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# The nexus between digitalization, supply chain management and firms' performance: An examination of SMEs sector in Kingston

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**Abstract**
The study assesses the nexus between digitalization, supply chain management and the firms' performance of SMEs in Kingston. The positivist philosophical paradigm approach was adopted, hence the use of quantitative method. The descriptive design was used. 200 participants participated in the study with the use of stratified and convenient sampling techniques. Data collected was then analyzed with the use of Statistical Package for Social Science version 21. Findings of the study demonstrated a significant positive relationship between all the three independent variables: digitalization, supply chain management, digitalization and supply chain management and the dependent variable SMEs' performance. However, digitalization and supply chain management strongly correlate SMEs' performance. Practical implications and direction for future studies are presented.

**Keywords:** Digitalization, supply chain management, SMEs, Kingston

## Introduction

The significance of logics in firms' operations is underscored in literature (Lagorio *et. al.,* 2022; Sparks *et al.,* 2023) [15, 26] in that every firm relies heavily on logistics. Logistics is said to be the link in the supply chain which also includes transportation, inventory management, purchasing, and warehousing. For the majority of businesses, logistics expenses appear to account for between 10% and 15% of a product's final cost (Richey *et al.,* 2022). [22] Utilizing cutting-edge innovative digitization tools like cloud computing, blockchain, smart contracts and industry 4.0 can be very beneficial for businesses in terms of effective operations management, elevated customer satisfaction, and increased employee satisfaction (Winkelhaus & Grosse, 2020). [29] In Jamaica, SMEs contribute significantly not only in employment creation but also to economic development. The need for the sector to embrace technology-led supply chains into their operations is regarded imperative for sustainability. As shared by Coyle *et al.* (2021), [7] the penetration of digitization in the logistics sector led to an increase in investment of more than 80%, from 161 million in 2015 to more than $4 billion in 2020. Global supply chains are complex and susceptible to a variety of dangers, ambiguities, and disruptions (Hugos, 2024). [13] Supply chain disruptions like the most recent corona virus pandemic, which affected supply chains and the economy adversely as a whole, were the catalyst for the need for digitization in supply chains (Biglardi *et al.,* 2022). These disruptions included anything from rising unemployment and high living costs to shortages of fast-moving consumer goods (FMCGs) and health supplies. To more effectively manage future disruptions and are ready for high-risk circumstances, the logistics and supply chain sector might tremendously benefit from adopting technology. These innovative solutions can improve the visibility of a supply chain, hence boosting its resilience. This increases the understanding of pandemic effects and lessens the likelihood of unexpected events occurring in the future when data are digitized. Digitalization helps to lower costs and increase system performance by doing away with manual operations (Seyedghorban *et al.,* 2020). [24] Tracking and tracing are essential for managing goods and products.

Technological tools like the internet of things (IoT) and internet of services (IoS) which improve organizational performance help supply chains' decision-making process (Aamer *et al.,* 2023). [1] A supply chain is a collection of connected businesses that converts inputs into finished goods for customers to consume (Hugos, 2024). [13] Improving the efficacy and performance of SMEs is crucial because they play such an important role in the nation's economy. According to Soni *et al.* (2022), these SMEs need to incorporate technology-led supply chains into their operations to improve their supply chain's productivity. Additionally, the cost of running the complete supply chain can be greatly decreased by coordinating and integrating capital, information, logistics, and trade movement throughout the chain. Literature is replete with studies on technology (Li *et al.,* 2022; Zou *et al.,* 2020) [31] and how it impact supply chain operations (Attaran, 2020; Morsen, 2023; Park & Li, 2021). [3, 20] However, the focuses of these studies were on the developed world where technology adoption is on the ascendency with little focus on developing country such as Jamaica living a gap in literature. More so, there appears to be dearth of studies on the relationship between digitalization, supply chain and firm performance, more specifically in the SMEs' sector in the context of Jamaica. This study seeks to fill in the gap in knowledge by examining the nexus between digitalization, supply chain and SMEs sustainability in Kingston.

Findings of the study will apprise managers in the SMEs sector to appreciate the significance of adopting technology-led supply chains into their operations to enhance performance and sustainability. Also, the study aims to provide suggestions and more meaningful policy interventions to develop the optimum governance framework for improving technology-led supply chain for SMEs in Kinston. The study also aims to contribute to extant literature. Researchers, students and the academic community should the study useful.

