# Handbook of Digital Innovation, Transformation, and Sustainable Development in a Post-Pandemic Era

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# 3 Digital Transformation Framework for Logistics Service Providers

## *A Systematic Literature Review*

*Seçil Gülmez and Gül Denktaş-Şakar*



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## *A Systematic Literature Review*

*Seçil Gülmez and Gül Denktaş-Şakar*

### 3.1 INTRODUCTION

Due to globalization and the competitive business environment, businesses need to produce goods and provide services more efficiently. To do this, it is necessary to combine emerging technologies with novel business practices and models. The Fourth Industrial Revolution (Industry 4.0) provided a suitable climate for business to find paths for differentiation as well as efficiency in their business processes by offering brand new technologies such as augmented reality, cloud computing, robotics, Internet of Things (IoT) and big data technologies (Ghaffari et al., 2020). Although the impacts of such technologies vary across industries, it is evident that the logistics industry is one which is exposed to dramatic changes both in the digitalized business environment and logistics business landscape itself. Considering the rapid changes in customer requirements and demand, customized service expectations of customers, inadequate management of goods in warehouses and possible risk of damage and loss in transportation processes, logistics service providers may face uncertainties as well as complicated information processing issues (Borgstrom et al., 2021). Apart from existing challenges resulting from the business environment itself, the COVID-19 crisis and sustainability targets of countries and firms have required business to transform its methods. The recent pandemic as one of the most impactful disruptions has changed the structure of supply chains. The logistical cost related to transportation has seen a significant surge, affecting companies' performance and profitability (Spieske and Birkel, 2021). Furthermore, customer demand, which is already unpredictable in nature, has risen and become even more complicated given the changes in consumer behavior and new e-commerce approaches (Al Mashalah et al., 2022). This drive has pushed businesses to build more resilient business systems to survive in challenging conditions. In such a complex business environment, a key component that emerges as a bounding mechanism between the logistics service providers and their customers is digitalization.


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Within a logistics context, digitalization represents technologically enhanced interconnected operations between companies and customers. The establishment of technological hardware and software tools within the concept of digitalization requires a thorough application of a proper business model within logistics service providers' organizations. The business model explains how an organization creates, delivers and captures value. Understanding customers' perceptions regarding value is a primary step in the creation of value propositions. This is followed by finding out the proper ways of delivering value to the market. In value capture, organization's pricing techniques as well as revenue sources play an important role. Digitalization of these stages in the overall business models of logistics service providers is widely accepted as a critical need in the industry (Xu et al., 2023; Meier et al., 2023; Bigliardi et al., 2022; Jović et al., 2022). An updated review of the existing business models and necessary changes in such models is expected to provide additional revenue from new sources (Gong and Ribiere, 2021), entry into new markets where logistics service providers were not available before (Jović et al., 2022), launch of new services (El Hilali et al., 2020; Chinoracky and Corejova, 2019), introduction of new sales channels (Jović et al., 2022) and new ways of charging for services (Pucihar et al., 2019). Dynamic and flexible business models enriched with improved digital tools are expected to provide increased customer engagement, efficient utilization of resources and better anticipation of customer demand, as well as changes in prices, tax and depreciation rates (Straková et al., 2022). Such dramatic changes in the logistics industry with novel business models trigger the development of a business climate fostering customer-centric innovation by involving customers in various stages not only in logistics processes but also in supply chain networks, real-time data sharing among the actors and business practices with flexible and agile solutions in order to allow a quick response to changes in the logistics industry. Based on these expected benefits, logistics services providers have started to implement new digitalized business models in order to remain competitive.

There has been increasing interest in the digital applications of logistics service providers in the literature. While some specific components have been discussed through the lens of digital transformation, such as government support and customer collaboration (Zhou et al., 2023), some studies have focused on the sustainability perspective of digital business models in the logistics industry (Xu et al., 2023; Piscicelli, 2023, Romagnoli et al., 2023; Liu et al., 2022). Some systematic literature reviews have also been conducted by focusing on specific supply chains (Ding, 2018; Rejeb et al., 2022; Rad et al., 2022). There have also been studies focusing on the maritime transport segment of the supply chain by discussing the maritime transport industry's response to digitalization (Balci, 2021; Poulis et al., 2020; Lambrou et al., 2019). Although the current practices of logistics service providers in the context of digitalization and emerging business models are widely implemented, academic research concentrating on the digital transformation processes in the logistics industry is rather limited. In addition, it was stated that uncertainty exists around how digitalization will impact logistics service providers' business strategies (Bjorkdahl, 2020; Kohtamaki et al., 2020). With this view, the main aim of this chapter is to present a framework for digital transformation in logistics service providers' business

models based on a systematic literature review. The main research questions of this study are as follows:

- What are the main components of a digital business model for the logistics service industry?
- Which dynamics are required to digitally transform the business models of logistics service providers (LSPs)?
- How can LSPs digitally redesign their business models?

