and improving traceability and transparency

(Dujak & Sajter, 2019). Once the transaction has entered a decentralized accessible system, it is guaranteed that the data is being recorded onto a cryptographically secure and immutable ledger that all users of the network can independently verify. Such a property is most relevant in supply chains, where blockchain technology enables real-time tracing of for example food products from farm to fork (Gulen & Karaagac, 2022). The ability to track shipments, verify the legitimacy of goods, and identify inefficiencies makes supply chain resilience higher as disruptions can be quickly discovered (Dujak & Sajter, 2019).

4. Research Method and Data

This thesis addresses the research question, *"What organizational issues exist that hinder the implementation of information processing and exchange-oriented technologies, depending on their extent of centralization?"*. Using a qualitative approach guided by the Gioia methodology.

This methodology provides a structured and transparent approach to analysis, with themes developing directly from participant responses. This creates a framework with detailed coding and categorization that helps to produce difficult insights on what difficulties organizations face when adopting technologies. The study was initiated through an online survey on the Qualtrics platform method, in which eleven managers from logistics companies, multinational companies, and SMEs were part. The questionnaire wanted to establish which technology these companies currently utilize to trace the movement of goods throughout their supply chains. One of the central questions, for example, explored the approaches that participants use to track events such as supplier arrivals, buyer pickups, or the condition of goods further along in the supply chain. The responses to the survey revealed trends in technology across the board, including increased use of advanced systems, such as ERP platforms and other technology in addition to more traditional tools, like Excel. These findings provided a core understanding of the technical environment which informed the design of the interviews below.

4.1 Research Sample and Data Collection

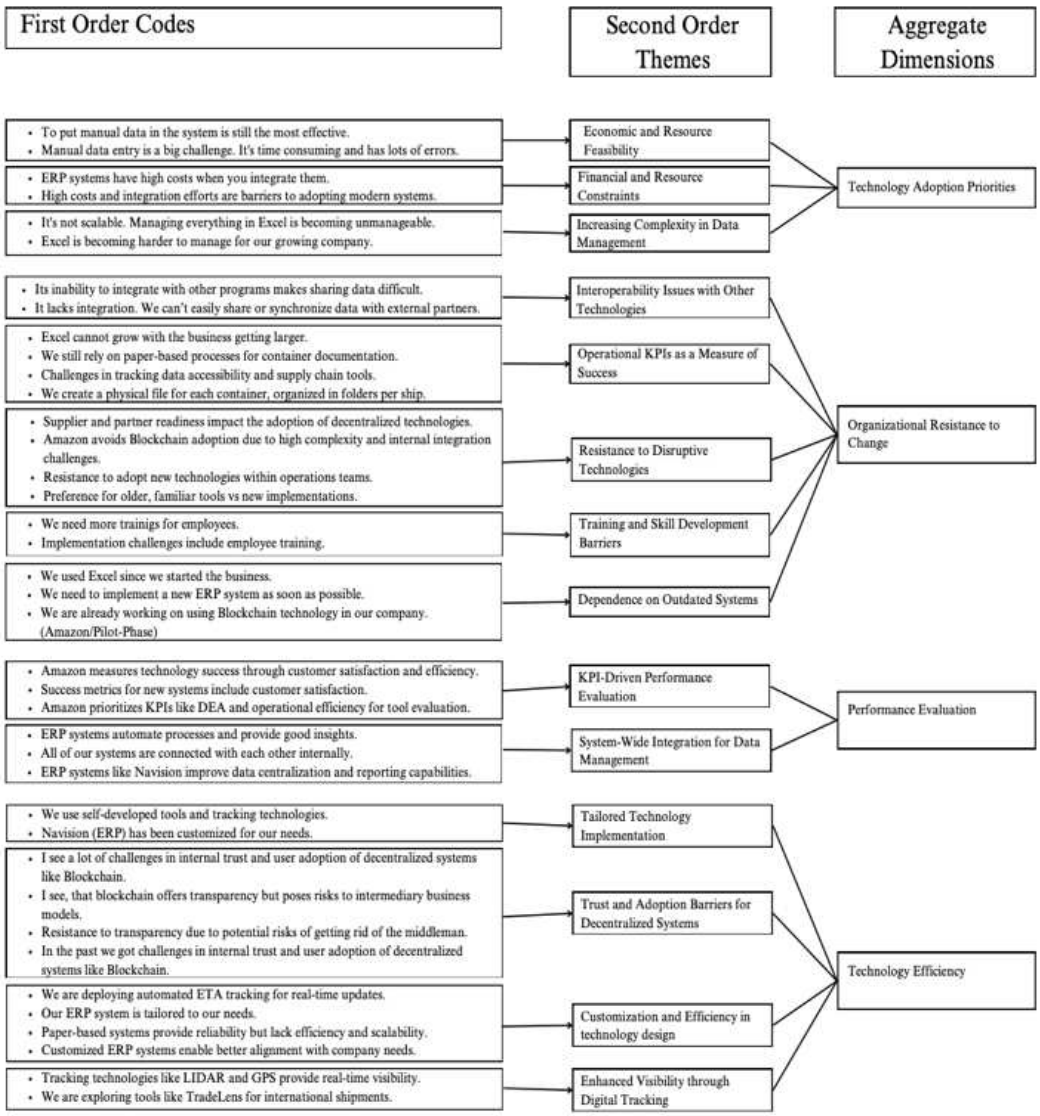
The same eleven participants were asked to participate in semi-structured interviews after the survey to dive deeper into the organizational possibilities and challenges related to technology adoption. Internal managers, outside partners including suppliers and logistics companies, and specialists with blockchain implementation knowledge were all included in the sample. Microsoft Teams was used to conduct the interviews online, allowing for safe and effective virtual meetings. With the participants permission, each 30 to 60 minute interview was recorded. Fireflies records and transcribes virtual meeting interactions. It was used to automate

