Impact of the Digital Supply Chain on Sales and Logistics Performance in the Jewelry Industry. A Case Study of L'AZURDE, Egypt.

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Abstract

The evolving landscape of the supply chain (SC) emphasizes the need for flexibility, resilience, and dependability, especially in the face of digital transformation challenges. As SCs become more digitalized, seamless coordination, traceability, and adaptability become dominant to ensure optimal control and visibility. This research investigates the influence of the digital supply chain (DSC) on sales and logistics outcomes, specifically within the jewelry industry at "L'AZURDE Company in Egypt." Furthermore, this research attempts to explore the benefits linked to DSC and its implications for sales and logistical efficiency through Digital Transformation (DT). Using quantitative analysis, this study evaluates the impact of the DSC on sales and logistics within the jewelry industry. The research used primary survey data and was further enriched with historical data from L'AZURDE. Moreover, the research adopted methods such as confirmatory factor analysis (CFA), correlation analysis, and structural equation modeling (SEM) to understand underlying relations, define the interconnections between variables, and examine the suggested hypothesis.

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The results reveal a positive influence of DSC on both logistics efficiency and sales, with a confidence level of 99%. Likewise, logistics performance was found to have a direct positive correlation with sales. Significant relations were also identified between fulfillment lead time and third-party logistics (3PL) at 95% confidence and between value and 3PL lead time at the same confidence level. These correlations can be attributed to the transformative power of digital tools in enhancing process efficiency.

Keywords: Digital Supply Chain (DSC), Logistics Performance, Sales, Digital Transformation (DT), Jewelry Industry.

أثر سلسلة التوريد الرقمية على أداء المبيعات والخدمات اللوجستية في صناعة المجوهرات. دراسة حالة شركة لازوردي في مصر.

الملخص

يؤكد المشهد المتطور لسلسلة التوريد على الحاجة إلى المرونة والمرونة والاعتمادية، خاصة في مواجهة تحديات التحول الرقمي. نظرًا لأن سلسلة التوريد أصبحت أكثر رقمية، أصبح التنسيق السلس وإمكانية التتبع والقدرة على التكيف هو السائد لضمان التحكم والرؤية الأمثل. يبحث هذا البحث في تأثير سلسلة التوريد الرقمية على نتائج المبيعات والخدمات اللوجستية، وتحديداً في صناعة المجوهرات "شركة لازوردي في مصر". الغرض من هذه الدراسة هو دراسة الفوائد المرتبطة بسلسلة التوريد الرقمية وآثارها على المبيعات والكفاءة اللوجستية.

وبالتالي، تسلط الدراسة الضوء على الإيجابيات والسلبيات المحتملة لتكامل سلسلة التوريد الرقمية وتقترح مبادئ توجيهية للشركات التي تهدف إلى تحسين استراتيجيات سلسلة التوريد الخاصة بها باستخدام منهجيات التحول الرقمي. باستخدام التحليل الكمي، تقوم هذه الدراسة بتقييم تأثير سلسلة التوريد الرقمية على المبيعات والخدمات اللوجستية في صناعة المجوهرات. اعتمد البحث على بيانات المسح الأولية وتم إثراؤه بالبيانات التاريخية من لازوردي. تم استخدام التقنيات بما في ذلك التحليل العاملي الاستكشافي والتحليل العاملي التوكيدي ونمذجة المعادلات الهيكلية لفهم الأنماط الأساسية وإقامة العلاقات بين المتغيرات واختبار الفرضيات المقترحة. وتكشف النتائج عن تأثير إيجابي ملحوظ لسلسلة التوريد الرقمية على كل من الكفاءة اللوجستية والمبيعات، بمستوى ثقة يبلغ 99%. علاوة على ذلك، وجد أن الأداء اللوجستي له علاقة إيجابية مباشرة بالمبيعات. كما تم تحديد ارتباطات مهمة بين المهلة الزمنية للتنفيذ والخدمات اللوجستية من طرف ثالث بنسبة ثقة 95%، وبين القيمة والمهلة اللوجستية من الطرف الثالث عند نفس مستوى الثقة. ويمكن أن تعزى هذه الارتباطات إلى القوة التحويلية للأدوات الرقمية في تعزيز كفاءة العمليات

الكلمات المفتاحية: سلسلة التوريد الرقمية، الأداء الخدمات اللوجستية، المبيعات، التحول الرقمي، صناعة المجوهرات

1. Introduction:

As information and communications technology develops, it becomes simpler for businesses to boost performance. Real-time business processes are one of the advantages of technology. Businesses will profit from the usage of emerging technologies as a result of the more intense business competition that encourages businesses to work hard to increase their effectiveness and efficiency. In order to fulfill client orders, a firm must manage its supply chain (SC), which is the transfer of raw materials, information, and funds between businesses. DSC is the new name for supply chain management (SCM). Online, real-time information sharing made possible by internet technology allows you to integrate your business with clients and suppliers. All SC activities can be carried out automatically with the adoption of DSC, which involves all stakeholders in the delivery process, including customers, suppliers, and internal and external components of the organization. and ensure that raw materials are sourced from both suppliers and goods so that they are always available to customers (Pujadi et al., 2020).

The e-commerce business has had a considerable impact on logistics compared to decades before due to its quick expansion and extensive reach. This study emphasizes the logistics models and supporting methods that have greatly enhanced logistics performance. international application. This study reviews typical e-commerce businesses with the goal of gaining possibilities and future perspectives that may be utilized to inform practitioners and academics as they think about DSC and SCM in the near future. According to the practical perspective of digital logistics, information technology is crucial to enhancing logistics performance and efficiency of

operations. Future technologies might be utilized to enhance the electronic logistics system, including cloud computing, big data analytics, and the Internet of Things (IoT) (Yu et al., 2016; Yu et al., 2017).

Thus, this research will examine the factors, attributes, challenges, and obstacles associated with the implementation of DSC within organizations, as outlined in the literature review. Subsequently, the research will assess the impact and develop insights using both primary and secondary data. Primary data will be collected through surveys to measure user acceptance and the effects of DSC. Moreover, secondary data has been sourced from L'AZURDE, which is currently recognized as the fourth-largest gold jewelry manufacturer in the world.

In the analysis phase, this research employs descriptive statistics to analyze survey responses, while confirmatory factor analysis (CFA), structural equation modeling (SEM), correlation analysis, and regression modeling are utilized to evaluate secondary data, all in an effort to test the hypotheses and address research questions.

Most companies build their structure based on sales channels such as retail, wholesale, or business-to-business. When the COVID-19 epidemic appeared, we found that e-commerce sales channels were trendy in worldwide markets. The majority of companies added an online sales channel, but they didn't have enough experience to merge digitalization to fulfill the new processes, strategies, and decisions using the technologies to fit the business model and flow of information to fit the online customer service level.