## Literature Review

### Concept of Digitalization

The concept of digitization has been treated in various ways. It is a vague concept, defining various areas of social life, focusing on digital media and electronic communication. In the literature on the subject Dellarocas (2003) considers digitization in terms of three features: creating value at the new frontiers of the business world; optimizing processes that directly affect the sum of customer experiences gained from contact with the enterprise or product; and building foundations supporting all business activities (Dellarocas, 2003), According to Schallmo & Williams (2018), digitization means fundamental changes in the way that business operations are carried out and business models function, implemented on the basis of new knowledge acquired by digitization activities. On the other hand, Santarius *et al.* (2023) [23] point out that the goal of digitization is to create and offer new value to customers, and not only to improve on, or ameliorate, that what they have already been in receipt of in terms of delivery Digitalization is defined as "the transformation of business models as a result of fundamental changes to core internal processes, customer interfaces, products and services, as well as the use of information and communications technologies (Ardito, 2023). [2] Digitalization refers to a process where enterprises apply digital technologies in a new way to optimize existing business processes.

### Concept of supply chain

The term "supply chain management" is a historical term that has been explained by different researchers in different contexts. Some researchers argued that this term is also used to explain the follow of information between companies and within the companies (Isensee *et al*., 2020). [14] This term also has been used to explain the logistic process along with planning and control of materials (Danicolai *et al.,* 2021). Some researchers also described the strategic and organizational issues regarding their supply chain management system (Vasilev *et al.,* 2020). [28] There are various definitions of supply chain management limited which have been defining by various researchers from 1982 to date. Desai, *et al*., (2016) define Supply chain management as it is the integration of key management functions, from supplier to the manufacturer who provides final products and services by the addition of values in the final controlling the operations of the supply chain with the purpose to satisfy customer consumer product (Branka *et al.,* 2020). Christopher & Matthias (2017) define supply chain management as "the process of planning, implementing and requirements as efficiently as possible.

### Empirical literature review on digitalization and supply chain management

Amid technological advances in many industries, supply chain management (SCM) has received substantial attention from organizations seeking supply chain efficiency (Aamer *et al.,* 2023). [1] Supply chain digitalization is a term that describes how different parts of the supply chain can be improved and optimized through the integration and application of digital technologies and data-driven solutions (Bigliardi *et al*., 2022). [4] It entails utilizing cutting-edge technology to enhance decision-making, cooperation, communication, efficiency, and transparency across the whole supply chain process. Utilizing technologies like cloud computing, blockchain, artificial intelligence (AI), Internet of Things (IoT), and data analytics are essential to supply chain digitalization. Numerous studies have demonstrated how value creation and data exploitation are supported in a variety of supply chain activities by big data technologies and data-driven innovation (Attaran, 2020). [3] According to the prior studies, the use of digitalization could enable supply chain firms handle any unforeseen incident if they could develop their inventive technical talents (Brozzi *et al*., 2021). [6] In buttressing this, Coyle *et al.* (2021) [7] posit that supply chain firms could become resilient in times of disruptions if appropriate technological strategies are adopted. Other research works have also demonstrated how the use of modern technologies and digitalization may be used to solve the business practices of supply chain operations (Gupta *et al.,* 2021; Hassan *et al.,* 2024). [10, 12] Inferring from literature, the study hypothesis as follows:

**H1: A significant positive relationship exists between digitization and supply chain**

### Empirical literature review on digitalization and SMES' performance

The use of digitalization approach has been identified as effective strategy to improve a firms' ability to develop innovative solutions in terms of products and services to enhance its performance (Hassan *et al*., 2024). Organizations including SMEs have recognized that creating strategies and incorporating internal functions, suppliers, and customers is a suitable model for achieving competitive advantage. The digitization of enterprises is a means of achieving a more flexible and competitive production, one that is adjusted to the modern realities of the emerging digital world. This digital transformation is defined as the exploitation of new technology aimed at radically improving production and increasing the expansiveness of the enterprise and enhancing performance (Emara & Zhang, 2021). [8] Thrassou *et al.* (2020) [27] conducted a study entitled: Digitalization of SMEs: A review of opportunities and challenges. Findings of the authors showed that digital procurement capabilities in SMEs improve the firm's performance. Digital integration in SMEs' operations is regarded vital since it has the potential to structure its organizational practices, activities, and strategies into collaborative, synchronized, and manageable processes to meet customer needs (Mohsen, 2023). [19] Therefore, digitalization is essential for an efficient and effective performance in SME operations. Hence, it is hypothesized that as follows:

**H2: A significant positive relationship exists between digitalization and SMES' performance**

### Empirical literature review on digitalization, supply chain management and SMEs performance

In the views of Shahadat *et al.* (2023), [25] digitalization is "a process to enhance competitive advantages, for example, by offering new services through virtual channels or enabling new systems. In the supply chain anagement operations, digitalization support supply chains by increasing the accessibility of information, collecting real-time data, optimizing supply chain anagement practices, reducing production and transaction costs, improving the timely

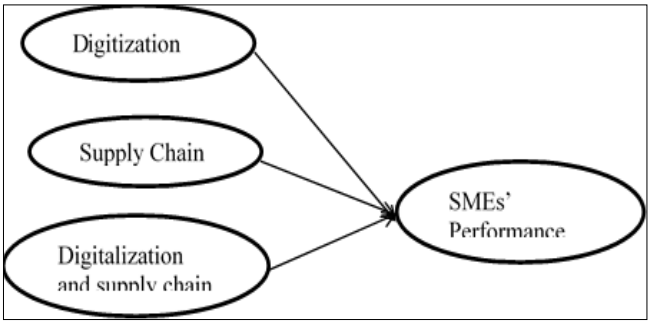
delivery of products to customers, and increasing both the efficiency and effectiveness of supply chain anagement functions (Zou *et al*., 2023). [31] Therefore, SME firms could reach operational efficiency and minimize their bullwhip effect by making internal processes smarter using digitalization.

Zhao *et al*. (2023) [30] conducted a study on Impact of supply chain digitalization on supply chain resilience and performance. Findings of the study showed that during crisis, supply chain digitalization can increase cost-effectiveness, enhance information and communication efficiency, and promote supply chain resilience to achieve better performance. Hassan *et al*. (2024) examines the relationship between digitalization and innovation performance in small and medium-sized enterprises (SMEs). digital diffusion is a significant positive trigger of innovation in SMEs. Hence, the study hypothesized that:

**H3: A significant positive relationship exists between digitalization, SCM and SMES' performance**

**Conceptual framework**

In testing the stated hypotheses, i.e. the relationship between digitalization, supply chain and supply chain and digitalization (as independent variables) and SMEs' performance (dependent variable), a construct is formulated as shown in figure 1.




Author's Construct, 2024

**Fig 1:** Conceptual Framework

**Methodology**

The positivist philosophical paradigm underpinned the study.

Burns & Grove (2010) define a research design as "a blueprint for conducting a study with maximum control over factors that may interfere with the validity of the findings". Regarding the research deign, the study adopted the descriptive research design since the questionnaire was used to generate basic statistics to enhance the analysis of the demographic characteristics of the respondents and also to determine the relationships between the study's variables Creswell, 2007).

Population according to Best & Kahn (2007) is any group of individuals that have one or more characteristics in common that are of interest to a researcher. Therefore, the population of the study consists of SME firms in manufacturing, agriculture, fishing, mining and the service sector.

Regarding the sampling technique, Panneerselvam (2009) defined sampling technique as the means of ascertaining or selecting a unit from a group of population of a study by way of assembling data collection about their individual characteristics. In this study, a sample size of 200 was selected with the use of stratified and convenience sampling technique. Stratified sampling was primarily used to ensure that different groups of the population are adequately represented in the sample so as to increase the population's level of accuracy when estimating the parameters. The convenience sampling was used in this case because the researcher deemed it fit for only participant readily available to participate in the study to avoid delay.

Questionnaire was the main instrument for data collection. Kumekpor (2002) emphasised that the most important elements in the research enterprise are the respondents, and everything must be done to alleviate their fears and anxiety. For this reason, no data was collected from vulnerable teams and the research was carefully designed to avoid creating any type of physical or psychological damage. Additionally, the respondents were informed about the aim of the research as well as their full consent was sought.