The chapter is organized as follows. The first section explains methodology employed in the study by presenting the main stages. Then, the findings and discussion section provides the findings of the systematic literature review by highlighting the main components in the business models and how such components may be adopted in the digitalized business landscape of logistics service providers. The chapter ends with a conclusion.

## 3.2 METHODOLOGY

In this study, a systematic literature review was adopted to identify the topics in a digital business model specific to the logistics industry and develop a digital business model for logistics service providers. Systematic literature reviews represent a methodological, scientific and a clear approach to delineating a specific area of study. They allow readers insights into the systematic process researchers follow in reaching their conclusions (Tranfield et al., 2003).

A systematic literature review strategy was followed based on Tranfield et al. (2003). The procedure involves three sequential stages: planning, execution and reporting. The planning stage refers to developing a review protocol which ensures objectivity through ensuring explicit illustration of the steps to be taken. The execution process starts with the identification of the research, selecting studies based on specific criteria, quality assessment of data to minimize biases and extracting and synthesis of the data, and finally, reporting implies synthesizing the findings through the predefined protocol (Tranfield et al., 2003). Figure 3.1 schematically illustrates the review process. In this study, the reporting part of systematic literature review is explained in the findings and discussion section.

### 3.2.1 Planning

The research questions and the objectives of the study mainly directed the review process. The analysis engaged in defining the concept of a digital business model and the framework which can facilitate the implementation of designing a new digital business model and managing the digital transformation process of existing business models of logistics service providers. In pursuit of that objective, the ("digitalization" OR "digitalisation" OR "digitization" OR "digitisation" OR "digital transformation") AND "business model" AND ("logistics" OR "shipping" OR "transport" OR "logistics service providers") search terms were defined for the query. After screening the outputs from the first query, the authors decided to reorganize the keywords in the research string to find more studies related to the field. In the second query, one additional research string was generated by excluding the "business model" keyword