Accordingly, this research aims to investigate the effects of DSC adoption on the sales and logistics performances of

companies. Hence, the research is set to achieve, explore, and analyze the subsequent objectives:

- To identify the DSC constructs in L'AZURDE.
- To measure the level of acceptance regarding the impact of DSC implementation.
- To measure the influence of DSC on sales metrics and growth.
- To measure the impact of DSC on logistics performance.
- To justify the benefits of applying DSC in the Jewelry Industry.
- To pinpoint the barriers and challenges of applying DSC in the Jewelry Industry.

In order to achieve these objectives, the following research questions have been identified:

- What are L'AZURDE's key DSC constructs?
- How is DSC adoption perceived by L'AZURDE's stakeholders?
- What is DSC's effect on sales growth?
- How does DSC impact logistics performance?
- What benefits does DSC offer in the Jewelry Industry?
- What challenges does DSC present in the Jewelry Industry?

This research standpoint is a vital exploration into the transformative effects of DSC on the jewelry sector, with a particular focus on L'AZURDE, a market leader in Egypt. Within a dynamic global marketplace, where traditional SC mechanisms are rapidly giving way to digital alternatives, this

research provides an essential academic inquiry into the operational, strategic, and financial repercussions of DSC adoption. By analyzing the complex interplay between DSC components, this research promises to yield critical insights into the facilitation of sales growth and the enhancement of logistics efficiency. Furthermore, it anticipates the challenges and defines the potential barriers inherent in the digital transformation (DT) process, offering a comprehensive roadmap for seamless integration in the jewelry industry. The findings are expected to contribute to the academic literature while providing a strategic blueprint for industry practitioners to navigate the DT effectively and efficiently.

2. Overview and Definitional Context of Digital Supply Chain

DSC represents a transformative, value-centric approach that enables organizations to unlock new revenue streams and enhance corporate value through the deployment of sophisticated technological and analytical capabilities (Zhang et al., 2022). This concept exceeds the traditional boundaries of SC operations, incorporating an array of modern technologies including drones, cloud-based services, artificial intelligence (AI), and Internet of Things (IoT) applications. Furthermore, it emphasizes the optimization of SC processes irrespective of the physical or digital nature of the products and services involved (MacCarthy and Ivanov, 2022).

The emergence of digital technologies marks a pioneering phase in industrial evolution, significantly reshaping business paradigms and altering the commercial landscape. DSC leverages these promising technologies to redefine the orchestration of business, enhancing information processing

and communication capacities through digital platforms (Agrawal and Narain, 2018). This synergy between DSC and SC partners fosters optimal cooperation. The standardization of processes, products, and SC activities through digital tools is instrumental in adding value to goods, thereby amplifying their appeal to digital-savvy consumers (Nasiri et al., 2020). Likewise, the essence of DSC lies in its goal to harmonize the planning and management of logistics networks, employing digital methodologies and instruments anchored in a cohesive information and communication infrastructure. Moreover, DT technologies are catalyzing the accelerated transit and distribution of goods, pioneering innovative business operations, and thus, greatly impacting the dynamics of SC functions (Büyüközkan and Göçer, 2018).

3. Factors and Features of Applying Digital Supply Chain

The initiation of the DSC marks a significant evolution in the synergy between technology and logistics, indicating a new era of efficiency, visibility, and responsiveness in the domain of supply chain management (SCM). By integrating advanced digital technologies such as the IoT, AI, and big data analytics, DSC transforms traditional SC operations into dynamic, interconnected systems that offer unparalleled transparency and adaptability (Iddris, 2018). Moreover, the DT enables businesses to anticipate market changes, rapidly respond to customer demands, and optimize their operations in real time. Thus, the adoption of a DSC represents a strategic weapon for companies aiming to achieve a competitive advantage in an increasingly complex and volatile commercial landscape. Building on the foundational concepts of the DSC, the

following subsections attempt to provide deeper insights into the critical factors that underpin its successful application.

3.1 Technology

In investigating the pivotal factors for DSC implementation, it becomes evident that robust information technology (IT) infrastructure and comprehensive cybersecurity systems are fundamental. Aamer et al. (2023) declared that 18.38% of the scholars declare that IT infrastructure is recognized as a critical determinant in DSC readiness. Moreover, effective digitization demands substantial investment in suitable, advanced IT infrastructures tailored to the business's maturity level (Yang et al., 2021). This includes reengineering the SC architecture and upgrading IT infrastructures to facilitate technology spreading both internally and externally. Likewise, centralization, knowledge management in IT, and formalized IT structures are acknowledged to be the key to proliferating technology across SC operations (Özkanlısoy and Akkartal, 2021). On the other hand, the IT role is also important in coping with SC dynamics, ensuring instantaneous access to extensive data pools, enhancing communication, and improving visibility within the SC (Iddris, 2018). Nonetheless, the adoption of DT must align with organizational capabilities, necessitating a comprehensive analysis to identify the appropriate IT infrastructure that fits the organizational functions before implementation (Ardito, 2023).

On the other hand, cybersecurity systems are vital in the transition towards DSC. The integration of IT in SC processes enhances decision-making and ensures data visibility and transparency (Weerabahu et al., 2022). Furthermore, cybersecurity solutions serve as a protective measure, safeguarding the transmission of data and information within

the supply chain. These solutions simplify the management of stakeholder data and fortify information protection, thus being indispensable in the context of DSC (Aamer et al., 2023).

3.2 People

In addressing the human factor within DSC transformation, literature underscores the "people" element as a cornerstone. Three primary drivers emerge from the literature: *digitization reskilling and upskilling, digitalization culture, and top management support*

Firstly, reskilling and upskilling implies the importance of human resources development in achieving DSC readiness. The synergy between human capabilities and technological advancements is vital for the successful deployment of DSC technologies, with the human-technology relationship deemed crucial (Büyüközkan and Göçer, 2018). Furthermore, Queiroz et al. (2021) confirmed that an organization's digital strategy enhances DSC capabilities and overall SC performance. Hence, firms are necessitated to invest in acquiring and developing a broad spectrum of digital skills among their employees. Furthermore, training initiatives and fostering adaptation to technological innovations through active engagement and collaboration become pivotal, highlighting the need for digitalization to be embraced as a core success factor for the company, rather than a challenge to its employees (Bag et al., 2021)

Secondly, the development of a digitalization culture concerns the collective attitudes and behaviors within an organization that facilitate a digital transformation, which is more indicative

of employee engagement with digital tools than of broader cultural values (Kalimullina et al, 2021).

Lastly, top management support is identified as an essential ingredient for DSC transformation preparedness. The role of senior management is extensive, encompassing support for IT infrastructure, organizational skills, coordination, strategic vision, and compliance (Frederico et al., 2019). Furthermore, leadership influence extends to shaping organizational strategy and culture, which fundamentally affects human capital (Chatterjee et al., 2023). Moreover, top management's commitment is necessary for facilitating efficient communication across various organizational levels and optimizing resource allocation.

The transformative process of the DSC is dependent upon management's ability to steward digital initiatives, shape organizational culture, and guide organizational behavior in relation to technology, thereby significantly impacting the success of DSC transformation (Aamer et al., 2023; Song et al., 2021; Garay-Rondero et al., 2019).

