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Abstract

Digitalization is changing the way organizations manage their supply chain and their daily logistical processes. The development of digitalized solutions have created a completely new business ecosystem. Additionally, customers are demanding more innovative, more diverse and greener products. This creates numerous challenges for all actors in the supply chain; yet, they also present an opportunity to create solutions and practices that improve performance and productivity. Companies around the world are re-thinking and transforming their supply chains as they see new digital technologies and organizational models coming to the forefront of business. At the same time, there is a lack of information available to business leaders about what it takes to have a true Digital Supply Chain (DSC) and how to operate one. Strong leadership is necessary to drive the transformational change required to build and apply digital capabilities across organizations. Digital transformation in the supply chain is a leadership problem. This study therefore sought to assess the digital supply chain leadership on organizations performance and the dynamics of leadership on the digital supply chain. The study finds that as customers and end consumers demand higher service and greater channel access, the importance of digitization within supply chain and talent who know how to harness insights will only continue to increase. Bringing new leaders into the supply chain and ensuring their success require buy-in and commitment throughout the organization.

Keywords: *Digital Supply Chain, Leadership & Performance.*

1.1 Introduction

Businesses are facing a revolutionary paradigm around big data, with a deluge of transactional information coming from multiple fronts, social media, mobile devices, corporate purchasing, point of sale, GPS mapping and product sensors Mihardjo, Sasmoko, Alamsjah & Elidjen, 2019).

The torrent of newly available information can be overwhelming, particularly to companies not yet accustomed to data management and advanced analytics. Strong leadership is necessary to drive the transformational change required to build and apply digital capabilities across organizations. Digital transformation in the supply chain is a leadership problem first and foremost (Kurz & Anandarajan, 2021).

Supply chain leadership that understands and can harness these inputs can create a powerful competitive advantage along the entirety of the supply chain, leading to reduced lost sales, increased efficiency and improved speed to market (Mussomeli, Gish & Laaper, 2016). With the right talent in place, along with the appropriate technologies and tools, the data collected and leveraged can offer visibility across the supply chain. More than that, data can allow organizations to develop an end-to-end perspective on the way a supply chain can and should be structured including the staging of raw materials and finished goods to serve the customer more effectively, a move toward a true demand-driven supply chain (Merlino & Sproǵe, 2017).

Digital Supply Chain (DSC) is defined as a customer-centric platform model that captures and maximizes the utilization of real-time data coming from a variety of sources. It enables demand stimulation, matching, sensing and management to optimize performance and minimize risk. The supply chain is the most significant business process for most companies today. This is a given for companies that manufacture and distribute products, but it rings true for companies that deliver software or financial services as well as other services. Such companies may not use the term supply chain, but they have one and it must be managed with greater precision than ever. Nasiri, Ukko, Saunila and Rantala (2020) shows that companies who successfully implement a Digital Supply Chain will reduce costs by 20% on average while increasing revenue by 10%.

Supply chains traditionally are linear in nature, with a discrete progression of design, plan, source, make, and deliver (Raskino & Waller, 2016). Today, however, many supply chains are transforming from a staid sequence to a dynamic, interconnected system that can more readily incorporate ecosystem partners and evolve to a more optimal state over time. This shift from linear, sequential supply chain operations to an interconnected, open system of supply operations could lay the foundation for how companies compete in the future (Viaene, 2017).

This interconnected, open system a digital supply network (DSN). Digital supply network integrate information from many different sources and locations to drive the physical act of production and distribution (Mihardjo, Sasmoko, Alamsjah & Elidjen, 2019). The result can be a virtual world, which mirrors and informs the physical world. By leveraging both the traditional and the new, such as sensor-based data sets (such as unstructured data), DSNs enable integrated views of the supply network and rapid use-case-appropriate latency responses to changing situations (Bowersox, Closs & Drayer, 2015).

Many organizations already on the path to creating digital supply network are shifting their focus away from managing and optimizing discrete functions, such as procurement and manufacturing (Merlino & Sproǵe, 2017). Instead, they often use digital supply network to focus more holistically on how the full supply chain can better achieve business objectives, while informing corporate, business unit, and portfolio strategies, digital supply network increasingly allow supply chains to become an integral part of strategic planning and decision making (Fontoura & Coelho, 2020). To this end, organizations can develop and leverage multiple digital supply network to complement different facets of their strategy and more effectively target specific needs (Alicke, Dumitrescu, Leopoldseder & Sankur, 2017).

