



# Digitizing Supply Chain Management: Challenges and Opportunities in the Era of the Covid-19 Pandemic

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## Abstract

Digitalization in supply chain management in the era of the Covid-19 pandemic is a necessity for producers. Efficiency and effectiveness in supply chain management, which was originally done through physical contact, is now very easy in the era of disruption that relies on engineering technology. Digitalization of supply chain governance is a challenge in this pandemic era as well as an open opportunity to achieve big profits, because of its efficiency and effectiveness in this activity directly between producers and consumers communicating with each other. No need to face to face physically, consumer ordering online is faster and companies in digital supply chain management are easy to respond to more quickly, optimally and variedly.

**Keywords:** Management; Supply Chain; Digitization; Opportunities; Challenges; Covid-19

## Introduction

The COVID-19 pandemic has had a global impact on all lines of life, both health, social life, economy, and the environment [1]. To prevent the transmission of the virus-19, various efforts have been made by all countries in the world, one of these efforts is the direct restriction of social activities [2-4]. Even though there are direct restrictions on social activities for this prevention, business activities must continue so that economic balance is maintained. Thus, supply chain governance must be digitally based [5]. Digitizing supply chains in business activities in the Covid-19 era is an effective effort in addition to avoiding face-to-face meetings, it is also more efficient in supplying goods and services from one place to another [6]. So, managers must carry out supply chain activities manually with digital technology is a necessity [7-9], supply chain management which is usually done physically must switch digitally [10]. Likewise, consumers are more flexible in ordering purchases of goods and services online. The supply chain digitization system makes it easier for producers and consumers in the era of physical restrictions due to the Covid-19 pandemic [11]. This is an opportunity for supply chain managers [12]. Therefore, the purpose of this paper is to explain how supply chains are managed digitally as a challenge and at the same time a great opportunity in the new normal era of the Covid-19 pandemic [13]. To support some of the theories above, and at the same time explain the unique characteristics of this paper, it is necessary to state the facts in the field.

## Literature Review

The Covid-19 pandemic has changed the world's paradigm, especially from offline activities and activities to online. Slowly but surely forcing changes in all business actions depending on the use of technology. According to [14] not only does this change enter the business sector, but this digital acceleration has become a trend in other sectors, such as

- a) Social relations and labour;
- b) Sales and marketing, and technology.

This close relationship does not only rely on the use of technology but also has an impact on the organization's competitive advantage. In particular, [15] in their findings state that due to this digitalization, competitive advantage in organizations can improve supply chain management. This is considering that engineering technology which is the basic capital in its involvement in the advancement of various industries triggers SCM to be played optimally. [16] emphasize that a company's competitive advantage that leads to decision-making involvement in digital supply chain transformation requires at least blockchain technology. This is done by business vendors, wherein pallet rental they rely on online. Their main reason said [17] is for efficiency in asset and supply chain management to occur. In the fast-food business and other products, according to [18], it is very possible in the Covid-19 era the supply chain uses blockchain technology. They proposed that Food SQR Block be widely used. [19] firmly recognize that

digitalization must be utilized by supply chains. This is not only to streamline and improve planning but also supply chain management. Moreover, its use for the production and logistics sectors. Likewise [20] in their research note that digitalization in the supply chain is very significant for any industry. Even digital supply chains can help advance a sustainable economy. According to [21] global competition in the industry 4.0 and Society 5.0 era, which is marked by technological changes, forces supply chain management and logistics to be digitally based.

Moreover, this era relies on Big Data which all industrial companies must follow this change. So, it is impossible to use the old ways in meeting the needs of a large and broad market. [22-23] also recognize that supply chains that include product development, manufacturing, logistics and marketing in this era of disruption are impossible without technology. Therefore, digital-based supply chain management is needed for companies. This is because supply chain management for the industry is the acceleration and visibility to get to the customer immediately. According to [24] that what we think about the supply chain for large and small companies in this Big Data era needs two main aspects, namely sustainability and technology. Aspects of sustainability to improve the balance of economic growth on the one hand, and on the other hand technology as a tool to facilitate the acceleration of supply services from companies to customers.