the interview transcribing to guarantee correctness and save time. These interview guide can be seen in Appendix A.

4.2 Data analysis

To investigate the differences among organizational environments, the study was divided into two parts. The first area focused on SMEs, while the second analyzed large multinational corporations. This approach made it possible to compare the ways in which organizational structure and measure affect the adoption and implementation of modern technologies. The Gioia approach was used to examine the interview data. Recurring themes were found through this technique and later categorized into more general groups. A more detailed overview of the Gioia table is obtained in Appendix C.

Figure 1: Coding Overview for supply chain managers



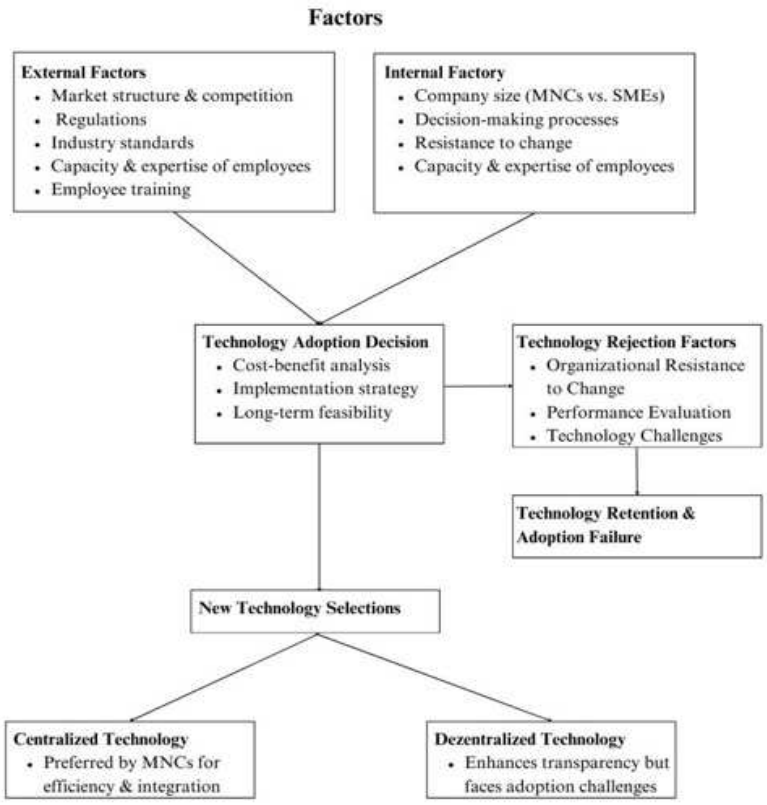
After then, these categories were simplified into more general conclusions. A structured classification into three categories, such as Type A, Type B, and Type C, was made possible by the patterns that emerged from the examination of the technologies used by the organizations that were questioned. By putting technology into groups according to common characteristics, these categories were created to make the evaluation process easier. To help researchers in the interpretation of the study's results, these categories are explained in more detail in the section that follows. Type A technologies handle and process data manually. Smaller organizations still frequently use these technologies, like spreadsheets or paper-based documentation. Due to the significant quantity of manual labor needed to link data points and promote information sharing across stakeholders, they are time-consuming and prone to errors. Since data is not centrally available, transparency is limited, and real-time tracking is challenging. These systems are also not scalable, which makes them unable to handle the intricacies of dynamic supply chains.