3.3 Processes

While exploring the literature on DSC, it is evident that a considerable portion of the literature emphasizes the focus on processes as a key success factor of DSCs. This includes the exploration of necessary steps and procedures in management, operations, and compliance with standards and regulations vital to enabling digital transformation initiatives within the SC (Büyüközkan and Göçer, 2018; Khan et al., 2021; Yang et al., 2021).

Wand et al. (2019) recognized the organization's strategy for digitalization as a critical determinant in the preparedness of the DSC. Furthemore, Yang et al. (2021) defined various expansion areas within the digitalization strategy, such as operations, objectives, and the establishment of a digital culture within organizations. Moreover, Omar et al. (2021) suggested a multi-faceted approach to the deployment of DSCs, incorporating interactions with different stakeholders, such as the organization and its community, value chain, environment, and human resources. Likewise, the successful mapping of a supply chain digitalization plan involves the development of an extensive strategy, information systems, and organizational structure that are in harmony with the overall digitalization strategy (Zekhnini et al., 2022). Moreover, the alignment of the SC's broader objectives with the organization's strategy is crucial by giving attention to cost considerations, standard operating procedures, personnel adaptation, and business process reengineering (Fraile et al., 2019).

An effective management of digital innovation within SCs can potentially reduce the cost of establishing system transactions. It encompasses interorganizational innovation processes that involve supply chain partners. These processes are characterized by clear objectives, reciprocal information exchange, the use of technology, trust, shared risks and rewards, and performance management (Carlan et al., 2018). Furthermore, the integration of tasks across supplier partners is highlighted as vital to the success of digital innovation management. Such integration promotes interorganizational learning and contributes to a shared culture, facilitated by the transfer of information and knowledge (Nasiri et al., 2020).

There are four identified types of collaborative management that contribute to digital innovation within SCs:

1. Program collaboration, which ensures interaction between subsystems.
2. Data collaboration, which concerns the conformance of information.
3. Control collaboration, which is about the flexibility in joining programs.
4. Interface collaboration, which deals with the operations system interface.

Innovation management in the SC, supported by information technology, is instrumental in the development of innovative products highlighting the necessity of a strategic, integrated approach to collaboration and technology application in order to foster innovation within the DSC environment (Kerdpitak, 2022).

3.4 Data Analysis and Big Data Management

The integration of digital solutions like cloud computing, IoT, and big data analytics is increasingly dominant in DSC context. As the digital landscape evolves, the management and analytical processes of big data have become pivotal components involving the systematic organization, storage, and representation of data within a specific framework, highlighting the essential nature of data provenance and the integration process (Kache and Seuring, 2017).

Gravili et al. (2018) asserted the challenges of Industry 4.0, particularly the difficulty in extracting actionable information from the large data sets produced by smart devices. Moreover,

the development of robust data analytics capabilities and the regulation of the physical data flow are imperative to mitigate the risk of data inefficiencies and consequent financial losses.

Thus, for an organization to gauge its readiness for DSC implementation, assessing the competency in big data management and analytics is essential. This assessment is a key determinant in preventing data redundancy and avoiding potential profit decline, ensuring the organization's competitiveness in a digitally disruptive environment (Fosso et al., 2018).

4. Digital Supply Chain Development Framework

Given the understanding of the DSC literature and the suggested structure for its development, the question of how best to apply and validate DSC in a normal SC emerges. Each SC will have a somewhat distinct set of priorities and objectives for digital development. The primary intended digital assessment objectives for SC frequently presents the areas of digitalization, technology, and SCM, which are crucial elements for organizational alignment, in addition to completely rethinking and rebuilding supply networks. This clearly defines the primary breakdown of the DSC development architecture.

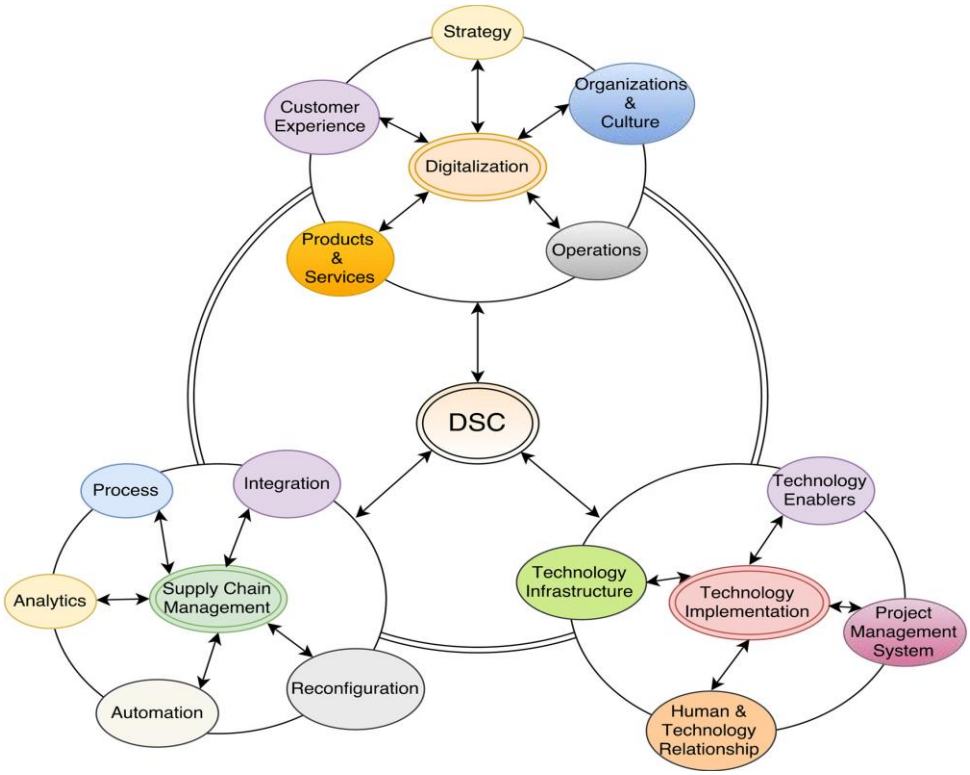

Figure 1. Integration framework for the development of DSC.
Source: Büyüközkan, G. and Göçer, F. (2018)

Figure 1 illustrates the multifaceted nature of DSC development emphasizing that a DSC is not a standalone concept but rather a system influenced by several interconnected factors: ***Digitalization, SCM, and Technology Implementation.*** Each element of the framework is interlinked, signifying that changes or advancements in one area will influence others. This holistic approach underlines the complexity and interconnectedness of building a DSC that is responsive, efficient, and customer-focused.

5. Challenges and barriers of implementing Digital Supply Chain

The implementation of a DSC is surrounded with several of challenges and barriers that organizations must locate, such as:

Data Security and Privacy: DSC involves the sharing of sensitive SC data across multiple stakeholders. Ensuring data security and privacy becomes crucial to protect against potential breaches or unauthorized access. Thus, organizations need to implement robust security measures, such as encryption, access controls, and regular audits, to safeguard sensitive information.