This is emphasized by [25] in their research that to plan superior, competitive and sustainable corporate resources (ERP) requires agile and adaptive supply chain management according to changing times. They offer 12 principles to industrial companies who want to plan superior, agile and adaptive supply chains as can be seen in the following table. The twelve principles offered by Sigala et al are very helpful in accelerating companies in the era of disruption (Industry 4.0 and Society 5.0), especially in increasing resources, as well as company competitiveness in facing global competition and improving its performance. In addition to the above principles, [26] also propose the Agile Supply Chain (ASC) principle in dealing

with market competition pressures and their instability as well as strengthening the operational and organizational performance of technology-based global companies that must be adaptive and flexible. However, they admit that with this ASC, a company's supply chain does not necessarily improve its performance effectively. According to [27] to improve these shortcomings, it is necessary to integrate digitalization technology devices through the Internet of things (IoT) with Blockchain with the principles mentioned above. The use of Blockchain in supply chain management for acceleration, security, and strengthening in an integrated manner throughout the supply chain. [28] also emphasized the advantages of blockchain-based technologies in supply chains. Where they explain that the supply chain can know four important components, such as techniques, knowledge, organization and products in detail. However, this model of using technology tools needs to be integrated with the use of other technologies in an integrated manner, such as IoT with ASC and the twelve principles mentioned above, Greenfield Analysis and Network Optimization, as applied to automotive companies in Mexico [29]. In the Covid-19 era, which has an impact on wide-scale restrictions, of course, it is very likely to optimize digital-based supply chains and use the Internet of things (IoT) as an adaptive solution to maximize supply chain management performance for large and small companies.

**Method**

This article aims to increase critical knowledge both inductively [30] as well as descriptive and in-depth which refers to various articles on digitalization of supply chain management in the Covid-19 pandemic era as a challenge as well as an opportunity in improving resource competence and supply chain performance. a company. Several conceptual models and literature in other papers that make important contributions from various sources (Scopus, Google Scholar, Google Science, Science direct, Elsevier, ProQuest, Nature, Springer, and so on) are used as main references in this study so that actual, comprehensive writing can be presented, and integrative through keywords, citations, and analysis [25-27,31,32].

**Results and Discussion**

**Table 1:** ERP Principles in SCM (Source: Sigala I F, Kettinger W J & Wakolbinger T 2020).

Principle	Design
1	To use replication and synchronization technologies that enable online and offline transactions and data storage
2	For activation and deactivation of encrypted data transfer, multi-currency and exchange rate support, predefined customs and permits
3	For multi-language support, online training, user-friendliness, and easy centralized installation and maintenance
4	For high transparency, reporting and grant management specifications and requirements
5	To support decentralized governance
6	For inter-organizational collaboration between hosts
7	For scalability across multiple requirements from field to HQ and modularity allows local and regional customization
8	For relief item specifications, stock management and item donation
9	To support routing and scheduling of assistance vehicles in field operations (fleet management module)
10	To track assets and valuables in unsafe field environments
11	To assess needs after a disaster occurs, beneficiary registration, and the Cash Assistance Program
12	For big data analytics and simulations for humanitarian operations

SCM in the Covid-19 pandemic era is very interesting to study compared to ordinary management studies, especially when it is connected to digital technology. [33] argue that this field of study is closely related to the skills and abilities of a team in a company so that its success cannot be denied. This statement is reinforced by his findings on the Deloitte Company, where less than 50% of respondents affected by Covid-19 stated that supply chain strategy was influenced by the skills and abilities of the team. Therefore, they divide research opportunities related to SCM into 5 important themes to make it easier for managers to focus on this area, as can be seen in Table 1 below. Table 1 above shows that the five themes that