Centralized platforms, like ERP systems, that are intended to integrate business operations within an organization are referred to as type B technology. These platforms eliminate redundancies and facilitate cooperation across the whole organization by centrally storing all data. The automation of processes like supplier management, inventory tracking, and payment are important characteristics. Reducing human error and increasing efficiency are the goals. Additionally, they offer up-to-date information on order status, inventory levels, and supply chain activity.

According to my definition, type C technologies are the final group of technical approaches. Among these technologies are decentralized systems made to simplify transparent and impenetrable data management. Blockchain technology is a significant illustration of this area. A decentralized digital technology the blockchain technology keeps track of transactions in an unchangeable public ledger. The data is safe, traceable, and impenetrable thanks to its arrangement. Since everyone in the network has access to the same data, transparency and trust are increased.

5. Results

Figure 2: Conceptual model of technology adoption process



The results of the study are presented in this chapter. Figure 2 presents the main findings that have emerged from the interviews. They build on the technology classification described in the preceding part. The study provides trends in the adoption of new technologies and the obstacles businesses have when putting them into practice. These insights are structured around the key themes that emerged through the Gioia methodology, with direct input from participants shaping the discussion.

5.1 Technology Adoption Priorities

Aspects such as size, structure, and strategy of a company affect how technology can be adopted in supply chains. The challenges and priorities differ for SMEs and MNCs.

MNCs have huge ERP systems (Type B technologies) in place and are relying on automated and centralized platforms to run their supply chains. Instead of being the extreme solution for supply chain management, MNCs still rely on spreadsheets and manual processes (Type A solutions), which are more common for smaller companies, as secondary tools for task execution. While a fully integrated ERP system offers effective data management and ease of communication from in-house departments to external partners. *"ERP systems like Navision improve data centralization and reporting capabilities."* one participant observed.

In fact, MNCs find Blockchain (Type C technologies) unnecessary and complicated. They already have their own set of internal controls, compliance requirements for transparency, which is why they see no added value in a decentralized solution. Moreover, as Type B technologies already allow for transparent centralized data and efficient reporting, MNCs consider Type C technologies as redundant instead of complementary. Implementing the blockchain would involve major modifications of existing systems, but it does not provide a clear operational benefit. Moreover, the decentralized validation approach found in the blockchain is opposing to the centralized data structures favored by MNCs, which further diminishes its interest. As one interviewee mentioned that *"MNCs avoid blockchain adoption due to high complexity and internal integration challenges."*

Small and medium-sized enterprises deal with other challenges. And most still use Type A technologies as their manual processes or simple spreadsheets and want to move to Type B technologies. However, they do not have the capital to implement these systems successfully. These include high acquisition costs and integrating with the new technology. As one participant made clear that *"High costs and integration efforts are barriers to adopting modern systems."*

Nevertheless, despite these challenges, some SMEs still see Type C technologies as an opportunity for improving trust and transparency throughout their supply chain. One of the main reasons being that SMEs do not take established compliance frameworks or formal processes for verifying suppliers. Blockchain’s trusted and immutable records could offer a more reliable alternative to their existing trust-based supplier relationships. Nevertheless, these

advantages are still largely theoretical, as the financial and technical burden of blockchain implementation is extremely far from most SMEs.