The function of any supply chain centers on the movement of materials, finished goods, capital, and other assets from place to place, as well as the production of finished goods (Choudhury, Behl, Sheorey & Pal, 2021). At their core, however, supply chains consist of many transactions: the exchange of time, money, information, or physical materials for some other unit of value (Kreutzer, Neugebauer & Pattloch, 2017). Dramatic technological and digital developments, such as greater computing power and lower overall costs, have impacted the traditional supply chain in several key ways, including a reduction in transaction costs and increase in innovation related to the production process itself.

1.2 Statement of the Problem

Digital technologies have changed dramatically in recent years, driven largely by developments in lower computing costs, cheaper storage, and less costly bandwidth. The sharp cost decline over the last few decades has made it possible for companies to invest less and still reap the benefits of digital technologies on a wider scale. However, the surge in digital technologies has likely not been driven by cost alone. Even as these costs have declined, computing power and technological capabilities have grown significantly (Kurz & Anandarajan, 2021). The confluence of technological developments significantly lower costs, and improved power and capabilities has led to exponential changes that enable leaders to combine information technology (IT) and operations technology. Companies are now empowered to create value in new and different ways. Improved processing capabilities now augment human thinking to analyze more data more quickly, and then act upon it. Such changes have ushered in the new era of Industry 4.0 (Choudhury, Behl, Sheorey & Pal, 2021).

Companies around the world are re-thinking and transforming their supply chains as they see new digital technologies and organizational models coming to the forefront of business. At the same time, there is a lack of information available to business leaders about what it takes to have a true Digital Supply Chain (DSC) and how to operate one. Scholars and supply chain consultants are struggling with the topic and frequently revert to yesterday's supply chain principles (Büyüközkan, & Göçer, 2018; Fontoura & Coelho, 2020). Yet it is clear that new approaches to business, such as platform business models, are having a profound impact on global commerce (Kurz, 2018). In addition, even if these new models are not yet fully understood by business leaders and others, their impact on traditional supply chains is already being felt (Fontoura & Coelho, 2020). Successful companies will need to take advantage of new management practices, a continuously expanding data reservoir, and new technologies relevant to digital supply chains, if they are to achieve future competitive advantage and delight their customers.

1.3 Study Objective

i. To assess the digital supply chain leadership on organizations performance
ii. To determine the dynamics of leadership on the digital supply chain

1.4 Research Questions

i. What is the effect of digital supply chain leadership on organizations performance?
ii. What are the dynamics of leadership on the digital supply chain?

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2.0 Research Methodology

The study assessed the digital supply chain leadership on organizations performance and the dynamics of leadership on the digital supply chain. The study used a desk study review methodology where relevant empirical literature was reviewed to identify main themes. A critical review of empirical literature was conducted to assess the digital supply chain leadership on organizations performance and the dynamics of leadership on the digital supply chain.

2.1 Literature Review

2.2 The Digital Supply Chain

For decades, firms have considered collaborative relationships as opportunities to make sure that their supply chain is effective and responsive to market transitions. Many companies, such as IBM, Dell, Hewlett-Packard, and Procter & Gamble, were able to achieve competitive advantages and lower transaction costs through strong long-term relationships with their partners (Attaran, 2020). Based on previous research, collaborative relationships enable risk sharing, complementary resources accessibility, productivity enhancement, and profitability during the time. We define relationship performance as the appropriate level of collaboration, both internally and externally, between companies and their suppliers, built for conducting business (Akter *et al*., 2016; Büyüközkan & Göçer, 2018). Internal collaboration includes activities such as internal production, processes, and communication among employees inside the companies, while external collaboration encompasses the abovementioned operations with other participants outside the firms, in the supply chain.

Organizations around the world have turned their attentions to digitally because of the considerable benefits it brings for firms. A huge number of benefits of utilizing digitalization in supply chains exists, many of which are still largely untapped. The reason could be the disruptive nature of organizational transformations, which might cause managers to neglect them and delay the processes (Büyüközkan & Göçer, 2018). Digitality has changed the way that both companies and individuals interact and communicate with each other in an extreme way (Berman, 2019; Büyüközkan and Göçer, 2018). Therefore, in order to exploit digitalization in business, companies should consider all the necessary procedures, strategies, and tools needed to move toward the digital supply chain (Akter *et al*., 2016; Weichhart *et al*., 2010). The digital supply chain is a bundle of interconnected activities that are involved in supply chain processes between suppliers and customers, which are handled with novel technologies (Büyüközkan & Göçer, 2018). The digital supply chain enables wider availability of information and infinitely superior interactions, communication, and collaboration, which lead to improved trust, agility, and productiveness (Büyüközkan & Göçer, 2018). The digital supply chain needs a combination of digital tools, strategies, and approaches, which support interactions between customers and suppliers externally, as well as employees internally. In order to reap the benefits of the digital supply chain, there is a need to leverage novel approaches, including digital transformation with technologies. Therefore, the digital supply chain built on both digital transformation and smart technologies.