Supplier and Partner Collaboration: DSC relies heavily on collaboration and information sharing with suppliers and partners. However, getting all stakeholders onboard and aligned with the new system and processes can be a challenge. Resistance to change, differences in technology capabilities, and varying levels of IT infrastructure can hinder effective collaboration.

Implementation and Training: Successfully implementing DSC requires proper planning, execution, and training. Organizations need to invest time and resources in selecting the right DSC solution, customizing it to their specific needs, and training employees on how to effectively use the system. Failure to adequately prepare and train employees can lead to low adoption rates and inefficiencies in utilizing the system.

Data Accuracy and Reliability: DSC heavily relies on accurate and reliable data to drive decision-making and SC operations.

Ensuring data quality, integrity, and consistency can be a challenge, especially when dealing with data from various sources and systems. Data discrepancies or errors can lead to inaccurate demand forecasting, inventory discrepancies, and disruptions in SC processes.

Change Management: Significant adjustments to organizational procedures, roles, and duties are sometimes necessary while implementing DSC. Implementation success may be hampered by staff resistance to change, a lack of support from important stakeholders, and insufficient change management techniques. Organizations need to effectively communicate the benefits of DSC, address concerns, and provide adequate support throughout the transition.
(Attaran, 2020; Sued, 2020; Queiroz et al., 2021; Agrawal et al., 2023)

In conclusion, while the DSC presents innovative opportunities for efficiency and transparency, the road to its integration is accompanied with challenges that are as diverse as they are complex.

6. Research Methodology

For the purpose of this research, a quantitative approach offering robust tools for investigation. The aim of the research is to provide investigate the impact of implementing DSC on logistics performance and sales. The research adopted a deductive approach, focusing on the general topic of DSC implementation to be applied specifically within the company L'AZURDE. Moreover, the research drew upon both primary and secondary data to achieve the aforementioned aim.

Detailed surveys will form the basis of the primary data, accompanied by archived data from L'AZURDE. Secondary data will serve as a reference point to maintain focus on the subject and help structure the scope of the survey questions.

On the other hand, statistical data analysis will be employed to process and quantify the gathered data using SPSS statistics software. Data will be input into SPSS, with multiple trials conducted to identify the most effective solution, hence accomplishing the research aim. This will also help to determine a resolution that either contradicts or supports the hypothesis. The analyzed data was systematically organized to respond to the research questions and test the hypotheses, using the insights gained to derive an optimal solution for implementing DSC to enhancing logistics performance and sales.
The analysis included three stages, as follows:

- **First stage:** ***Descriptive Statistical Analysis of Primary Data***

  This initial phase involves a comprehensive descriptive statistical analysis of the primary data collected through survey questionnaires. The primary aim is to assess the impact of the deployment of DSC on L'AZURDE's operations. This analysis will serve to summarize the data, providing insights into the general patterns and tendencies within the dataset related to DSC implementation.

- **Second stage:** ***Evaluation of Secondary Data for Reliability and Validity***

The second stage is devoted to the in-depth analysis of the secondary data. This step is critical to confirming the reliability and validity of the variables under consideration. Additionally, a SEM method will be utilized to determine the interrelationships among the variables and to understand the causal impacts exerted by these variables on each other within the context of the research.

- **Third stage:** ***Descriptive Statistical Analysis of Secondary Data for Hypothesis Testing***

The final stage encompasses a detailed descriptive statistical analysis of the secondary data and to ensure that the secondary data is analyzed to validate the hypothesized relationships and to draw evidence-based conclusions about the deployment and effectiveness of the DSC within L'AZURDE.

Hypotheses and variables:

There are two key components to how the Internet affects order fulfillment and last-mile delivery procedures. The first one has to do with electronic commerce (e-commerce) and involves completing consumer orders submitted online. While online order placement has become more effective for clients, The second consideration relates to how internet tools may help offline and online companies alike fulfill orders more effectively. Accessing and modifying a huge quantity of data, from client orders to inventory levels, is necessary for the order fulfillment process. As a result, employing Internet technology to access and share data along the SC can make this process more productive and less expensive. All SC participants having access to real-time, or almost real-time, customer order

information may significantly reduce variability and costs while also enhancing the firm's responsiveness.

Order fulfillment and last-mile delivery are related to the efficient management of all the tasks necessary to fulfill the customer's order. To enable the timely and accurate fulfillment of orders, an effective SC must be designed at the strategic level. The order fulfillment process is defined at the operational level by the operations of creating, sharing, entering, processing, picking, and delivering customer orders. In order to ensure customer satisfaction and reduce total costs before, during, and following order fulfillment, this process essentially involves the integration of the production, logistics, and marketing departments.

Logistics responsibility for getting the right products to the right place at the right time. If it is not done effectively, it can cause delays in shipments, which could mean a major loss in revenue and lost sales that can have a significant impact on the profits earned. By decreasing fulfillment and last-mile delivery lead time and reducing shipping costs, a company can increase their profits, which would otherwise be lower if they were paying higher rates for delivery services without considering other factors such as time or distance traveled during transportation. So, it is important to optimize logistics if companies want to remain profitable.

H1: Positive relationship between DSC and logistics performance.
H2: Positive relationship when applying DSC to enhance performance and increase sales.

H3: Positive relationship between the efficiency of logistics performance and the share of increasing sales.

Based on the prior, the research hypotheses were proposed are illustrated as variables:

Model Variables: Figure 2 demonstrates the variables of the study. The independent variable is DSC, which affects the dependent variables logistics performance and sales, and has sub variables fulfillment lead time and 3PL lead time under logistics performance. The sale sub variable is the value of sales.

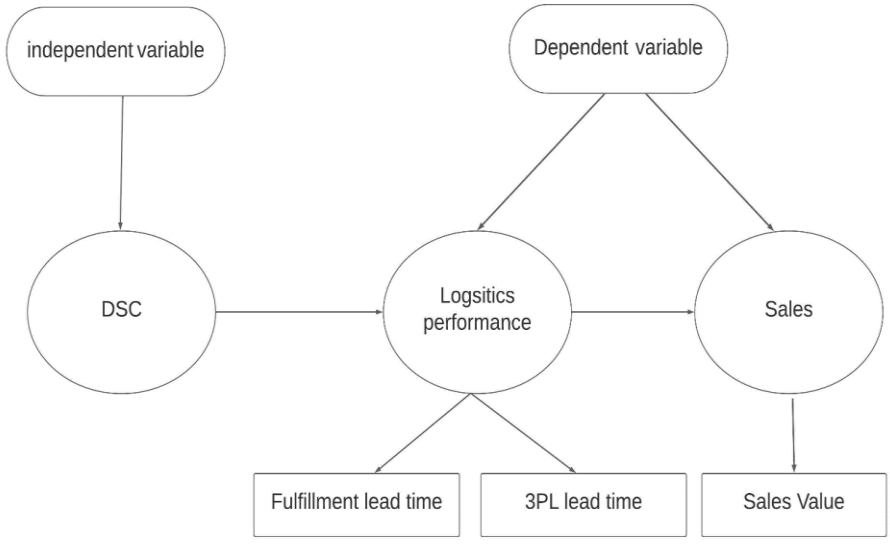

Figure 2. Model of variables of the Study
Source: Developed by authors (2023)

- **Fulfillment lead time**: Refers to the duration of time it takes between customer place date. It can be recorded as a timestamp when the order is received in the system to shipped to carrier date. The fulfillment lead time includes various stages such as order processing, packaging, quality

control, and shipping processes (Athikiat, 2013).