Although MNCs still recourse to Type A solutions in certain scenarios, they primarily depend on Type B technology for their supply chain management. They can be utilized for further purposes like fast data exports, internal analytics, or compatibility with legacy systems by using spreadsheets and manual tracking. Even when they are not included in their key operational systems. Nevertheless, these capabilities do not serve as a substitute for the highly structured and efficient processes that ERP systems deliver.

Importantly, MNCs leverage the strengths of established Type B technologies, viewing Type C technologies as unwanted. While SMEs are still largely limited to both types, despite their potential benefits. Large enterprises face the challenge of incorporating the technology into their already complex deployment models, while SMEs will need to overcome financial and technical barriers to transition beyond Type A solutions. The challenge for MNCs, however, is not about feasibility but necessity. They already have what meets compliance and transparency requirements, so do not have the pressure to integrate and work with decentralized technologies immediately. This difference in attitude creates an obvious gap regarding technology usage between SMEs and MNCs, where one clearly struggles to catch up with upgrades.

5.2 Organizational Resistance to Change

Whether a SME or a multinational company, internal resistance remains one of the biggest challenges businesses faces when adopting new technologies.

The problem, in many instances, is not only financial shortage. The reason for the slow adaptation of new technologies is the absence of change management strategies as well as the reluctance of employees and management. Many companies prefer to stick with systems they are used to, to keep from disrupting their business. One respondent noted, *"Operations teams are reluctant to embrace new technologies"* while another emphasized the *"Preference for well-established tools over new implementations."*

But limited IT capacity also strengthens resistance. Many businesses fail to implement new technologies into existing processes, making them less efficient. Hence, the technological complexity regarding data synchronization leads to a tough adoption process.

One participant referenced *"Challenges in tracking data accessibility and synchronization"* which can make it difficult for businesses to link the new system to its current infrastructure.

Even maturing companies are far from implementing blockchain technology, limiting their use to only pilot projects. Bringing decentralized systems into existing ERP structures adds complexity without a clear operational upside. Whereas traditional ERP systems have defined responsibilities and centralized management, blockchain involves multiple stakeholders that need to coordinate. This shift raises the question of which employee is responsible for which tasks during the technology adaptation process. Many organizations are more reluctant to make the leap out of concern that they will lose control of critical processes. One of the survey respondents underlined this by saying that "Unclear responsibilities and no accountability in the company's lead to delays and resistance when it comes to the adoption of new systems."

One of the most common mistakes companies make is treating staffing as a technological problem. Many companies underestimate the need for cultural change if adoption is to be successful. Even though the process of training is not always enough, people still need to adapt to new methods by way of systemic sufficient training and time.

Any companies that either do not have any sort of onboarding process for new technologies lead to even more frustration and decreased employee output. A respondent mentioned that *"We need more training for employees"* while another added, *"Employee training is one of the implementation challenges."*

Resistance can also be related to a fear of more work. Responsibilities that are unclear only complicate the process further. Stretching this implementation process with no clear boundaries of hierarchy within the organizations and a clear function that states which employee is responsible for what, means fueling organizational resistance. In the long run, this can result in a lag or a complete failure of integrating modern technologies into companies.

"Unclear responsibilities and lack of accountability within companies lead to delays and resistance when adopting new systems."

5.3 Performance Evaluation of Technology Adoption

Businesses that adopt new technology often expect an immediate bump in performance. However, the integration process is usually more difficult than imagined, causing often delays. A lot of businesses care more about quantifiable results and near-term productivity gains than long-term technological innovations. Organizations do not want to fully commit to a new implementation only to abandon completely at the slightest sign they are not going to see the promised benefits.

According to one respondent, *"MNC's measure technology success through customer satisfaction and efficiency"* so businesses do not commit to widespread adoption before measurable outcomes. *"Success metrics for new systems include customer satisfaction"* emphasized another participant, underscoring the expectation that new technologies would provide instant benefits.

ERP systems are a major driver of success for MNCs for proven efficiencies as integration is in place. These systems streamline key processes and facilitate internal coordination without necessitating significant upstream operational changes. Because of their ability to maintain established workflows and streamline operations that MNCs prefer Type B technologies over their decentralized counterparts.

In one interview, someone stated that*, "ERP systems automate processes and provide good insights"* which aligns with the need to integrate current control systems and organizational frameworks.