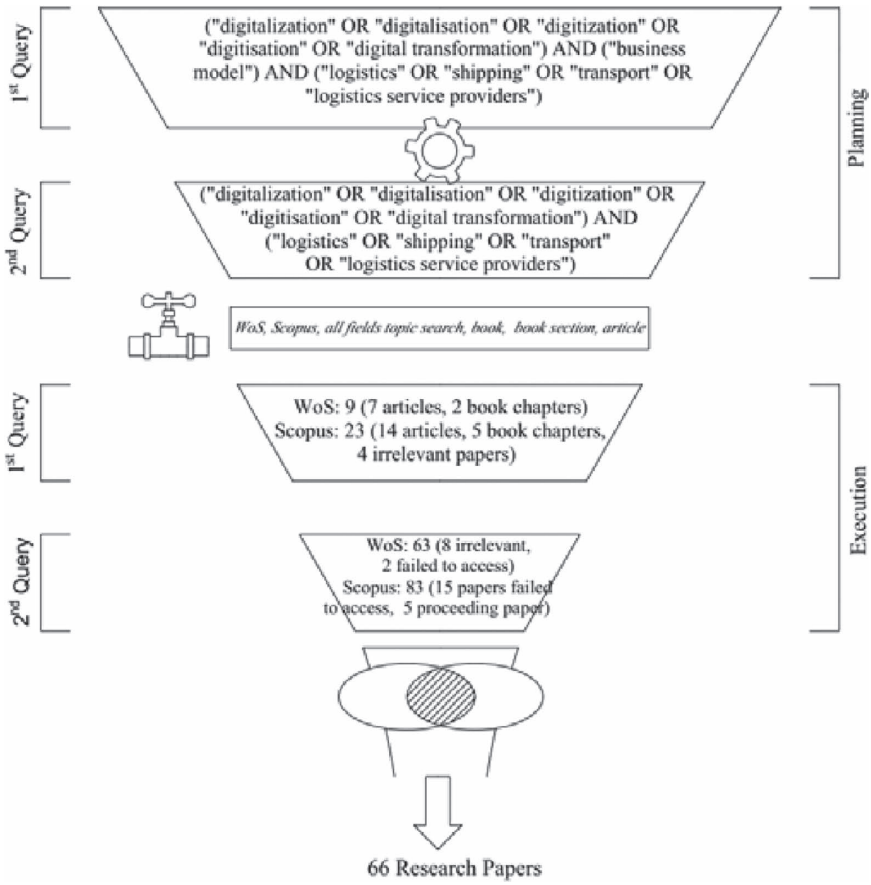


**FIGURE 3.1** Search inquiry and process.

and then unified with the first research string. Thus, two different research streams were combined into a single compact research string. With the two-stage research query, those keywords were also reaffirmed during the coding process. To ensure the quality of the papers, the ISI Web of Science (WoS) and Scopus databases were chosen without setting any time constraint and in all search topics. A topic search was performed in both databases, and inclusion criteria were set regarding the text language (non-English text was excluded) and type of research (book, book section and article were determined for the query. Proceeding papers were excluded due to concerns about not being included in a comprehensive peer-review process).

### 3.2.2 Execution

In the first step of the two-stage research query, WoS yielded 9 research papers (7 articles and 2 book chapters), while Scopus yielded 23 papers (14 articles, 5 book chapters, 2 irrelevant articles, 2 irrelevant book chapters). Because of obtaining limited articles in the field, the second query was performed with reorganized keywords.

The WoS query at the second stage yielded 63 research papers (8 irrelevant papers and 2 papers for which access failed), while the Scopus search provided 83 papers (30 book chapters/books, 53 articles, 4 papers for which access failed, 5 proceeding papers and 15 book chapters with limited access). After the outputs of each query were merged into a single file, duplicated papers were eliminated and the contents of all paper re-assessed by their relevance of the field. Ultimately, a total of 66 papers were identified for coding purposes.

A deductive approach was adopted to generate an archetype for a digital business model for LSPs and strategic points in digital transformation of their business model. The coding framework guided the coding process to identify the main components of digital business model for the logistics service industry, which dynamics are required for digitally transform the business models of LSPs and how they can digitally redesign their business models. The process was inspired by the business logic triangle (see Figure 3.1), as outlined by Osterwalder and Pigneur (2010) and Rachinger et al. (2019). The analysis encompassed strategic, architectural and technological levels of the business model.

At the architectural level, the initial set of codes was rooted in the business model (BM) value architecture, as described by Osterwalder and Pigneur (2002) and Teece (2010). While various frameworks exist for depicting a business model's structure, they tend to converge toward the concept of value architecture (Morris et al., 2005; Teece, 2010; Saebi et al., 2017). Consequently, this study revolved around key aspects such as value creation, value proposition, value delivery and value capture.

Nvivo 11 Plus supported the content analysis and coding the activities. Regarding the coding framework depicted in Figure 3.2, open codes were determined deductively