- **Third part logistics (3PL) Lead time:** Refers to the duration of time it takes for 3PL provider to handle the shipments between order picked date to deliver date to end consumer. 3PL lead time included various activities such as picking, receiving, transit, dispatching, and delivery processes (Domingues et al., 2015).
- **Sales value:** Sales value refers to revenue generated from the sale of goods or services. It represents the total amount of money received by a company as a result of selling its products or services to customers (Sullivan et al., 2012).
- **Order total Lead time**: Total lead time typically starts from the moment a customer places an order date until his order delivered and received by the customer date. Total lead time including fulfillment and 3PL lead time (Urzúa et al., 2019).

To measure a sub variable such as total lead time, we will need to use some equations and data related to the fulfillment process, like Fulfillment lead time is the time it takes from when a customer places an order to when the courier receives the shipments to start last-mile delivery service. Table 1 presents the equations used to measure fulfillment lead time, 3PL lead time, and sales value.

Table 1. Sub variables definitions and equations

Variable	**Fulfilment Lead Time (FLT)**	**3PL Lead Time (3PL)**	**Sales Value**
Definition	The fulfilment lead time is the difference between dispatching delivery time (DDT) and order placement time (OPT).	The 3PL lead time is the difference between the Order Delivery Time (ODT) and the Order Dispatch Time	Sales value refers to revenue generated from the sale of goods or services. It represents the total amount of money received by a company as a result of selling its products or services to customers
Equation	FLT = DDT - OPT	3PL = ODT – ODT	Sales value

Source: Developed by authors (2023)

7. Analysis and Findings

The data used in the analysis is divided into primary and secondary data. The primary data is obtained from the survey. Around 99 of 108 responded back, making a response rate of 91.67%. The secondary data were obtained from L'AZURDE. The history of L'AZURDE company starts in 1980, when it was the first in the gold jewelry industry to launch an e-commerce platform and sell its products online within its sector. It is nowadays considered fourth in the world for gold jewelry manufacturing. The gold jewelry brands sector in Egypt is considered an oligopoly market that consists of a few companies. According to the Egypt Business Directory and Forbes, L'AZURDE owns a large market share in not only Egypt but also the Middle East and North Africa Region.

Stage one: *Descriptive Statistical Analysis of Primary Data*

The authors constructed structured questions, before distributing the main survey, aiming to ascertain the distribution of demographic responses. These responses were categorized by variables such as gender, with subdivisions of male and

female, followed by age and years of professional experience, as outlined in **Table 2**

a) Please indicate your gender.
b) Please specify your age bracket.
c) Please state the length of your professional experience.

Table 2. Frequency for sample demographics

Variable	Characteristics	Frequency
Gender	Female	48
	Male	50
	Prefer not to say	1
	Total	99
Age	50 Years and above	19
	From 30 to less than 40	38
	From 40 to less than 50	32
	less than 30 Years	10
	Total	99
Years of Experience	10-less than 15 years	24
	14 years	2
	15 years and more	53
	5- less than10 years	7
	Less than 5 years	12
	more than 30 years	1
	Total	99

Source: Developed by authors (2023)

Table 2 presents the demographic analysis of survey respondents based on three primary variables: gender, age, and years of experience. The gender variable is categorized into three groups: 'Female' with 48 responses, 'Male' with 50 responses, and one respondent preferring not to disclose their gender, concluding in a total of 99 respondents.

Regarding age, four categories were defined: those '50 Years and above' tallying 19 respondents, individuals 'From 30 to less than 40' with the highest representation at 38, participants 'From 40 to less than 50' years consisting of 32 respondents, and the 'less than 30 Years' group having the least, with 10 individuals. The cumulative total for age distribution also stands at 99.

For years of experience, the survey captures six distinct ranges: '10-less than 15 years' with 24 respondents, a precise count of 2 respondents with '14 years' of experience, the majority category '15 years and more' with 53 respondents, '5- less than10 years' including 7 respondents, 'Less than 5 years' comprising 12 respondents, and a singular entry of one individual possessing 'more than 30 years' of experience. The aggregate count for this variable equals 99, which is consistent across all three categories.

Overall, the table is a quantitative representation of the surveyed demographic, providing an insight into the diversity of the participants in terms of gender, age, and professional experience, which could be crucial for understanding the perspectives and insights gathered in the study.

Proceeding forward with the analysis, a survey instrument was designed with questions covering four different scopes:

- Benefits of implementing DSC in logistics performance.
- Challenges and barriers of implementing DSC.
- Impact of applying DSC to marketing and sales.
- Advantages of applying DT.

Table 3 represents the survey or evaluation results regarding the implementation of DSC and its perceived effects on various aspects of business operations. The table is divided into statements about the impact of DSC on different business processes and the respondents' level of agreement with each statement, using a Likert scale where 1 represents strong disagreement and 5 represents strong agreement.

Table 3: Perceptions and Impacts of DSC Implementation

	1	2	3	4	5	Mean	Std. Deviation
By Implementing, DSC total lead-time of fulfilment and last mile delivery is reduced.	0%	6.1%	26.5%	32.7%	34.7%	3.9592	.93450
Internet and IT provide real-time communication between businesses, suppliers, and agents when implementing the DSC.	4.1%	12.2%	24.5%	28.6%	30.6%	3.6939	1.15838
DSC provide information visibility and exchange due to simple access between enterprises and suppliers.	2%	10.2%	22.4%	24.5%	40.8%	3.9184	1.11499
The DSC provides Better real-time forecasting decision	2%	6.1%	34.7%	24.5%	32.7%	3.7959	1.04042
Updated information, such as inventory numbers, improves inventory distribution without a warehouse when implementing DSC.	2%	6.1%	18.4%	34.7%	38.8%	4.0204	1.01015
DSC improves customer service	4.1%	8.2%	18.4%	30.6%	38.8%	3.9184	1.13352
Lowering operational expenses (payroll, rent, handling, and utility assets) and not needing a warehouse by using just-in-time when implementing DSC	2%	6.1%	20.4%	26.5%	44.9%	4.0612	1.04897
DSC play a key role to understand customer's needs, pains and Increased customer satisfaction	2%	6.1%	34.7%	20.4%	36.7%	3.8367	1.06745
Increased profits. Cutting down on resources helps a business save money and make more money by Implementing DSC	2%	4.1%	20.4%	42.9%	30.6%	3.9592	.93450
Use of portable wireless computer and other devices to access information anywhere at any time when implementing DSC	2%	4.1%	26.5%	34.7%	32.7%	3.9184	.97546
Increased awareness of the company's/project's purpose and objectives when implementing DSC	0%	10.2%	16.3%	24.5%	49%	4.1224	1.03345
Increased security and trust when implementing DSC	12.2%	8.2%	34.7%	28.6%	16.3%	3.2857	1.20761
Re-engineering firms' core business operation when implementing DSC	2%	4.1%	20.4%	28.6%	44.9%	4.1020	1.00509
Improved software compatibility and Integrated information management when implementing DSC	2%	2%	30.6%	24.5%	40.8%	4.0000	1.00000
A deficiency in integration and transaction blockage provides further difficulties in the execution of DSC.	0%	14.3%	24.5%	26.5%	34.7%	3.8163	1.07381