But SMEs understand how blockchain technology can enhance supply chain transparency and reliability. Yet, they underestimate the difficulty of implementation, however, the difficulty of transforming existing procedures to decentralized systems. Unlike some other new technologies, implementing blockchain requires firms to modify processes and ensure interoperability with other technologies.

In contrast to the ERP solutions, which tie into organized corporate structures, most SMEs do not have the technical expertise and IT resources that this shift demands. Like implementing ERP, integrating blockchain requires heavy investment in infrastructure and training employees. The difficulties of modernizing legacy systems pose an additional challenge for smaller companies. One participant said, *"Many companies underestimate the technical challenges of new technologies, especially the need to overtake existing technologies."*

The gap between potential benefits and the difficulty in implementation stops many companies from fully embracing innovation. While businesses expect quick results, when faced with technical and organizational obstacles, they typically fall back on existing solutions. Adapting to new technologies demands a systematic execution plan, a long-term adoption, and persistent resource investments. Without a clear strategy and enough support, companies that initially expressed interest in innovation often postpone implementation.

5.4 Prioritization of Efficiency

Small and medium-sized enterprises (SMEs) and multinational corporations (MNCs) take different approaches to evaluating emerging technologies. SMEs value qualitative aspects such as trust more, while MNCs are guided by well-structured, efficiency-oriented KPIs, such as cost minimization and delivery efficiency. However, many SMEs lack formal evaluation processes, which makes consistently measuring how effective new technologies are much harder. In the absence of standard performance metrics, SME investment decisions are often based on qualitative assessments.

The primary challenge with implementing new technologies is their integration into existing KPI-level systems. Real-time monitoring technologies are also widespread because companies tend to favor developments with clear, measurable advantages. These technologies provide real-time visibility that makes assessing their effect straightforward. One participant remarked „*Tracking technologies like LiDAR and GPS provide real-time visibility"* claiming that companies tend to favor solutions that deliver quick results.

Decentralized technologies such as blockchain emphasize long-term benefits such as robustness and traceability. These benefits are difficult to measure. In addition, there are only a few who take on this enormous financial burden.

Furthermore, MNCs employ efficiency-based key performance indicators (KPIs) to manage their technology commitment, which reinforces their reliance on Type B technologies. These platforms simplify operations by centralizing data and embracing better internal communication. *"ERP systems like Navision improve data centralization and reporting capabilities",* one respondent said, demonstrating how inter-system synergies create efficiencies.

"All of our systems are internally connected" another participant said, meaning the ways digital technologies enhance operational performance by reducing inefficiencies. Solutions that could integrate within the already established workflows, keeping the disruption minimal, were consequently sought after.

Overall MNCs, as well as SMEs, perceive short-term operational efficiency as the role model preventing them from adopting disruptive technology. This problem causes uncertainty in decision-making as SMEs are affected by the lack of standardized evaluation techniques. On the other hand, the highly organized KPI frameworks of MNCs make it hard to explain long-term investments.

However, in either case, companies tend to back innovations that fit into already accepted guidelines. Due to this long-term transparency, Type C systems such as blockchain are often unappreciated. To address this challenge, corporations would likely need to shift their assessment processes from a transactional perspective one focused on near-term gains to one that weights both short-term benefit and longer-term strategic value.

6. Discussion

This study identifies supply chain technology adoptions determinants, underlining how internal barriers, organizational architecture, and company size measurably influence the decision-making process. Companies assess technology based on how it is to integrate, scale, and use. While smaller businesses often struggle with technological and financial limitations, larger businesses benefit from established digital infrastructures and sufficient resources. Small businesses are often restricted by technological and fiscal limitations, whereas larger businesses hold all the benefits of an established digital infrastructure and limitless resources.

6.1 Organizational Challenges

When businesses embrace new technology, they must overcome structural barriers. One of the greatest challenges is employee resistance to change. Most employees have established habits, so they view digital technology as disruptive instead of useful. This skepticism is evident when companies migrate from legacy systems to modern technologies. When employees don't understand the advantages well, it becomes very difficult for them to adopt and adapt to the new technologies.