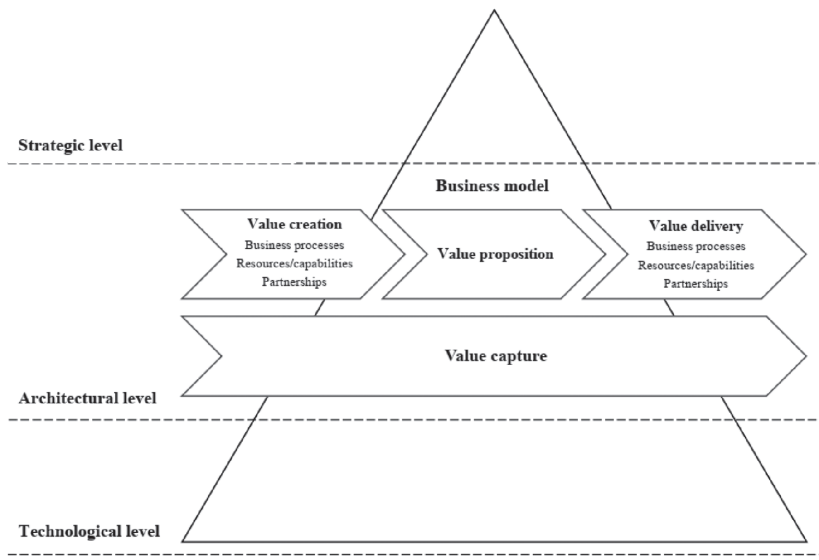


**FIGURE 3.2** Coding schema for digital business model of LSP.

**Source: Rachinger et al. (2019); Osterwalder and Pigneur (2002).**

**TABLE 3.1**
**Business Model–Associated Coding Terms**

| Business Model–Based Value Segment | BM Components | Terms Associated with BM Components |
|---|---|---|
| Value Proposition<br>*What value is suggested and for whom is it intended?* | Offer | Product/service type, value creation and delivery, offerings (Morris et al., 2005; Bocken et al., 2014) |
| | Value Proposition | Customer segment, offering, customer needs, service, product, experience, channel pricing, offering, generic strategy to attract customer, relationship, operations, quality, availability, innovativeness (Linder and Cantrell, 2000; Osterwalder et al., 2005; Richardson, 2008; Clauss, 2016; Bocken et al., 2014) |
| | Customer Segments | Target customer, distribution channel, relationship (Bocken et al., 2014; Morris et al., 2005) |
| | Customer/ Partner Relationship | Customer, partner, supplier relationship (Morris et al., 2005; Bocken et al., 2014) |
| Value Creation<br>*How is value created?*<br>Value Delivery<br>*How is value delivered?* | Key Activities | Activities/activity system (Richardson, 2008) |
| | Key Resources/ Capabilities | Execution, distinct capabilities, technology, equipment, operating system, supply chain management, networking, resource leveraging, (Osterwalder et al., 2005; Clauss, 2016; Bocken et al., 2014; Richardson, 2008; Morris et al., 2005) |
| | Key Partners | Partnership, suppliers, customers, partners (Richardson, 2008; Bocken et al., 2014) |
| | Channels | Process, value chain, business process (Clauss, 2016; Richardson, 2008) |
| Value Capture<br>*How is value captured?* | Cost Revenue Flows | Cost structure, revenue sources, economics of the business, revenue model, financial structure (Richardson, 2008; Bocken et al., 2014; Clauss, 2016; Osterwalder et al., 2005; Linder and Cantrell, 2000) |

*Source:* Compiled through the categorization of Ranta et al. (2018) and Nußholz (2018)

based on the value segments specified in the coding framework, and papers were coded deductively. BM-related open codes, which are illustrated in Table 3.1, were used in coding the collected papers.

While coding the papers, BM components were defined as free nodes and associated terms coded as tree nodes. In the articles, related words were queried; then the paragraphs involving the word groups were coded to the nodes. Although using software tools provides greater advantages for analyzing the bulk of qualitative data, it may not always address the analysis requirement. Because of exploring the main components and the dynamics of a digital business model specific to the logistics

service industry, the coded data were deeply reanalyzed and re-coded to according to the business logic triangle (Figure 3.2).

## 3.3 FINDINGS AND DISCUSSION

Figure 3.3 outlines the findings of the systematic literature review in developing a business model framework for digital transformation of logistics service providers. The results were discussed by business model triangle aspects.

### 3.3.1 Value Proposition

As Figure 3.3 shows, the findings underscore the multifaceted value proposition stemming from the digital transformation of LSP business models. Customer engagement emerges as a cornerstone, as involving clients in the design process not only empowers them but also fosters a sense of ownership, thereby creating a more profound bond between customers and services. This trend continues as businesses further integrate digital tools to enhance customer experience. The focus remains on empowering customers and fostering loyalty through interactive and personalized digital experiences.

The pivotal role of strategic marketing efforts is illuminated, elucidating how efforts aimed at building consumer trust have a cascading effect on brand credibility and long-term customer loyalty, highlighting the symbiotic relationship between customer perception and business success.

