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THE EVOLUTION OF LOGISTICS MANAGEMENT TOWARD THE DIGITAL TRANSITION

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ABSTRACT

The digital transformation and automation become indispensable for organizations and countries due to the progress and rapid development of technology. Also, it impacts on the logistics sector. Thus, this study presents a theoretical perspective related to logistics evolution and digital transformation. On the basis of the literature review, this paper studies the logistics evolution over time and its innovations, followed by an analysis of digital transformation and its impact on logistics based on the main challenges remained to achieve digitalization. The results of the study show that logistics sector is highly impacted by the industry evolution and the introduction of information technology, which bring several challenges toward the digital transition. Also, it shows that the digitalization has many benefits for the logistics sector within technological, economic and environmental factors.

Keywords: Logistics, Management, Digital Transition

JEL Codes: M10, M15, O32

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1. INTRODUCTION

The logistics management is an integrated management where it coordinates between marketing, sales, manufacturing, financial management and technology management information. In addition, it explores the difference between supply chain management and management of logistics. The supply chain means managing relationships in the direction and reverse of flow with each of the suppliers and customers to deliver value to the client at the lowest cost for all elements of the supply chain (Waters, 2003).

Several studies were interested in logistics and supply chain. Sachan and Datta (2005) mentioned that the logistics management contains an integrated set of functional activities, which are repeated several times through specific channels during the conversion of raw materials into finished products, with the addition of tangible value to these products in the mindset and convictions of customers, in that they will get it. In addition, the logistics chain is dependent on the degree of coordination among all the actors in the whole system. As for the logistics management, it contains an integrated set of functional activities (Hlali and Wanis, 2020). In the context of flows, Maia and Cerra (2009) mentioned that the logistics are the responsible part of the flows in the supply chain management in the company.

As mentioned above, the evolution of logistics concerns the tools and methods improvement to achieve the process of production. It evaluated from classical systems to digital system based on information system and programming models. In this vein, Philipp (2020) confirmed that a preferment logistics operation is the key of digital transformation and the economic growth of each country.

The logistics continue to develop and create new opportunities over time. Also, it increases value perceived by the customer, in terms of service quality. Thus, this paper studies the logistics management evolution and develop it evolve during the digital transition. This study develops a theoretical perspective within a conceptual literature review in logistics evolution and the impact of digital transformation in supply chain, applied a timeline analysis to explore the evolution over time, then develop a systematic review of the logistics and digitalization. Above all, to accomplish this study the literature review purposes to answer the following research questions:

What are the main concepts and timeline related to logistics evolution?

What are the impacts of digitalization on logistics and supply chain evolution?

What are the challenges and benefits of digitalization on logistics and supply chain?

In this perspective, the interest of this study is to contribute to the theoretical vision in logistics and supply chain and share a review of the logistics evolution, in particular in the stage of digitalization. The paper is organized as follows: the second section represents

the literature review in which the study develops the evolution of logistics management and the different logistics evolution stages, then analyses the impact of digitalization on logistics and discuss the challenges to achieve a digital supply chain. The third section represents the conclusion.

2. LITERATURE REVIEW

The study is based on literature review to develop three main research questions. The first question is about the main concepts and timeline related to logistics evolution. The second is about the logistics and supply chain evolution in the context of digitalization. The third is about the challenges and the benefits of the digital supply chain.

2.1. The Main Concepts and Timeline Related to Logistics Evolution

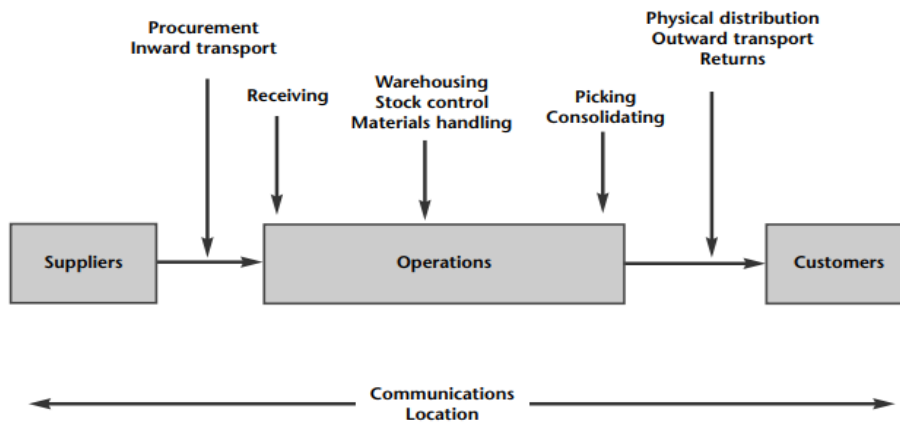
The stages of development of the concept of logistics evolved over a range of time stages it discusses as below:

2.1.1. Integrated Logistics

Before 1975, logistics activities were separate among the functions of the organization, especially in the management of physical distribution and materials management. It appeared as one of the components of supply and distribution, which mainly focuses on the organization carrying out the coordination process between transport activities, warehousing, and warehousing policies and control over distribution channels to meet customer requests and achieve an appropriate level of service for them.