Beyond internal resistance, firms often confront technological imperatives. Too many companies are stuck using older technology that is difficult to integrate with modern technology. Because of this, compatibility problems arise, and costs are higher. Organizations underestimate the extra work required to align new solutions with current processes, leading to delays and inefficiencies in the technology adoption process.

6.2 The Influence of Firm Size on Technology Adoption

Organizational size and structure of a business is another aspect which is disturbing the way new technologies are adopted. Larger businesses also have extensive financial resources and specialized IT teams, which simplify the implementation of complex systems. These companies tend to focus on streamlining and automating processes, establishing centralized systems to

facilitate scalability. However, their internal complexity and organization may cause them to be slow and start adopting new ideas later than expected.

Smaller companies can make changes more quickly, as there are fewer levels of management. But on the other side, budgetary constraints coupled with inexperience often hold back implementation, even if they are aware of the benefits new technology delivers. Many smaller enterprises in the manual track system will find it difficult to adapt to automated systems. Therefore, the help form the outside and carefully considered investment strategies, implementing modern techniques is still difficult. Finding a balance between creativity and financial viability is essential for long-term success with digital transformation for SME´s.

6.3 Corporate Culture and Resistance to Change

A company's corporate culture has a significant impact on its readiness to adopt new technologies. Organizations that actively encourage innovation have a higher chance of effectively integrating new tools than those that are resistant to change. Leadership has a significant impact on this mindset since clear strategies and efficient communication boost trust in new systems. Workers are more motivated to support digital transformation if they are properly trained and understand its benefits.

Uncertainty about workload increases and operational disruptions can all contribute to resistance to adopting new technologies. Companies that ignore these problems frequently face inefficiencies and delays in the integration process. Employees can adjust to new systems at a controlled pace with the aid of training programs and strategies for gradual implementation, which facilitate this shift. The overall effectiveness of technology breakthroughs decreases in the absence of structured learning programs, since the danger of disengaging rises.

6.4 External Market Forces

There are also outside forces that determine how businesses are adopting new technologies. In globally integrated supply chains, collaboration and standardization are critical. New solutions must fit with the technologies already deployed throughout the industry. When critical partners in the supply chain do not implement such systems, efficiency and overall effectiveness are reduced. Market trends and customer expectations also affect decision-making. Businesses are also driven by market competition to adopt technologies that improve transparency and productivity. Those who do not innovate and implement modern technologies risk their competitiveness. An active approach to technology integration ensures businesses can rapidly respond to changes in the industry and remain agile.

6.5 Rethinking Technology Adoption

The study's findings highlight the organizational hurdles companies face integrating new technology into their supply chains. Implementation of technologies such as blockchain, ERP systems are often being held up due to financial constraints, integration issues, and strategic misalignment.

One particularly relevant example of these challenges is the TradeLens platform built on blockchain to improve shipping transparency. This initiative certainly failed, which indicates the complications of technology adoption in supply chain management. TradeLens is a tool based on blockchain provided by IBM and Maersk, whose purpose is to enhance the transparency of shipments. This technological promise was not met with sufficient industry uptake to keep the project viable, however, and it wound up being abandoned. These included concerns about dependency and lack of competitive neutrality given that it was a Maersk-controlled platform.

This reflects a broader issue identified in this study that adoption challenges emerge when decentralized solutions do not align with businesses strategic objectives. The failure of TradeLens demonstrates the key findings from this study. If the decentralized solution is not the most efficient, integrated into their current ERP systems, MNCs are unlikely to adopt it without a clear bottom line benefit. However, because of budgetary restrictions and technical sophistication, SMEs who often do not have structured compliance systems, are unable to take advantage of the facts of transparency provided by blockchain technology. This is consistent with the fact that even though SMEs recognize the values of decentralized solutions, implementation is very often met with the challenge of lack of funding and know-how.

Organizational resistance is another cause of the TradeLens failure. But within the uncertainty of governance vs. responsibility, the uncertainty of decentralized networks has led businesses to be hesitant. Yet this unwillingness undermines the certainty of blockchain. Businesses must embrace the technology to win the battle of decision making. This aligns with the study's finding that businesses prefer centralized solutions due to their transparent internal workings and unique ownership structures.