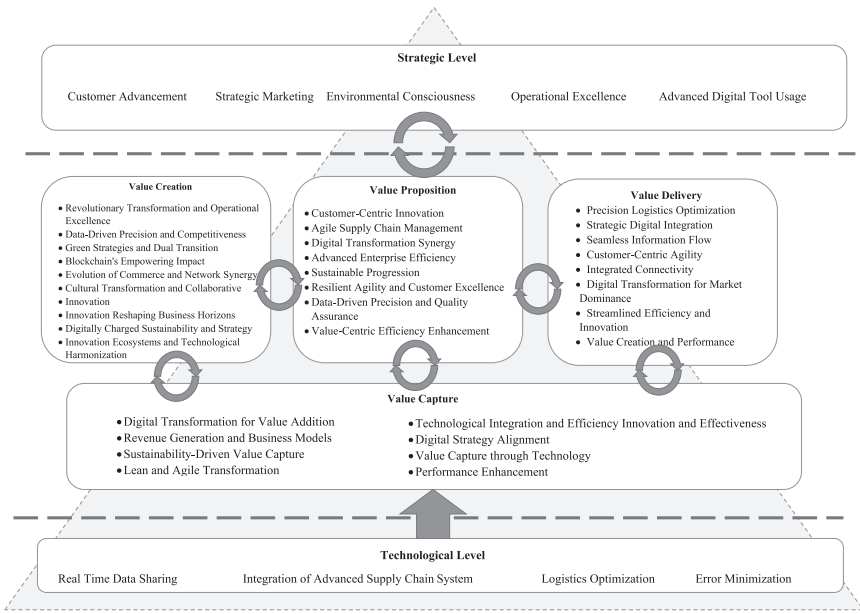


**FIGURE 3.3** Business model approach to digitalization of logistics service providers.

Furthermore, the findings emphasize the strategic imperative of addressing the burgeoning environmental consciousness of consumers. The provision of sustainable products and services emerges as a strategic alignment that reinforces the brand's significance in an era characterized by heightened environmental awareness (Iglesias-Pradas et al., 2022). This resonance with societal trends underscores the importance of staying adaptable and relevant in a market driven by ecological considerations. LSPs can also accelerate the adoption of digital solutions to provide sustainable services, ensuring their operations align with ecological considerations and customer expectations.

The integration of advanced digital software for supply chain optimization takes center stage as a transformative force in logistics operations. This digital integration, which prioritizes factors such as cost, time, quality, resilience and environmental impact, is shown to be essential in achieving operational excellence. Additionally, the role of digital platforms as proactive sentinels, alerting companies to global risks and enabling strategic responses, highlights the real-time responsiveness that digital tools can offer to the dynamic and resilient logistics landscape (Varriale et al., 2021).

The significance of real-time data sharing among logistics partners is commonly emphasized, accentuating how this practice not only enhances operational efficiency but also promotes collaborative decision-making, ultimately resulting in cost-effective and streamlined operations. Especially in disruptions, real-time data sharing and collaboration remain critical. Enhancing the usage of related platforms facilitates the continuous collaboration and information exchange, driving more efficient and agile logistics operations (Belmoukari et al., 2023).

Digital technologies extend their transformative reach to waste management, optimizing routes for material collection. This integration within scalable cloud environments is shown to enhance accessibility and data flow, streamlining waste management processes and broadening the operational spectrum of logistics service providers (Sorkun, 2020). Innovative business models driven by digital tools reshape value propositions, enabling the expansion of market reach and catering to evolving customer demands, thereby fostering a competitive edge in the industry landscape (Korucuk et al., 2022).

Among software technologies, the strategic role of enterprise resource planning (ERP) systems as organizational orchestrators should not be neglected in terms of ensuring agile and responsive schedules across the supply chain. Moreover, the integration of radio frequency identification (RFID), Internet of Things and automation technologies enhances precision and minimizes errors in various logistical processes, further attesting to the role of digital tools in operational optimization (Varriale et al., 2021).

In the realm of sustainability, the findings through the literature review highlight the alignment of digital transformation with eco-consciousness, stressing the significance of businesses fostering environmental awareness and offering eco-friendly products. Strategic agility emerges as a key factor in anticipating disruptions, fostering innovation ecosystems and providing businesses with essential digital capabilities to enhance resilience in the face of market uncertainties (Wohlleber et al., 2022). LSPs can invest in enhancing digital capabilities to stay ahead on a market that continues to face uncertainties and disruptions.

### 3.3.2 Value Creation

The insights gathered through the analysis highlight a fundamental shift in the industry, driven by the integration of new technologies, resulting in operational excellence and increased value for customers. The incorporation of novel technologies signifies a paradigm shift in the management of the service life cycle. This transition not only facilitates operational excellence but also generates unprecedented value for discerning customers. The flexibility achieved through organizational changes empowers businesses to evolve seamlessly, leading to personalized experiences that redefine benchmarks for value. This customer-centric approach disrupts traditional models, effectively enhancing customer value.

An evidence-based approach amplifies precision and competitiveness as Industry 4.0 technologies converge to empower stakeholders with improved services and operational capabilities (Rad et al., 2022). The notion of servitization unlocks substantial value by offering comprehensive, impactful solutions to customers. The acceleration of operational speed not only heightens customer satisfaction but also reinforces the dedication to value creation (Jabloński and Jabloński, 2019). The integration of software solutions and simulation models mitigates risks and confers competitive advantages, enhancing value across the spectrum.