Hoek et al expect are at least an option for managers in increasing the competitiveness of supply chain companies. [34] emphasized that in the era of Covid-19, which is spreading very quickly in the world, managers need to accelerate the pace of supply chain usage with digital technology utilizing artificial intelligence (AI) and the Internet of Things (IoT) so that supply chains can be connected quickly and precisely. Both of them in their research at a South Korean Manufacturing Company linking 2 factors that affect supply chain performance, including healthcare digitalization, and social capital with supply chain performance as can be seen in Figure 1 below:

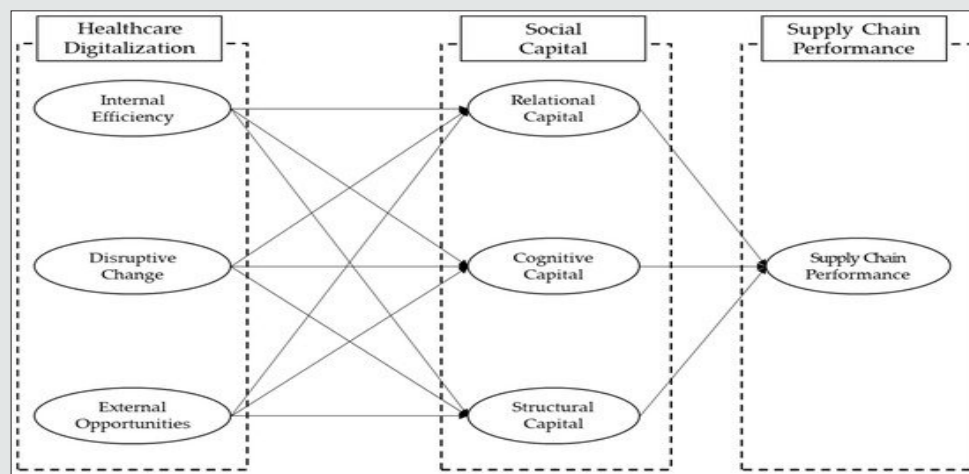


Figure 1: Relationships that affect Supply Chain Performance. Sumber: Kim dan Lee (2021).

Figure 1 above makes it clear that the existence of SCP can be influenced directly or indirectly by digitalization and social capital as intermediate variables. Kim and Lee found that supply chain performance can be effectively influenced by digitalization which includes internal efficiency, disruption change, and external opportunities as well as social capital in terms of relationships, knowledge, and structural capital. This of course should be a reference for company managers in planning the production process and supply chain network for optimizing factory output. However, [32] see that the significance of digitization in SCM is not the same in all countries. This is influenced by the situation and conditions, especially in the geographical sector especially during the Covid-19 period, so it offers the need for further, more comprehensive research, especially regarding the digitization

of SCM, as can be seen in Figure 2 below. Blockchain technology as one of the models recommended by researchers to accelerate SCM digital transformation in the Covid-19 era can be seen in Figure 3 above. Methodologically, both qualitative-empirical and quantitative are challenges as well as opportunities for companies, especially in the industrial sector, both food-agricultural products, health and retail in all countries in the world. According to [35] in addition to what was stated above, SCM in the era of the Covid-19 pandemic actually through utilizing digitalization-based technology can strengthen the sustainability of careful supply chain planning. Moreover, a mature SCM planning process with the involvement of productivity, disruption, and destruction can provide positive reinforcement (Table 2).

Table 2: Supply chain talent management research themes and opportunities and the impact of COVID-19. Source: van Hoek et al (2020).

Theme	Explanation	Selected further research opportunities	Selected (post) COVID-19 implications
EI	In managing a tech-savvy and modern supply chain workforce emotional intelligence of managers impact retention, engagement, and service outcomes	Collaboration with managers in experiments	EI is only more crucial for coping with pandemic events and for achieving resilience
Digitization	Digital technologies impact the role of executives but in a nuanced way; they may complement, overtake, and not impact roles	Impact of cultural differences Strategies for managers to digitize Behavioural approaches to digitization in the supply chain	Digitization, widely called for to improve resilience, maybe a long time horizon.