TradeLens collapse also had something to do with methods of performance evaluation. This study shows that businesses assess the uptake of technology primarily with efficiency-focused KPIs, such as process automation and cost reduction. It is therefore difficult to align these short-

term performance indicators with the benefits of blockchain technology in terms of increased transparency and long-term resilience.

TradeLens also suffered from methods of performance evaluation. As this study reveals, businesses largely rely on efficiency-driven KPIs, such as automating processes and reducing costs, to evaluate technology adoption. These short-term performance metrics are hard to reconcile with the benefits of blockchain, including improved transparency and long-term resilience. This meant that, for many businesses, there wouldn't be any reason to invest in TradeLens unless there were all the benefits upfront, instantly and point measurable.

When it comes to embracing new technologies, the TradeLens instance has brought to the fore the importance of industry-wide collaboration, clear governance frameworks, and unambiguous financial incentives. Businesses are more likely to adopt new technologies that can be integrated with existing systems, deliver measurable benefits, and address broader organizational challenges such as interoperability and training, this survey finds. What lessons learned from current challenges might be incorporated into future technology deployments, designed to promote widespread adoption and sustained success.

7. Limitations

While the importance of technology adoption is well-understood, many questions remain unanswered regarding how aspects of the organization influence the effectiveness of adoption efforts, notably in terms of comparing small to large companies. The previous research centers around market dynamics, financial investments, and technical skills. But less has been studied about the internal challenges that companies face when integrating new technology into their supply chains. Also, relatively undervalued challenges are interfirm coordination, decision-making, and resistance to change (Akkermans et al., 2003). Research highlights that many of these implementation challenges stem more from managerial, strategic, and cultural misalignments rather than technical challenges (Kotter, 1996).

This study bridges the gap closures by exploring organizational barriers to technology adoption. But it is important to keep some limitations in mind. Limitations in the research and its reach included the limited size of the sample and the respondents in that sample. A broader diversity of participants, particularly from other industries and organizational structures, may have led to more comprehensive insights, even if the study combined survey data with qualitative interviews. Further studies identifying these results with a larger and more diverse sample.

Another limitation of the study is that it only reflects a snapshot in time. Problems confronting the organization and technology adoption are driven by market factors, legislative changes, and strategic choices. A more long-term study could give a deeper understanding of how companies adjust their strategies and overcome implementation challenges.

Moreover, the findings are self-reported, and there may be biases of perception. This approach can be supplemented with observational studies or experimental research to make a more objective assessment of the factors impacting technology adoption. While there are some limitations to the study, it provides valuable insights into how organizational factors can influence technology adoption.

8. Conclusion

This thesis concludes that decentralized technologies have their challenges in supply chain implementations, whereby the decisions, size of the organization, and organizational structures all play an important role in how technology is adopted in businesses. It points out that most companies are set for digital transformation as a strategic goal, with operational changes and financial challenges. Thus, these factors impede transitioning from traditional, centralized systems to decentralized technologies, such as blockchains. Big multinational companies typically have established ERP systems to prioritize efficiency and scalability. Small and medium-sized businesses understand the promise of decentralized solutions in driving transparency, but they struggle to implement it. These findings underscore that organizational readiness plays an equally vital role in sound technology adoption as does technical viability.

This study expands the body of research on supply chain resilience and digital transformation by framing technology adoption as a trade-off between organizational constraints and strategic priorities. It shows how companies are reluctant or unable to adopt decentralized technology and that resistance to change acts as a barrier to entry. Retaining systematic change management while aligning system innovations with business needs appears to be the mainstay of the study, which comes to this conclusion. The consequences of this are that companies should create broader evaluative frameworks. This would consider companies long-term resilience and transparency benefits.

This study is large, well done, and has important clinical implications. In the end, organizations will have to invest in gradual integration strategies for their infrastructures for decentralized technologies to be adopted. To address these weaknesses of the strict ERP-based systems, MNCs need to consider hybrid approaches that balance centralized control and decentralized

data-sharing mechanisms. In contrast, SMEs require tailored support systems such as readily available blockchain infrastructure and financial motivation to overcome adoption hurdles. By tackling these issues in a proactive manner, businesses can be better positioned to free up innovation.