In analyzing the data, the Statistical Package for Social Science (SPSS) version 21.0 was used. The Cronbach Alpha was used to ascertain the internal consistency of the responses received whilst pretesting was performed to ensure validity. Findings of the study were presented in tables and accompanied with relevant commentaries for easy reading and comprehension

**Results and discussion**

**Results**

**Background characteristics of f respondents**

The proportion of male to female firms in the SME sector in Kingston was approximately equal with male representing 102(51.0%) as against female 98(49%).

The results of the study showed different categories of age groups in the SMEs' sector in Kinston with the age groups 52-62 years 70 representing 35.0%, age groups 41-51 years 60 representing 30.0%, age groups 30-40 years 25 representing 12.5.0%, age groups 19-29 years 10 representing 5.0% and age groups 63 years and above 35 representing 17.5%.

The study's dataset showed that 30 915.0%) of the respondents have obtained bachelor degree certificate, 5(2.5%) of the respondents have master degree certificate and 165(82.5%) of the respondents are other certificates holders.

Regarding the SME sector of respondents, 105(52.50%) of the respondents are in the service sector, 70 (35.0%) of the respondents are in the mining sector, 15(7.5%) of the respondents are in the manufacturing sector and 10 (5.0%) of the respondents are in the agricultural sector.

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**Reliability statistics**

To ascertain the internal consistency and stability of the responses received, the Cronbach alpha reliability test was conducted. A Cronbach alpha of 0.7 is found reliable. From the study, the coefficient value of Cronbach alpha realized for the four variables is 0.780 which is higher implying a high internal consistency. Table 1 presents the results obtained.

**Table 1:** Reliability of variables

| Cronbach's Alpha | Number of Items |
|---|---|
| 0.780 | 4 |

**Source:** Researcher's Field Work, September, 2024

**Correlation analysis**

The results from the multiple regression analysis showed a positive correlation between the independent variables (Digitalization, Supply Chain Management, Digitalization and Supply Chain Management) and the dependent variable (SMEs' performance). Digitalization and Supply Chain Management was found to be the most significant with correlation value of .880 whist digitalization alone recorded a correlation value of .850 and supply chain management recorded a correlation value of .740 at 0.1 confidence level. The results are presented in table 2.

**Table 2:** Showing Correlation between the Independent and Dependent Variables

| | | SMEP | Digitalization (D) | SCM | D & SCM |
|---|---|---|---|---|---|
| SMEP | Pearson Correlation | 1 | 850 | 740 | 880 |
| | Sig. (2-tailed) | - | 000 | 000 | 000 |
| | N | 200 | 200 | 200 | 200 |
| Digitalization (D) | Pearson Correlation | 850 | 1 | - | - |
| | Sig. (2-tailed) | 000 | - | - | - |
| | N | 200 | 200 | - | - |
| SCM | Pearson Correlation | 740 | - | 1 | - |
| | Sig. (2-tailed) | 000 | - | - | - |
| | N | 200 | - | 200 | - |
| D & SCM | Pearson Correlation | 880 | - | - | 1 |
| | Sig. (2-tailed) | 000 | - | - | - |
| | N | 200 | - | - | 200 |

**Source:** Researcher's Field Work, 2024

** Correlation is significant at the 0.01 level (2-tailed).

***SMEP, D and SCM denotes SME Performance, Digitalization and Supply Chain Management respectively

**Discussions of results**

**H1: A significant positive relationship exists between digitization and supply chain functions**

The statistics from the correlation analysis obtained revealed a positive correlation between digitalization (independent variable) and supply chain management the (dependent variable). The findings demonstrate a positive relationship such that (r= .850, p=0.0001). The results are presented in table 2. The correlation value demonstrates that 85.0% variation in supply chain management functions is influenced by digitalization and such variation is significant. We can, therefore, accept the null hypothesis of the study H0: a significant positive relationship exists between digitization and supply chain functions and reject the alternative hypothesis and concluded that a significant positive relationship exists between digitization and supply chain functions. The study's findings corroborate earlier findings (Bigliardi *et al.*, 2022). [4] In the study of Seyedghorban *et al.* (2020), [24] digitalization was found to impact supply chain functions positively. Findings of the study also align with the theory of constraints (TOC). The TOC ideology focused on how firms can deal with constraints which represented anything that restricts a system from attaining expected higher performances. Sparks (2023) [26] explained that the limiting factor is the weakest link in any system; thereby, exposing a firm's operational activities to severe threats from various environmental forces including suppliers, consumers and competitors. Supply chain firms in the SME sector are likely to experience severe supply shortages, inventory-related issues, financial difficulties, poor demand forecasting, long lead times and consequently threaten their survival and competitiveness in the face of production bottlenecks. However, the adoption of supply chain digitalization will allow supply chain management strategies in the SME sector attain flexibility and agility, thereby creating more values.