From 1975 to 1990 the logistics integrated start to be realized in several companies. The goal become to achieve interdependence and integration between the activities of physical distribution and the activities of materials management. The integration of supply chain is a strategic organization to improve the company performance (Narasimhan and Das, 2001) . This stage also witnessed an appropriate increase in the cost of logistics with the increase in specialization in logistics activities in different directions. Towards long-range planning and the use of information technology, which reduce the logistics activities cost (Neng Chiu, 1995); Daugherty et al., (1996). Figure.1 summarizes the logistics activities within a company. In the traditional model, the activities were separated in the management from initial to the final product.

Figure.1 Summary of Logistics Activities



Source: Waters, 2003.

It is not easy to integrate all the logistics within a company in practice. The supply chain englobes different activities, different types of operation and expend different systems. So, the performance need the integration developing over time to improve the whole process of the supply chain.

2.1.2. The Joint Logistics

This period is characterized by a total production capacity that exceeds demand, which led to increased competition. In return, customers are distinguished by their behavior Unpredictable consumption, i.e. uncertainty of demand is an important feature of the market (Gurnani et al., 2014).

The competition is not only between producers, but also between supply chains. To stay in the market requires that all parts of the logistics chain be linked by a very strong cooperation that amounts to an alliance between them, in this Environment. The problem of logistics includes the integration of logistics operations in the company and the logistical cooperation between companies from the same supply chain.

The integration interest in the field of business increased in logistics activities because leaders become convinced to achieve competitive advantage and increase profits. This achievement results from customer satisfaction at the lowest total cost in the creation of added economic value. The logistics system is rapidly developing despite its modernity, which led to the emergence of many concepts and modern trends in this field.

The engagements of companies towards reverse logistics are different. The reverse logistics includes the return of defective units, containers, boxes and packing aids from storage, handling and moving materials flow backwards from the customer to the supplier. Decisions about transportation, storage and packaging are influenced by costs reverse logistics.

Several studies examined the importance of the reverse flow management in logistics and/or in a closed-loop supply chain and its challenges to face the customer requirement in the new environment (Ruiz-Torres et., 2019; Ruiz-Torres et al., 2022). Reverse logistics are friendly to the environment and ecosystem because it recycles unused items to preserve the environment.

In fact, taking the cost of reverse logistics into account may lead to changing some decisions such as choosing the supplier, the way packaging, alternatives to production, handling, storage and transportation. Studies show that the packaging that can be returned in the industry. It represents a profitable logistical strategy. However, there is evidence of financial shortcomings associated with this strategy.

2.1.3. Towards a Collaborative Supply Chain

After 1990s, the publishers of integrated supply chain proposed a systems information. The new system allows companies to better centralize information and circulate it throughout the supply chain. This technological innovation enabled coordination of processes, while having an overview of the details of the chain, and at the same time to work closely with external stakeholders through the permanent exchange of information (Xu et al., 2001).

The Supply Chain terminology will be appropriated by the firms which used the software packages of integrated management to steer their supply chain, but this time taking into account their internal and external stakeholders. This organizational innovation will push the experts to develop a new transversal chain model that goes beyond the confines of the company, named Supply Chain.

During this period, the objectives of the supply chain and logistics were the same, but major differences remained. Indeed, both models placed to satisfy the customer, but the scope differed from one network to another. If the chain logistics did not go beyond the borders of the company, the Supply Chain, on the other hand, went beyond this level by integrating external players in the overall logistics process. Same for the flow of information, which stopped for the supply chain at the internal level, between the actors of the firm, while for the Supply Chain, it circulated inside and outside the company through ERP (Enterprise Resource Planning).

2.2. The Impact of Digitalization on Logistics and Supply Chain Evolution

The advancement of new technologies in the business world is the greatest success of the decade. This development of technology across the new horizons of economics, and gives rise to new products, services and work methods. And so many years, a new component has become the engine of economic growth: Digitalization. Digital transformation is the profound transformation of organizational and business activities, processes, skills and models based on new digital technologies.

2.2.1. The Digitization of the Supply Chain

In recent years, the network becomes an indispensable part of business. In fact, the information and communication technologies provide flexibility in interaction with partners and all company stakeholders. They offer new possibilities of exchanging data between the different computer systems, and it is in this context that these developments are opening up new perspectives for the industry.