This thesis presents three major findings that further our understanding of the adoption of digital technologies in supply networks. First it involves that adoption decisions are strongly determined by firm size and internal structures. Second, it emphasizes that existing assessment frameworks do not properly account for what we want to see when it comes to decentralized technology because they favor short-term effectiveness over long-term resilience. And finally, it suggests that collaborative efforts by supply chain actors and organizational flexibility are required to tackle these challenges. By incorporating these insights into strategic decision-making, businesses can more effectively leverage decentralized technology and navigate the challenges of digital transformation.

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10. Appendix

10.1 Appendix A

1. Thank you for taking the time to participate in this interview. I'm conducting research on supply chain technologies, particularly ERP systems and their potential to improve transparency and resilience in operations.
2. Could you please introduce yourself, describe your role in the company, how long you've been part of the organization, and how involved you are in coordinating with suppliers, customers, or logistics partners?

1. Current System and Technology Identification

3. Could you describe the primary system or process you use for managing container documentation and related operations?
4. You mentioned that your company is transitioning to an IT solution. Could you provide more details about the current ERP system being tailored to your needs?

2. Challenges and Benefits of the ERP System

5. What are the three main benefits you have experienced or expect to experience with your ERP system?
6. What are the three main challenges you've encountered or anticipate encountering as you implement the ERP system?

3. Comparison with Other Technologies

7. Have you considered other ERP systems or solutions?
8. How does your system compare in terms of benefits and challenges?
9. Are you familiar with decentralized technologies, such as blockchain, which could potentially address some of the same goals as your ERP system (e.g., transparency, real-time tracking)?

4. Hypothetical Questions

10. If your company were to consider adopting a decentralized technology like blockchain, what factors would be most important in making that decision?
11. What internal challenges (e.g., training employees, adapting workflows, or overcoming resistance to change) could you imagine facing if blockchain were implemented?

12. What external challenges (e.g., integration with shipping lines and ports, compliance with industry standards, or customer expectations) might arise if blockchain were adopted?
13. If your company implemented blockchain, how would you define and measure its success? What criteria or metrics would be most important?

5. Closing

14. Do you have any additional thoughts on your ERP system, your current processes, or the potential adoption of blockchain technology?

Thank you very much for taking the time to have this conversation with me. It was incredibly insightful to learn about your experiences with implementing and transitioning to new supply chain technologies, as well as the challenges and benefits you've encountered. Before we conclude, I'd like to ask if you would be open to me potentially reaching out to you in the coming weeks for a short follow-up survey (5-10 minutes). This could provide me with a more quantitative perspective to complement the valuable insights you've shared today.

10.2 Appendix B

Interview information of managers

ID	Age Group	Gender	Company Size	Industry	Role	Years of Experience	Technology Used
M1	20-35	Male	1-50 employees	Food & Beverage	Manager	1-3 years	ERP (Navision), Paper-based
M2	36-50	Male	51-250 employees	Logistics	Entry Level	4-6 years	Excel, GPS via bespoke app
M3	51-70	Male	Larger than 1000	Technology	Director	More than 15 years	Custom ERP, TradeLens
M4	20-35	Male	1-50 employees	Food & Beverage	Executive	7-10 years	None (manual

							processes)
M5	**36-50**	**Male**	**51-250 employees**	**Logistics**	**Entry Level**	**1-3 years**	**Sage, GPS**
M6	**51-70**	**Male**	**Larger than 1000**	**Technology**	**Manager**	**11-15 years**	**SAP ERP, in-house tracking tools (LiDAR, GPS)**
M7	**20-35**	**Male**	**1-50 employees**	**Food & Beverage**	**Entry Level**	**1-3 years**	**ERP (Navision), Paper-based**
M8	**36-50**	**Male**	**51-250 employees**	**Logistics**	**Director**	**4-6 years**	**Excel, GPS**
M9	**51-70**	**Male**	**Larger than 1000**	**Technology**	**Executive**	**More than 15 years**	**Custom ERP, TradeLens**
M10	**20-35**	**Male**	**1-50 employees**	**Food & Beverage**	**Entry Level**	**7-10 years**	**None (manual processes)**
M11	**36-50**	**Male**	**51-250 employees**	**Logistics**	**Manager**	**1-3 years**	**Sage, GPS**