**H2: A significant positive relationship exists between digitalization and SMES' performance**

The findings obtained from the correlation analysis also revealed a positive correlation between digitalization (independent variable) and SMEs' performance (dependent variable). The relationship demonstrates positive such that (r= .740, p=0.0001). The correlation value demonstrates that 74.0% variation in SMEs' performance is influenced by digitalization whilst about 26% variation is as a result of other variables. The variation demonstrated is significant. We therefore reject the alternative hypothesis and accept the null hypothesis of the study H2: a significant positive relationship exists between digitalization and SMES' performance. The results are presented in table 2. The results of the study are largely in support of extant literature Liu & Chiu (2021) [17, 18] and Zhao *et al.* (2023). [30] Zhao *et al.* (2023) [30] posit that digitalization can bring a differential impact on supply chain resilience capabilities through different aspects of resource and structural adjustment measures. Liu & Chiu (2021) [17, 18] also revealed a relationship between supply chain digitalization and firm performance. The adoption of digital technologies in the present business environment cannot be overemphasized. Supply chain digitalization could only boost the productivity of SMEs' firms e.g., lower operational costs, high customer satisfaction, and client retention. With most SME firm facing financial constraints, digital technologies adoption can significantly leads to an effective, agile and responsive supply chain where the lead-time can be reduced, and the availability of products can increase to enhance performance.

**H3: A significant positive relationship exists between digitalization, SCM and SMES' performance**

The analysis from the correlation statistics shows a significant positive relationship between digitalization and supply chain management (independent variable) and SMEs' performance (dependent variable). The beta value obtained is .880 implying that 88.0% variation in SMEs' performance is influenced by digitalization and supply chain management whilst about 12% variation is as a result of other variables hence, the alternation hypothesis was

rejected as we accept the study's null hypothesis H3: a significant positive relationship exists between digitalization, SCM and SMES' performance. The results are presented in table 2. Results of the study largely support extant literature. For instance, Liu *et al.* (2022) [17, 18] aver that large enterprises improve financial performance through supply chain integration after efforts spent on the digitalization of their supply chain, while SMEs improve financial performance directly through supply chain digitalization. Liu *et al.* (2022) [17, 18] also found significant relationship between supply chain digitalization and performances of SME firms. Digitalization, which is identified as the top trend in next-generation supply chain development, facilitates the distribution of products, increases organizational flexibility to changing demand or supply situations, and boosts the efficiency of the supply chain including firms in the SME sector. Also, the study of Tedeky (2022) confirmed that emerging digital technologies can improve the performance not only of firms but also of supply chains firms to enhance performance. The advert of digital technologies have impact firms operations including supply chain processes and it is obvious that the shift from a traditional supply chain to a digital supply chain appears as a competitive advantage creating sustainable value for organisations to enhance performance.

## Conclusion

The Small and Medium Enterprise (SME) sector is a Priority Programme within the Ministry of Industry, Commerce, Agriculture & Fisheries and remains a priority for the Government of Jamaica. The SME sector accounts for 80% of jobs in the Jamaican economy and SMEs contribute significantly to GDP, employment and wealth creation, poverty alleviation, female employment and social stability.

Therefore, findings of the study provide insights for managers and policymakers of SMEs in formulating appropriate implementation strategies for digital transformation.

The impact of supply chain digitalization is predominantly investigated in terms of organizational performance. Regarding the practical implications, the conceptual framework provides insights into the relationships between digitalization, supply chain management and the firms' performance helping SME firms benefit from the advantages deriving from digitalization. SME firms could reach operational efficiency and minimize their bullwhip effect by making internal processes smarter using digitalization. Therefore, managers in SMEs should embrace digitalization to support supply chains by increasing the accessibility of information, collecting real-time data, optimizing supply chain anagement practices, reducing production and transaction costs, improving the timely delivery of products to customers, and increasing both the efficiency and effectiveness of supply chain management functions. Future studies could expand the sample size for generalization of findings. Also, future could be qualitative since the current study leans to quantitative.

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