2.3 Importance of Digital Transformation in the Digital Supply Chain

Collaboration, both internal and external, makes up an important part of companies' relationship performance in the digital supply chain. Digital transformation driven, for example, by increased automatization, data collection, information exchange, and networking, has created opportunities and challenges for company collaboration activities (Riemer & Schellhammer, 2019; Singh et al., 2018). According to Riemer and Schellhammer (2019), the ability to collaborate and exchange information has provided new forms of working and new types of virtual organizations, which have given companies the need to adjust their operations.

Digital transformation has revolutionized the possibilities and solutions for companies to handle and execute their external collaboration activities in the digital supply chain (Crittenden et al., 2019). Even though different types of social media solutions have changed the way people communicate, contemporary devices can also be identified and contacted by other devices or people. As such, digital transformation can enable the acquisition of external collaboration, and reduce engagement costs (Crittenden et al., 2019). In relation to external collaboration activities in the digital supply chain, digital transformation can also improve customer service as it enables the collection of large amounts of data from different sources and their utilization in building strong networks between different partners. Digital transformation also makes it possible for consumers and end-users to become experts on product and service offerings (Mihardjo, Sasmoko, Alamsjah & Elidjen, 2019).

In addition to possibilities for external collaboration in the digital supply chain, digital transformation provides possibilities for internal collaboration within companies. Digital transformation can, for example, support collaborative work for planning and executing business processes (González-Rojas et al., 2016), as there is a possibility to exchange information and make everything digitalized. Even though the internal collaboration activities are difficult to handle without face-to-face communication, and companies require new types of capabilities to utilize the possibilities provided by digital transformation (Riemer & Schellhammer, 2019), the provided options can, for example, ease the establishment of a collaborative work environment (Merschbrock & Mundvold, 2015), where different people can operate.

2.4 Digital Supply Chain in Organization

2.4.1 Reducing transaction costs

The increase in power and efficiency of technologies has manifested itself in greatly reduced transaction costs for business operations both internally and externally (Attaran, 2020). No longer does it have to be prohibitively expensive or time intensive to gain insight into each minute step of operations, or to deeply understand customer or supplier demand patterns. The influx of inexpensively acquired and easily manipulated information seems to demand that supply chains begin to incorporate and utilize increased intelligence (Mihardjo, Sasmoko, Alamsjah & Elidjen, 2019). While the linear flow of designing, creating, and moving physical goods remains unchanged, the underlying data now flow through and around the nodes of the supply chain, dynamically and in real time (Attaran, 2020).

The new interconnections between processes and sub processes have transformed supply chains into efficient and predictive networks. When the cost of transactions falls, the ability to transact with more and different partners increases. This creates an opportunity to shift to a world of more

networked supply chains, as companies can simply connect with more different partners when and where necessary in order to deliver substantially increased value (Fontoura & Coelho, 2020)..

2.4.2 Innovation in production

Simultaneously, how production is enabled in the physical world also seems to be changing as a result of dramatic improvements in both the process by which matter can be manipulated and the embedded computing power that actuates those processes in pursuit of production (Choudhury, Behl, Sheorey & Pal, 2021). Improvements in the flexibility and capability of capital equipment should lead to less of it being required to commence production. When less capital is required, the minimum efficient scale comes down as well, and production is allowed to scatter, locating closer to demand. Furthermore, smaller and more nimble players can enter the playing field more easily. These shifts in physical capabilities should be addressed both strategically and operationally (Attaran, 2020).

2.5 Leadership in Digital Supply Chain

The four key characteristics that supply chain leaders should possess in the era of digital disruption:

2.5.1 A Firm Understanding of Data and Systems Technologies

Today's businesses are able to gain profound insights into customer behavior through data analytics and the collection of data through digital means (Kreutzer, Neugebauer & Pattloch, 2017). While chief supply chain officers are not required to be information technology experts, they should have enough knowledge about data gathering, technology and analytics to lead the conversation and provide a digital vision for supply chain teams. Supply chain leaders should recognize how pertinent platforms and processes are implemented and utilized including demand forecasting, inventory management programs, sales and operations planning processes, and transportation management systems. Leaders also should demonstrate a solid understanding of the scope and scale of data from diverse channels. Importantly, they must be prepared to act intelligently on data (Mihardjo, Sasmoko, Alamsjah & Elidjen, 2019).