Sustainability initiatives in information and communication technology (ICT) play a pivotal role in driving sustainability, catering to environmentally conscious consumers and enhancing societal well-being (Belmoukari et al., 2023). The dual transition—green and digital—creates a synergistic effect, promoting sustainability while catalyzing technological advancement. The fusion of green strategies and digital integration extends market dominance, providing a competitive edge and augmenting customer value (Cavalli et al., 2021). By combining circular economy principles with digital solutions, businesses redefine their paradigms, achieving a balance between commercial growth and ecological sustainability.

The transformative impact of blockchain is evident. Smart contracting systems redefine efficiency, precision and automation, strengthening logistics entities with superior capabilities and enhancing client value. The convergence of digital tools and self-executing contracts ensures transparency, trust and unparalleled excellence (Silkina et al., 2021). Blockchain empowers stakeholders to become data-enabled decision-makers, guiding processes and strategies toward optimal outcomes.

The evolution of commerce, particularly the shift towards network commerce, revolutionizes value delivery by connecting marketplaces and providing consumers with unmatched convenience. Shared supply management platforms revolutionize stock control, leading to operational efficiency and elevated stakeholder satisfaction (Kassou et al., 2021). The dynamics of network competition reshape the market landscape, with empowered corporate ecosystems influencing market direction and delivering paramount value.

One another achievement factor in digital transformation is cultural transformation, which enables organizations to extract enduring value from change (Lomakina et al., 2021). Engagement and knowledge investments enhance employees' expertise, serving clients with elevated value. Collaborative data exchanges expedite service optimization and excellence, resulting in significant cost savings and heightened stakeholder satisfaction.

The synergy between digitally charged sustainability and strategic alignment is evident. Organizational transformation and knowledge exchange expedite value enhancement, enriching both business prosperity and client satisfaction (Awan et al., 2022; Wohlleber et al., 2022). The crafting of digital strategies not only aligns with the digital economy's rhythm but also fosters value amplification across stakeholder landscapes. Environmental stewardship through green technologies exemplifies the holistic essence of value, uniting commercial advancement with global betterment. Process optimization through emerging technologies extends value horizons by promoting sustainability, financial prudence and operational excellence (Silkina et al., 2021).

The innovation topic, in this realm, emerges as a driving force reshaping business horizons, invigorating service quality and introducing novel value dimensions. Open innovation, coupled with technology partnerships, crystallizes value by propelling businesses towards greater creativity and efficacy. The innovation ecosystems nurtured through this transformation cultivate entrepreneurial potential, magnifying industry worth by synergizing collective ingenuity. Technological integration propels streamlined processes, creating opportunities for value amplification and delivering enhanced services.

### 3.3.3 Value Delivery

Value delivery in digitally logistics service organizations highlights the strategic integration, information flow, customer centric agility, integrated connectivity, efficiency and innovation and value creation and performance topics.

Precision logistics optimization emerges as a key driver, leveraging smart transportation to ensure the timely delivery of materials while reducing both delays and costs. By harnessing data-driven insights, LSPs engage in industrial symbiosis, effectively minimizing waste and optimizing resource efficiency, thereby maximizing the value they deliver (Alhawari et al., 2021).

Strategic digital integration becomes a cornerstone in this transformation journey, where the implementation of software solutions enhances network optimization, leading to efficient resource allocation (Wei et al., 2019). Risk-analyzing platforms enable proactive risk management, empowering decision-making and minimizing risks. Automation-driven tour planning and freight portals redefine routes, ultimately saving valuable time and resources (Meier et al., 2023).

Seamless information flow, facilitated by blockchain technology, redefines transparency and collaboration. The pandemic especially highlighted issues like lack of transparency and collaboration in supply chains. Blockchain technology gained attention for its potential to address these issues (Kamble et al., 2020). Through smart contracts, manual errors are significantly reduced, ensuring accuracy across processes. The real-time data sharing capabilities of blockchain bridge gaps in supply and demand, driving operational efficiency and value delivery.

Customer-centric agility stands out as a pivotal factor, as logistics services tailored to customer needs redefine the value proposition. Real-time collaboration with customers guarantees rapid responses to their preferences and concerns, fostering meaningful engagement (Raza et al., 2023). Co-creating value with customers leads to personalized solutions, elevating customer satisfaction.

Integrated connectivity, enabled by cloud computing, establishes a scalable IT infrastructure that bolsters efficient operations (Heilig et al., 2017). Integration of ICT systems, along with stakeholder engagement, further amplifies information flow and collaboration. The exchange of real-time data enhances transparency, thereby elevating overall operational efficiency (Varriale et al., 2021).