Several authors studied the digitalization of the supply chain and the impact of digital supply chain on manufacturing organization (Bigliardi et al., 2022; Lee et al., 2022; Nguyen et al., 2022). In addition, Ballou (2007) studied the evolution of supply chain and logistics, this study found that the improvement of information technology is one of the main factors of logistics developing in the future.

The development of technology and the adoption of automation and robots has an impact in the organization and in the supply chain management and system. In this vein, many researchers interested to illustrate a conceptual model or a literature framework to develop the role of the new technologies in the logistics evolution and its impacts (Tan, 2001; Bhandal et al., 2022; Shamout et al., 2022).

In addition, information is essential to understand the past, see the present, react and predict the future in order to optimize operating costs. Much of the data produced by manufacturing companies can be transformed into information, then observed, analyzed, linked and applied in decision support models, this is called Big Data.

Big Data represents all the digital data produced by means of news technologies. With the increase in the amount of data to be processed. The Industry 4.0 is flexible and linked to intelligence. Thus, it this sector seeks to satisfy the environmental needs. So, digitization is a permutation that should be used with caution (Wade and Marchant, 2014). Also, digitization is based on the collaboration of all departments in order to provide an adequate solution (Bughin, et al., 2015). The use of digital technologies is a key tool for the anticipated revolution of companies (Barreto et al., 2017).

The evolution of logistics from just concerned the physical distribution of services and goods to the logistics 2.0 concerned for massive production and motivated the use of automation supply flow. Then arrive to Logistics 3.0 which integrated the spread of computers and IT technology. After that arrives the Logistics 4.0 which is based generally on the smart technologies. In addition, the object of the Logistics 4.0 is to create an ecosystem for all the systems and to share data (Cichosz et al., 2020).

2.3. The Challenges and the Benefits of Supply Chain Digitalization

The challenges of digitizing the supply chain are numerous, the most important being to metalize the boundaries between the different departments of the company, in order to

facilitate the construction of a common plan and to propose new customer experiences. All actors have to improve visibility of the global supply chain which will enable them to optimize their processes, reduce costs, manage inventory, serve omni-channel and, ultimately, improve margins and increase market share.

The technology evolution consists in bringing more into contact stakeholders with society, with the aim of standardizing exchanges so that they are simplified and easily usable and with more relevance on a daily basis. The approach also consists of taking advantage of the quantity phenomenal amount of data collected by the tools of different stakeholders by restoring and analyzing them. The idea is to ensure that the various players inform all of the value chain with the available data, allowing to make the right investment decisions and planning of the entire supply chain.

Moreover, with the complexity of the regulations of the international trade, IT tools provide companies with improved traceability, better write security, as well as a means of communication simplified with commercial management platforms.

Table 1. Benefits of Supply Chain Digitilazation

Benefits	
Economic	<ul style="list-style-type: none"> - Reduce the gaps in the whole planning strategy of the company - Determinate the best sales potential, - Eliminate the shortages, - Optimize the logistics flows, - Anticipate the human activity
Technological	<ul style="list-style-type: none"> -Simulate several scenarios in order to anticipate the demand and to plan in an optimal and robust way the different resources available. -Work with extraordinary volumes of data, taking into account exogenous data, and impact measurement of each product characteristic of its sales return.
Environmental	<ul style="list-style-type: none"> -Optimize and improve overall performance, -Facilitate anticipation and decision-making, -Make it easier to manage the special cases.

3. DUSCUSSION AND CONCLUSION

This paper studies the evolution of logistics management based on the literature analysis. The main objective of this study was to find the major change of logistics caused by the introduction of digital process over time.

The previous literature studies the logistics evolution in different contexts. The contribution of this paper discusses the importance of digitalization in logistics. It identifies the main concepts and timeline related to logistics evolution and analysis the

impacts of digitalization of logistics and supply chain evolution. It also contributes to summarize the challenges and the benefits of digitalization on logistics and supply chain.

The results of the study showed that the evolution of logistics has given rise to several links. With its continuous evolution, logistics give the birth of new concepts which are the supply chain. Despite the remarkable progress made in logistics and the rise in power of the use of information technologies, the coordination between the actors of the chain remains limited, because the factor of confidence between the various actors, constitutes an obstacle which hinders the smooth running of the various processes. Thus, the implementation of an integrated software package internally does not solve this problem.

The main findings of this study underline that the concepts related to the logistics have been evolved overtime, it found also that the digitalization has an important role in the supply chain within various benefits. For future work, an analysis of logistics evolution could be realized with practical case.

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