Reluctance/inability to adopt computer technologies among subcontractors and suppliers when implementing DSC	2%	26.5%	22.4%	20.4%	28.6%	3.4694	1.22648
When adopting DSC, one of the main issues that arises has to do with the diversity of systems utilized by the various SC partners.	2%	26.5%	22.4%	26.5%	22.4%	3.4082	1.17115
Overreliance on technology and inability to grasp what information has to be conveyed and, notably, how new technology changes business operations when implementing DSC	6.1%	30.6%	16.3%	22.4%	24.5%	3.2857	1.30703
Culture and capabilities of employees are major factors of challenges when implementation DSC	6.1%	16.3%	10.2%	24.5%	42.9%	3.8163	1.31772
Inflexible business processes and lack of industry specific guidelines when implementing DSC	2.0%	14.3%	24.5%	20.4%	38.8%	3.7959	1.17224
Fear of implementing a business process change when implementing DSC	2.0%	12.2%	14.3%	34.7%	36.7%	3.9184	1.09614
Risk of taking initiative when implementing ESCM	6.1%	8.2%	26.5%	28.6%	30.6%	3.6939	1.17622
High implementation and running costs when implementing DSC	2.0%	8.2%	24.5%	28.6%	36.7%	3.8980	1.06546
Lack of support from top management when implementing DSC	4.1%	8.2%	18.4%	40.8%	28.6%	3.8163	1.07381
Lack of in-house digital skills and technical expertise when implementing DSC	2.0%	18.4%	26.5%	32.7%	20.4%	3.5102	1.08248
Fear of losing confidential information when implementing DSC	0%	8.2%	34.7%	30.6%	26.5%	3.7551	.94716
One of the primary challenges in adopting DSC is the variety of systems that the different SC partners use.	2.0%	10.2%	44.9%	28.6%	14.3%	3.4286	.93541
Lack of demand from customer/client when implementing DSC	4.1%	10.2%	28.6%	28.6%	28.6%	3.6735	1.12524
Security concerns when implementing DSC	16.3%	28.6%	28.6%	20.4%	6.1%	2.7143	1.15470

Lack of software that meets the needs of the construction industry when implementing DSC	14.3%	28.6%	24.5%	20.4%	12.2%	2.8776	1.25221
Extending firm's reach of online consumers when applying DSC on marketing	2.0%	10.2%	44.9%	28.6%	14.3%	2.7347	1.18630
Increased customer loyalty and retention when applying DSC on marketing	4.1%	10.2%	28.6%	28.6%	28.6%	2.6735	1.28108
Improved competitive position and company image in market when applying DSC on marketing	16.3%	28.6%	28.6%	20.4%	6.1%	2.8571	1.20761
Improved customer relationship and gain additional comprehensive data on consumer behaviour and browsing when applying DSC on marketing	14.3%	28.6%	24.5%	20.4%	12.2%	2.7959	1.17224
Reducing marketing costs (Communications, Interactions, and managing customers information and inquires) when applying DSC on marketing	20.4%	18.4%	34.7%	20.4%	6.1%	3.1633	1.21359
Improved planning and decision making when applying DSC on marketing	20.4%	30.6%	20.4%	18.4%	10.2%	3.7347	1.09498
Replace traditional workflow with digital processes is one of the advantages of applying Digital Transformation	16.3%	22.4%	28.6%	24.5%	8.2%	3.5714	1.22474
Invest more time in learning a new development approach rather than waiting to accomplish a goal is one benefit of using digital transformation.	16.3%	22.4%	34.7%	18.4%	8.2%	3.6327	1.18487
Changing the modern and professional working model, constantly improving the spiritual life of employees is one of the advantages of applying Digital Transformation	10.2%	22.4%	20.4%	34.7%	12.2%	3.8163	.92811
Increase workflow efficiency and minimize technical errors is one of the advantages of applying Digital Transformation	2.0%	14.3%	20.4%	34.7%	28.6%	3.6531	1.16460
Apply new services and technologies quickly and flexibly is one of the advantages of applying Digital Transformation	10.2%	6.1%	24.5%	34.7%	24.5%	3.0816	1.18738

Improve work quality and performance is one of the advantages of Applying Digital Transformation	4.1%	16.3%	20.4%	30.6%	28.6%	3.5918	1.15323
Increase labour productivity and improve the quality and appearance of products is one of the advantages of Applying Digital Transformation	0%	8.2%	28.6%	36.7%	26.5%	4.1837	.85813
Increase re-investment ability is one of the advantages of Applying Digital Transformation	6.1%	10.2%	22.4%	34.7%	26.5%	2.6531	1.31579
The website is easy to navigate and find products.	12.2%	18.4%	28.6%	30.6%	10.2%	2.8980	1.21183
The checkout process is clear and easy to follow.	4.1%	16.3%	20.4%	34.7%	24.5%	2.7143	1.25831
The product descriptions are accurate and helpful.	28.6%	16.3%	24.5%	18.4%	12.2%	2.6939	1.38750
The prices are competitive compared to other websites/stores.	8.2%	24.5%	32.7%	20.4%	14.3%	3.0816	1.16970
The delivery process is timely and reliable.	6.1%	28.6%	30.6%	20.4%	14.3%	3.0816	1.15175

Source: Developed by authors (2023)

Table 3 represents the survey or evaluation results regarding the implementation of DSC and its perceived effects on various aspects of business operations. Moreover, the table presents a structured summary of data regarding the perceptions and effects associated with the implementation of a DSC. It captures quantitative feedback across multiple dimensions, such as "Efficiency," "Customer Service," and "Fear of New Technology," among others. The presence of categories like "Agree," "Neutral," and "Disagree" suggests a survey-like approach to data collection, allowing for an analysis of consensus and variance within the respondent group. Notably, there is a strong agreement on "Efficiency" and "Customer Service," indicating that the DSC is perceived as beneficial in these areas. Conversely, the "Fear of New Technology" has a higher incidence of neutral and disagreeing responses,

highlighting possible concerns or resistance among stakeholders. This distribution suggests that while there are recognized benefits to DSC implementation, there also exist challenges and apprehensions that may need to be addressed.

Stage two: *Evaluation of Secondary Data for Reliability and Validity*

Table 4 presents the reliability and validity metrics for the variables derived from CFA post-exploratory factor analysis (EFA). The purpose of the CFA is to verify the factor structure and confirm the reliability and validity of the constructs. The reliability of the constructs was assessed using Cronbach's alpha. All constructs demonstrated a Cronbach's alpha value exceeding the acceptable threshold of 0.7, affirming the internal consistency of the items within each construct. Hence, the items related to DSC, logistics performance, and sales are considered reliable for representing the respective factors in the study.