Digital transformation for market dominance becomes a driving force, as digital capabilities redefine operational excellence, yielding cost savings and improved services. By harnessing digital technologies, LSPs achieve revenue growth and penetrate new markets. Collaborative innovation through networks solidifies their competitive advantage, ensuring sustained success.

Streamlined efficiency and innovation emerge as direct outcomes of process optimization through digital technologies. The integration of blockchain, smart contracts and the Internet of Things augments operational performance and accuracy (Varriale et al., 2021). With transparency and collaboration flourishing through blockchain, profound impacts are observed across core business processes.

Value creation and performance are intrinsically linked to digitalization. Operational performance reaches new heights, resulting in the delivery of higher-quality products and services. Digital technologies act as catalysts for revenue growth and innovation, reshaping entire industries. Open collaboration and digital networks reframe value propositions, ultimately amplifying overall success.

### 3.3.4 Value Capture

The research findings illustrated several value capture perspectives within the context of the digital transformation of logistics service providers' business models. The integrated framework presents a structured approach that aligns identified factors and dimensions, guiding LSPs in their journey towards digitalization while maximizing value creation. In the pursuit of value addition, LSPs are directed towards upgrading their digital infrastructure to minimize waste and augment process value. This also led to alignment with sustainability goals as well. LSPs can foster nuanced human–machine interactions for heightened process efficiency, enabling real-time data visibility, transparency and liberation from spatial and temporal constraints to cope with changing market demands and maintain resilience against future disruptions. Increasing omnichannel capabilities in service provision can provide greater resilience in LSPs' business model and lead to capture value through enhanced stakeholder engagement.

Within the realm of revenue generation and business models, systematic analysis of the extant research underscores the significance of charging fees for software-driven network optimization solutions. Implementation of risk management platforms and the monetization of freight portals and logistics optimization services have the potential for revenue generation. Especially capturing value through digital transformation extends to efficiency and risk reduction offerings, further accentuated through the implementation of fee-based scheduling and logistics management software (Kwilinski et al., 2022; Wei et al., 2019).

One other perspective to value capture in digitalization of LSPs is sustainability-driven value capture, which is identified as a strategic imperative, as LSPs leverage

green strategies and digital systems to achieve enhanced market share and cost advantages. Strategic policies are recommended to promote sustainable approaches in logistics, and special financing programs are highlighted as tools to foster the adoption of green technologies, thereby capturing value through sustainable practices.

Lean and agile transformation emerges as another pivotal dimension in the digitalization of LSPs' activities. It advocates for the adoption of lean principles to establish standardized efficiency, while agile practices facilitate rapid adaptation and alignment with dynamic market conditions (Cichosz et al., 2020). Furthermore, the integration of external partnerships is recommended to empower LSPs with cutting-edge technology and innovation. However, this integration gives rise to another concern, particularly regarding technological integration and the effectiveness of technological usage.

This concern becomes critical for operational enhancement, as it encourages LSPs to effectively plan and execute using advanced systems like MRP, MRP 2, ERP and distribution resource planning (DRP). Additionally, further techniques such as the shared supply management approach can be integrated into freight flow to optimize distribution and stock management (Kassou et al., 2021). This integration ultimately leads to increased efficiency and value capture.

Innovation and effectiveness are championed, prompting LSPs to renovate outdated processes, strategically assess competitive potential and transform business models to match the pace of innovation in the digital age. The alignment of digital and business strategies is crucial, requiring preparedness for cultural shifts and the proactive customization of technology implementation to maximize its tailored impact (Raza et al., 2023).

Existing studies generally accentuate value capture through technology, advocating for the proactive adoption of advanced technologies to drive digitalization efforts. Strengthening information processing capabilities is identified as a critical step, while the harnessing of government policies for logistical enhancements further amplifies value capture. The creation of novel digital products, services and business models is recognized as a conduit for expanding value capture potential.

### 3.3.5 Strategic Level of Business Model Triangle

As strategic level, customer engagement, strategic marketing efforts and environmental consciousness have a critical role in shaping the value proposition. The integration of advanced digital software for logistics process optimization is properly portrayed as a transformative force that aligns with the strategic objectives of operational excellence. The emphasis on real-time data sharing, particularly through blockchain technology, demonstrates strategic agility in enhancing collaboration and operational efficiency. The focus on customer-centric agility and sustainable practices indicates a strategic shift towards personalized solutions and market differentiation. The strategic significance of integrating green strategies and digital systems is well articulated, showcasing a thoughtful approach to value creation aligned with evolving societal trends.