2.5.2 An Influential and Collaborative Approach

The days of supply chain leadership working successfully in a silo are long gone. The chief supply chain officer touches every part of the business from raw material and product supply to manufacturing operations, logistics and customer delivery (Büyüközkan & Göçer, 2018). Internally, supply chain leadership must be able to communicate and collaborate with the chief technology officer to help determine the appropriate technologies and policies for the organization. The chief supply chain officer, in particular, needs to be able to cooperate with the chief data officer to understand how data are best captured and used. This chief supply chain officer also must be able to interact with the chief marketing officer to understand how the supply chain can be more customer focused and demand driven. Ultimately, this executive will need to be able to build bridges with both internal stakeholders and external suppliers (Fontoura & Coelho, 2020).

2.5.3 Cross-Functional and Global Experience

Companies are moving away from hiring specialized talent for the supply chain role and, instead, are looking at candidates with broader experience who can understand and communicate with people from multiple business functions. Today, it is important that chief supply chain officers have knowledge across a broad range of functions, including non-traditional disciplines like sales,

finance or technology in addition to more common areas such as procurement, manufacturing or logistics (Choudhury, Behl, Sheorey & Pal, 2021). Further, familiarity with multiple countries and cultures is extremely beneficial and tends to bring an appreciation for different backgrounds, ideas and approaches that can be invaluable in today's fast-changing business world.

2.5.4 The Ability to Develop New Skills and Train Others

Today's chief supply chain officer must stay abreast of the latest technologies, ensuring that the organization appropriately incorporates digital skills and digitally minded talent (Kreutzer, Neugebauer & Pattloch, 2017). One of the biggest mistakes that companies make is to implement a data management solution without properly preparing the organization. Tools alone do not drive results people must be developed and trained to use those tools. Establishing internal programs to ensure an adoption of skills across the supply chain is critical. The chief supply chain officer is not excluded from this requirement, as digitization of the supply chain should be driven from the top down (Fontoura & Coelho, 2020).

Companies that drive down costs and drive up market share through their Digital Supply Chain strategy will reshape the competitive landscape (Kreutzer, Neugebauer & Pattloch, 2017). Companies that successfully execute this strategy will collaborate with their suppliers in a new way, and at the same time, let their collaboration with customers drive innovative products and services. By the year 2025, some entirely new companies will be utilizing, and in some cases mastering, how to operate a digital supply chain globally. And some current powerful companies will also make the transformation to a digital supply chain platform (Mihardjo, Sasmoko, Alamsjah & Elidjen, 2019).

Supply chain leaders have done a good job of optimizing results by managing suppliers, moving manufacturing to low-cost locations and increasing the efficiency of logistics. However, these steps are insufficient in the world that is being reshaped by big data and analytics, new technology, new people skills and an increasingly risky operating environment. A front side flip is a required move. It is the only way to ensure company success and Digital Supply Chain effectiveness (Choudhury, Behl, Sheorey & Pal, 2021).

4.1 Conclusions and Recommendations

Digital supply chains represent the evolution of supply chains, a result of the changing technology landscape, and increasing connectivity between the digital and the physical worlds. New access to information, computational abilities, and innovative technologies have collapsed and connected the formerly linear and siloed supply chain. Now real-time information and insights can be shared across the entire supply network to drive actionable decisions. These changes are happening quickly. But with change comes opportunity: the ability of digital supply chains to play an integral role in strategic decision making, fewer trade-offs, customizing multiple supply networks to the specific needs of customers and clients.

As customers and end consumers demand higher service and greater channel access, the importance of digitization within supply chain and talent who know how to harness insights will only continue to increase. Bringing new leaders into the supply chain and ensuring their success require buy-in and commitment throughout the organization.

Digital transformation across the supply chain is more than just technology and IT. Starting with the CEO and executive committee, the organization must be prepared to support a fresh way of

thinking, fostering a culture that is open to innovation and technology and willing to challenge convention about the way the supply chain is managed.

With billions of connected devices across supply networks contributing real-time information on service requirements, location and inventory allocation and even enabling anticipatory demand, executive leadership that understands and embraces the power of digital disruption is critical to future-state supply chain advantage.

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