For validity, both composite reliability (CR) and average variance extracted (AVE) were calculated. Validity is concerned with how well the items of a construct measure what they are intended to. The AVE values for all constructs are above the cut-off value of 0.5, indicating that a majority of the variance in the items is due to the hypothesized constructs. Similarly, the CR values are all above 0.7, further confirming the constructs' reliability and indicating good internal consistency.

Table 4: Reliability and validity of variables based on confirmatory factor analysis

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
DSC	**0.871**	**0.899**	**0.906**	**0.660**
Logistics performance	**0.889**	**0.893**	**0.909**	**0.503**
Sales	**0.844**	**0.854**	**0.882**	**0.518**

Source: Developed by authors (2023) based on calculations using Smart PLS

The results indicate that each construct is a valid measure of its respective factor, and the high levels of reliability suggest that the constructs are consistently represented by their respective items.

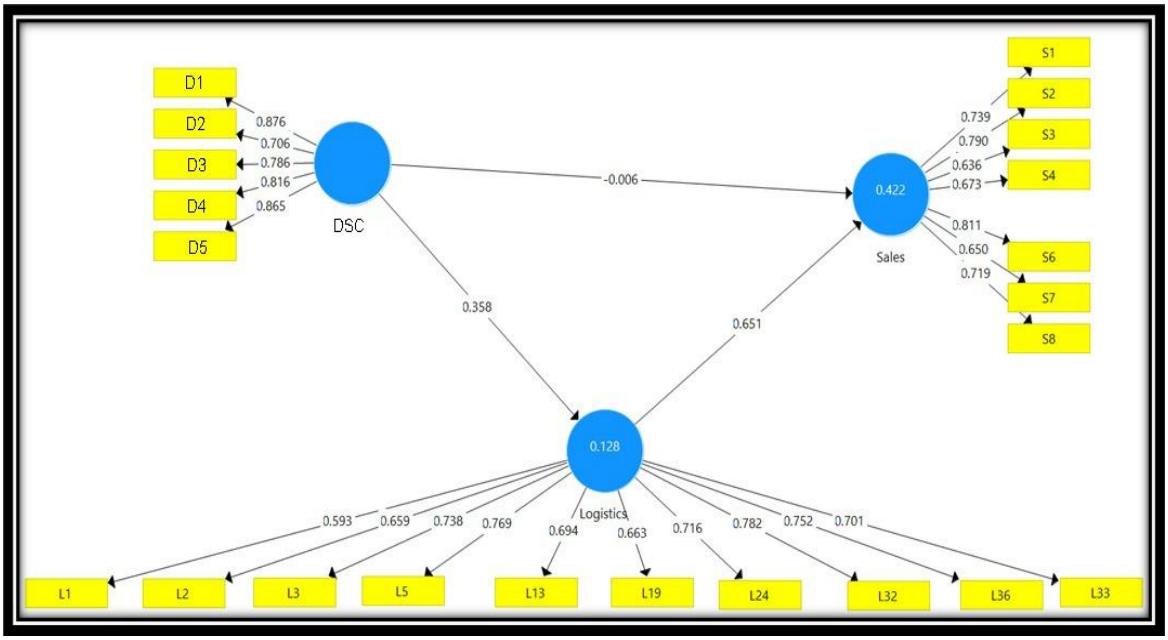

Figure 3. SEM analysis of the relationships Between DSC, logistics performance, and sales

Source: Developed by authors (2023) based on calculations using Smart PLS

The SEM is used to investigate the impact of variables on each other. It gives an understanding for the phenomenon. After using CFA, the SEM can perfectly model data due to its assumptions being satisfied. **Figure 3** represents a SEM diagram, showing the relationships among the research variables: DSC, logistics performance, and sales. It is obvious that all the loading are above 0.6 which gives an indication that no statements shall be removed from the study.

Furthermore, DSC shows positive loadings with all its observed variables, implying that each indicator has a positive correlation with the latent construct of DSC. Similarly, the observed variables of logistics performance and sales also shows positive loadings with their latent variables, which supports their relevance and contribution to the constructs they intend to measure.

Overall, the SEM analysis offers a detailed understanding of how DSC affects logistics performance and, in turn, how both these constructs impact Sales. The positive relationships suggest that improvements in DSC systems and logistics performance may potentially lead to better sales outcomes, though the direct relationship between DSC and sales in this model appears weak. This analysis can help in strategic decision-making and optimization of resources in business settings where these constructs are relevant.

Table 5: Coefficient estimates of SEM

	Original Sample	Mean	Standard deviation	T	P Values
DSC -> Logistics performance	0.358	0.396	0.122	2.934	0.004
DSC -> Sales	0.306	0.323	0.125	2.448	0.018
Logistics performance -> Sales	0.651	0.698	0.123	5.292	0.000

Source: Developed by authors (2023) based on calculations using Smart PLS

Table 5 provides the coefficient estimates of a SEM analysis. These estimates are used to understand the direct relationships between DSC, logistics performance, and sales.

DSC → Logistics Performance

The positive coefficient of 0.358 along with a p-value below the standard cutoff of 0.05 suggests that DSC has a statistically significant positive impact on logistics performance. The T-Value, being greater than 1.96 (assuming a 95% confidence level), confirms the statistical significance of this relationship. This indicates that as the efficiency or effectiveness of the DSC improves, it is likely to lead to better logistics performance.

DSC → Sales

This relation also has a positive coefficient, signifying a beneficial impact of DSC on sales. The p-value indicates that

the effect is statistically significant, although the effect size is slightly smaller than that on logistics performance. This implies that enhancements in the SC can directly contribute to increased sales.

Logistics Performance → Sales

With the largest coefficient among the relationships and a p-value of 0.000, this result suggests a very strong and statistically significant positive impact of logistics performance on sales. This strong relation emphasizes the importance of logistics performance as a critical factor in driving sales.

Table 6: Summary of coefficient estimates

Independent Variable	Dependent Variable	Hypothesis	Accepted/Rejected
DSC	Logistics performance	DSC has a positive impact on Logistics performance	Accepted
DSC	Sales	DSC has a positive impact on Sales	Accepted
Logistics performance	Sales	Logistics performance has a positive impact on Sales	Accepted

Source: Developed by authors (2023)

Table 6 is a summary of the coefficient estimates derived from the SEM analysis previously discussed. This table lays out the hypothesized relationships between variables and the conclusion of their statistical testing.

Stage three: *Descriptive Statistical Analysis of Secondary Data for Hypothesis Testing*

In this stage, the analysis attempt to evaluate the historical secondary data concerning L'AZURDE and its subdivision into two distinct brands, MissL and L'AZURDE itself, to examine the hypothesis and assess the influence of the DSC on the logistics performance and sales variables. The measurement of logistics performance considers factors like fulfillment lead time and 3PL lead time, while sales performance is measured through the metric of sales value.