### 3.3.6 Technological Level of Business Model Triangle

At the technological level, integration of various digital tools and technologies within LSPs' business models should not be neglected. The results of the thorough analysis of the literature review imply the integration of precision logistics optimization, where smart transportation and data-driven insights play pivotal roles in enhancing delivery efficiency and minimizing costs. The mention of risk management platforms and automation-driven planning of freight movement illustrate the application of advanced technologies in risk reduction and route optimization. The emphasis on blockchain technology and real-time data sharing point up technological advancement in ensuring transparency, accuracy and collaboration. The integration of advanced systems like MRP, MRP 2, ERP and DRP highlights the technological underpinning of efficient planning and execution. The reference to RFID, IoT and automation technologies further validates the incorporation of technology in enhancing precision and minimizing errors. Moreover, the fusion of green strategies with digital integration showcases how technological advancements contribute to sustainability initiatives.

## 3.4 CONCLUSION

The motivation for this chapter stems from the lack of existing studies concentrating on digital transformation in the logistics industry with a specific lens of emerging business models. Through an extensive systematic literature review, this chapter provided a framework for the digital transformation components in the business models of logistics service providers. The study highlighted some components within the perspective of value proposition, value creation, value delivery and value capture by considering the impact of digitalization. With regard to value proposition, the main components that emerged in the systematic literature are customer-centric innovation, agile supply chain management, digital transformation synergy, advanced enterprise efficiency, sustainable progression, resilient agility and customer excellence, data-driven precision and quality assurance and value-centric efficiency. Digitalization offers new ways to communicate with the current and potential customers, and this is also reflected in logistics service providers' information processing speed. In addition, by having historical transaction records in order to analyze customer preferences and provide customized services, logistics service providers can meet the expectations of their customers in a more efficient way. In the case of advanced enterprise efficiency, the use of robots, hybrid and unmanned vehicles and self-driving cars has huge potential in the value propositions of service providers.

In the value creation process, servitization, use of software solutions and simulation models, adoption of circular economy principles and the need for cultural transformation are highlighted. In servitization literature, digitalization is considered a critical driver of business model, value creation and value capture (Grubic, 2014; Parida et al., 2019). Additional benefits of digital servitization regarding environment and society can also be listed as reduction in energy consumption and increases in resource efficiency and product life span (Bressanelli et al., 2018). All these efforts of logistics service providers must also be supported by the organization itself

through cultural transformation which includes cultural readiness and collaborative actions among the stakeholders in order to achieve flexibility and transparency.

The value delivery process includes logistics optimization, strategic digital integration, seamless information flow, customer-centric agility, integrated connectivity, digital transformation for market dominance, streamlined efficiency and innovation, value creation and performance. Facilitation of storage and sharing of data can be achieved by strategic digital integration, integrated connectivity and seamless information flow between logistics services providers and their customers as well as their relevant stakeholders.

Value capture is reflected through specific components like digital transformation for value addition, revenue generation, sustainability-driven value capture, lean and agile transformation, technology integration and efficiency, innovation and effectiveness, digital strategy alignment, value capture through technology and performance enhancement. Logistics service providers may benefit from income streams in order to achieve more effective management of their fleets. As Ehret and Wirtz (2017) and Parida et al. (2019) stated, a critical approach to reducing operational expenses is by implementing process optimization and monitoring techniques to facilitate cost-effective resource allocation and improve overall capacity.

Considering such findings originated from a systematic literature review, the study provided a framework by focusing on the digital transformation concept in the business models of logistics service providers. The study systematically provided an evaluation of value proposition, value creation, value delivery and value capture components of business models through the specific investigation of logistics service providers' practices. The study has several limitations. The systematic literature review was limited to the analysis of two databases, ISI Web of Science and Scopus. For future research, three main suggestions can be made. First, other academic databases may also be considered for further studies. Also, some keywords, as explained in the methodology section, were used in the search query, and these can be increased or narrowed based on the aims of the future research. Last, the framework discussed in the current study can be evaluated and discussed by panel of experts. This can be conducted via in-depth interviews or focus groups. A panel of experts may specifically include practitioners from the logistics industry to get industry-specific feedback. In addition, a combination of various stakeholders, including logistics professionals, digital service providers and customers, may be considered for detailed discussion of the components in the framework.

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