Future of work in supply chains	Industry 4.0 will augment work, create new roles, and reduce the need for other roles. Lifelong learning is expected to be essential	The growing importance of talent management in the supply chain and the need for executives to create learning opportunities and make failure safe	COVID-19 is growing the need for a move to industry 4.0 but the question is if managers will “revert0020back” or accelerate the transformation after the pandemic
University education model	The delivery model may need to change to support lifelong learning	The rebalancing product portfolio, more company engagement and change of the HRM model toward adjunct faculty and faculty with industry experience	COVID-19 engagement provides a great stepping stone to experiment with the education delivery model
University research model	To support lifelong learning product development research may become more collaborative with managers	How to engage managers in research to enable their learning and how to connect research with industry learning needs more	COVID-19 presents the perfect opportunity for event-based risk research and manager engaged research and learning

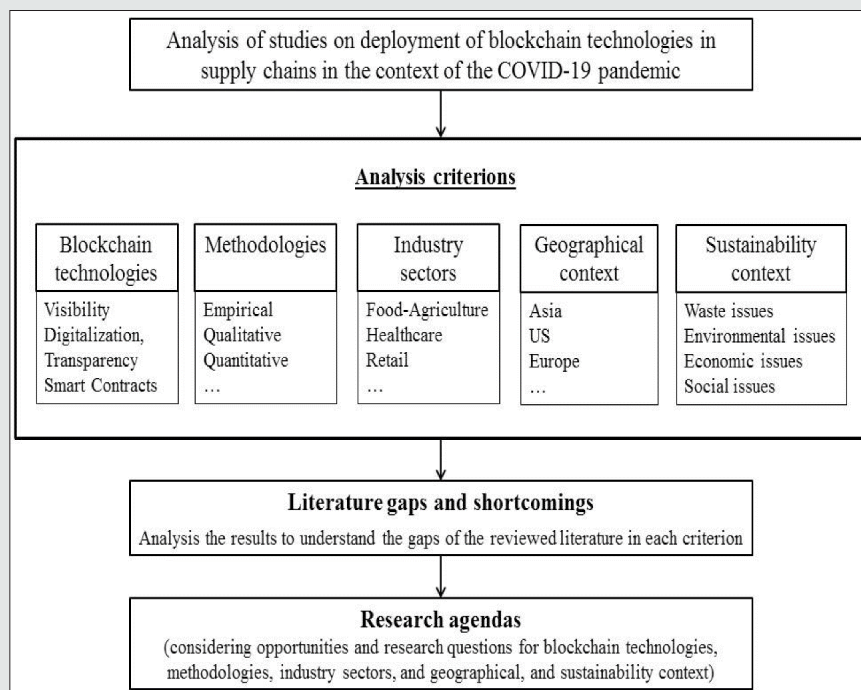


Figure 2: Use of blockchain technology in SCM. Source: Nabipour dan Üikü (2021).



Figure 3: Three Elements of Engagement in SCM.

So, the impact of the Covid-19 endemic on supply chain management in almost all countries is felt so that it needs adequate handling. [36] offer six keys to systematic handling so that SCM can compete quickly, responsively and precisely. Among them are adaptation, digitization, preparedness, recovery, ripple effects, and sustainability. These six measurable and systemic treatment perspectives have been partly described above. According to [37-

39] that the digital perspective in increasing opportunities and reducing risks in the SCM and logistics sector based on several researchers' findings, such as the use of blockchain technology and the Internet of things (IoT) as the main drivers of change. Digital business models are very strategically applied to SCM in this era. On the other hand, SCM remains strong in the Covid-19 era if logistics service providers (LSP) are digital-based [40].



## Conclusion

Two years of the Covid-19 pandemic, which has shattered the world's challenges in all aspects of life, including the supply chain sector, global companies have seriously adapted from using computing technology to digitalization using the internet of things (IoT) as a reference. Key elements offered by [32-40] as mentioned above have significantly contributed to the resilience of SCM. Business digitalization by utilizing Big data and engineering technology with the Internet of Things (IoT) is a new direction in the new normal era of the Covid-19 pandemic, and the toughness of logistics service providers adds to the competitive advantage and competitiveness of SCM in facing the challenges of the times and opportunities in the future.

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