Figure 4 presents a pie chart displaying the distribution of product counts between the two brands. Based on the calculations conducted using SPSS, L'AZURDE represents 56.74% of the total, indicating that it accounts for a majority share. In contrast, MissL comprises 43.26%, forming a significant minority portion of the data set. This proportional representation is critical in analyzing the performance and impact of each brand on the overall business metrics such as logistics performance and sales.

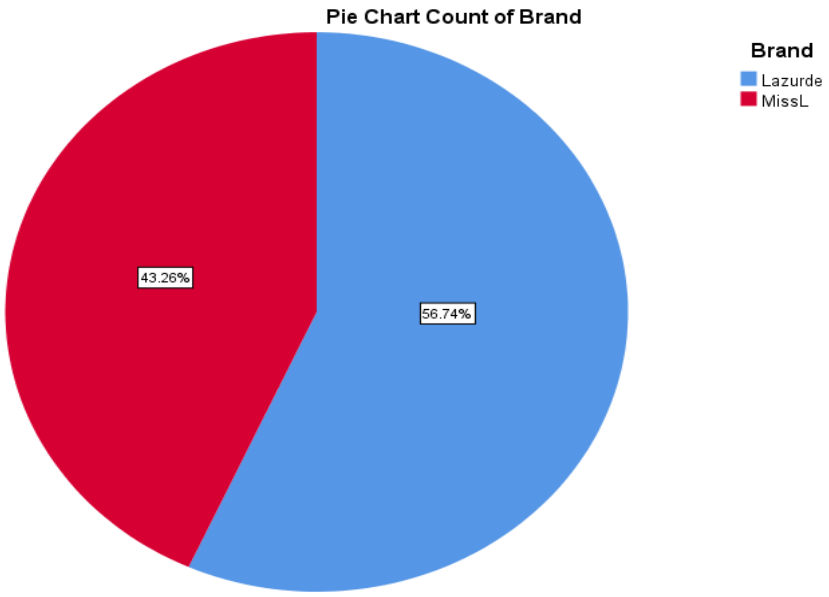

Figure 4. Brand Distribution Pie Chart for L'AZURDE and MissL
Source: Developed by authors (2023) based on calculations using SPSS

In the context of DSC's impact, a larger share by L'AZURDE could mean that any findings related to logistics and sales performance may be more heavily influenced by L'AZURDE's data. It also suggests that initiatives to improve logistics performance or sales may want to prioritize the brand that has a greater share or explore specific strategies tailored for each brand due to their different weights in the dataset.

Table 7: Descriptive Statistics of Logistics and Sales key performance indicators (KPIs)

	Mean	Std. Deviation
Fulfillment lead time	1.24	1.015
3PL lead time	1.66	1.310
Sales value	3062.337	2958.118

Source: Developed by authors (2023) based on calculations using SPSS

Table 7 presents the descriptive statistics for three key performance indicators (KPIs) related to the logistics and sales context. This table is crucial for understanding operational efficiency and financial performance.

The fulfillment and 3PL lead times have relatively low means and standard deviations, suggesting that the processes are fairly quick and consistent, though the 3PL lead time is slightly less consistent than the fulfillment lead time. On the other hand, the sales value has a high standard deviation compared to the mean, which could indicate that there are occasional very high or very low sales values.

Pearson Correlation Coefficient

Table 8 presents correlation matrix, showing the relationship between fulfillment lead time, sales value, and 3PL lead time.

Table 8: Pearson correlation coefficient for the correlation analysis

		Fulfillment lead time	Sales Value	3PL Lead Time
Fulfillment lead time	Pearson Correlation	1	.109**	.048**
	Sig. (2-tailed)		.000	.000
	N	62983	62983	62983
Sales Value	Pearson Correlation	.109**	1	.030**
	Sig. (2-tailed)	.000		.000
	N	62983	62983	62983
3PL lead time	Pearson Correlation	.048**	.030**	1
	Sig. (2-tailed)	.000	.000	
	N	62983	62983	62983

Source: Developed by authors (2023) based on calculations using SPSS

- **Fulfillment Lead Time and Sales Value** (Pearson Correlation = .109**):

There is a statistically significant positive correlation between fulfillment lead time and sales value. This implies that as the fulfillment lead time increases, the sales value tends to increase as well.

- **Fulfillment Lead Time and 3PL Lead Time** (Pearson Correlation = .048**):

There is a statistically significant correlation between fulfillment lead time and 3PL lead time. This suggests that there might be a slight tendency for increases in internal fulfillment lead times to be associated with longer 3PL lead times.

- **Sales Value and 3PL Lead Time** (Pearson Correlation = .030**):

There is a statistically significant positive correlation between sales value and 3PL lead time.

Summary of Findings

- This research findings confirm that implementing DSC has a positive and significant effect on logistics performance, which is reflected in the increased efficiency of the operations, which leads to enhanced order fulfillment and 3PL lead time in a timely manner.
- The findings confirm that implementing DSC has a significant positive impact on logistics performance and sales at a 99% confidence level, while logistics performance has a significant positive impact on sales.

- The fulfillment lead time has a significant positive impact on sales value at the 0.1 level of significance. So, the first hypothesis is accepted.
- Both fulfillment lead-time and 3PL lead time had a significant impact on value at a 95% confidence level, and DSC had a significant impact on value. Therefore, both hypotheses were accepted, and the results were consistent with primary and secondary data, indicating that the three hypotheses of this study are accepted.

8. Conclusions and Recommendations

The exploration of the DSC's influence on logistics performance, sales, and 3PL lead times within this research provides persuasive evidence on the DT of SCs. Through quantitative methodologies, such as regression analysis and correlation assessment, the study clarified the vital role of DSC in enhancing business operations.

The results derived from the data analysis strongly indicate that the adoption of digital technologies within SC processes substantially improves logistics efficiency. This improvement is closely linked to a rise in sales value, emphasizing the tangible financial advantages that stem from digital optimization in the SC. Moreover, a notable finding from the research is the positive impact of refined fulfillment operations on sales value.

Furthermore, the investigation confirmed statistically significant positive correlations between fulfillment lead times, 3PL lead times, and sales values. The integration of DSC is thereby implicated in not only improving operational timelines

but also substantially increasing business value. This correlation was consistently observed across different datasets, lending confidence to the strength of the findings.

In summary, the integration of a DSC stands out as a critical strategic move for organizations looking to thrive in the digitally-driven marketplace. The research concludes with all three proposed hypotheses being supported, providing strong empirical evidence of the benefits of DSC. This conclusion contributes to the existing literature by affirming the strategic importance of digital advancements in SCM and offering a reliable basis for future academic inquiry and practical application in the field.

This research provides an understanding of DSC integration and its consequences on logistics efficiency and sales revenue; however, it acknowledges several limitations. Firstly, it does not account for the variable success rate of DSC implementation across different industries, potentially introducing bias as the representativeness of the sample may not extend across all industry sectors. Secondly, the study does not explore the financial implications of adopting DSC technologies for organizations. Lastly, the research did not consider the potential cybersecurity threats inherent in digital transitions, such as data breaches and the risk of cyberattacks.

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