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# DIGITAL INNOVATION AND SALES PERFORMANCE OF FOOD PRODUCTS MANUFACTURING SMES IN NIGERIA

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## ABSTRACT

*This study examined digital innovation and sales performance of food products manufacturing SMEs in Nigeria. The aim of the study was to determine the relationship between digital innovation (artificial intelligence, internet of things and cloud computing) and sales performance (sales volume growth and sales revenue growth) of food products manufacturing SMEs in Nigeria. Six (6) research questions and hypotheses were developed to address the objectives of the study. The study adopted the positivist research philosophy and correlational research design. The population of this study consisted of all the 2,763 manufacturing SMEs with e-commerce in Nigeria. A sample size of 349 SMEs was used in this study. The sample size was determined using the Taro Yamene's formula. The sampling unit consisted of entrepreneurs of the selected food products manufacturing SMEs with e-commerce. The purposive sampling technique was adopted. A structured questionnaire was used to elicit data from the respondents. The data collected were analyzed statistically while the Spearman Rank Order Correlation Coefficient (rho) was used to test the hypotheses. The correlation analysis was carried out with the aid of the SPSS version 24. The findings revealed that artificial intelligence has significant relationship with sales volume growth and sales revenue growth of food products manufacturing SMEs in Nigeria. Internet of Things (IoT) was also found to have significant relationship with sales volume growth and sales revenue growth of food products manufacturing SMEs in Nigeria. The study equally revealed that cloud computing has a significant relationship with sales volume growth and sales revenue growth of food products manufacturing SMEs in Nigeria. Based on these findings, it is concluded that digital innovation has a significant relationship with the sales performance of food products manufacturing SMEs in Nigeria. Therefore, it is recommended that food products manufacturing SMEs in Nigeria should adopt digital innovation such as artificial intelligence, internet of things and cloud computing as it would improve their sales performance.*

***Keywords: Digital innovation, artificial intelligence, internet of things, cloud computing, sales performance, sales volume growth and sales revenue growth.***

## INTRODUCTION

The digital world is undergoing new developments which has affected the operations of SMEs in Nigeria. New digital technologies are emerging, thereby rendering the old technologies obsolete. Large enterprises have embraced these new digital technologies as a way of keeping pace with the new developments in the digital world. As large enterprises embraced new technologies, SMEs in the food manufacturing sector need to follow suit by acquiring new digital technologies in order to improve their sales performance and compete favourably with their larger rivals. Tsado and Santas (2018) noted that large enterprises in the food industry are making more sales than SMEs due to their large retail network and technologies. SMEs need to improve their sales performance in order to grow and survive in this industry. According to Ogwuche et al (2018), sales is the key to business growth and survival. Without sales, no business can grow or survive in a highly competitive industry. The food industry in Nigeria is highly competitive and as such every

company is strategizing to improve their sales performance. SMEs need to intensify their efforts to improve their sales performance by embracing digital innovation in all areas of operations.

Digital innovation is the creation of new and improved digital technology that solve existing business problems in a unique way (Fichman et al, 2014). Nylen and Holmstrom (2015) defined digital innovation as the development of new digital products, service and models that will solve business problems or meet unmet needs. Digital innovation is the central element of digital transformation and its implementation in business organizations is well recognized in the public sphere. A good number of digital innovations has taken place in the past few years. Some of the notable digital innovations include artificial intelligence, internet of things, augmented reality, cloud computing, additive technologies, rapid prototyping and digital double (Yoo et al, 2012; Kurilova & Antipov, 2020; Calderon-Monge & Ribeiro-Soriano, 2022). These new technologies are developed to modernize business operations, improve business processes, enhance production efficiency, give customers a pleasurable and memorable experience and improve the competitiveness of a firm (Yoo et al, 2012). A company with digital innovation orientation adopts modern digital tools, equipment and technology in their business operations (Soluk & Kammerlander, 2021).

Digital innovation needs to be practiced in the informal sector in Nigeria. According to Lamberton and Stephen (2006), digital innovation opens up new opportunities for SMEs to reach, inform, engage, sell, learn and provide services to customers. It also help SMEs to optimize and modernize their business processes and models, and provide positive customer experience which will give greater value to the business. Fitzgerald et al (2013) stated that the application of new digital technologies in SMEs provides four (4) major advantages namely; modernization of business operations, greater customer experience, new customer acquisition and the emergence of new business lines. Sprenger et al (2017) argued that a company can improve its sales performance if it innovates its digital technologies continuously. When digital innovation is well implemented in SMEs, it will result to quality product delivery, transformation of business operations, and delivery of better customer service and experience (Felicetti et al, 2023). It also enable SMEs to stream the workflows, automate their routine tasks, and deliver quality products that would give customer a positive experience and increase sales. It is against this backdrop that this study examines digital innovation and sales performance of food products manufacturing SMEs in Nigeria.

**Statement of the Problem**

The major challenge facing manufacturing SMEs in the food industry in Nigeria is how to improve their sales performance in the midst of competition from their larger rivals. Many manufacturing SMEs in the food industry in Nigeria are finding it difficult to improve their sales performance and compete favourably with their larger rivals. Large enterprises have dominated the food market for years, selling their food products to both local and international customers with the help of their large distribution networks and technologies. As large enterprises continue to dominate the food market and increasing their sales, it becomes necessary for manufacturing SMEs to intensify their efforts to modernize their operations and improve their sales performance. This can be done by embarking on digital innovation using modern digital tools, equipment and technologies such as artificial intelligence, internet of things and cloud computing to perform their business operations and give customers a pleasant and memorable experience. It is argued that digital innovation can help to improve the sales performance of food manufacturing SMEs in Nigeria but substantial empirical evidence that support this claim are lacking in literature, hence the need for this study.

## Conceptual Framework

The conceptual framework of digital innovation and sales performance of food products manufacturing SMEs is shown in figure 1.

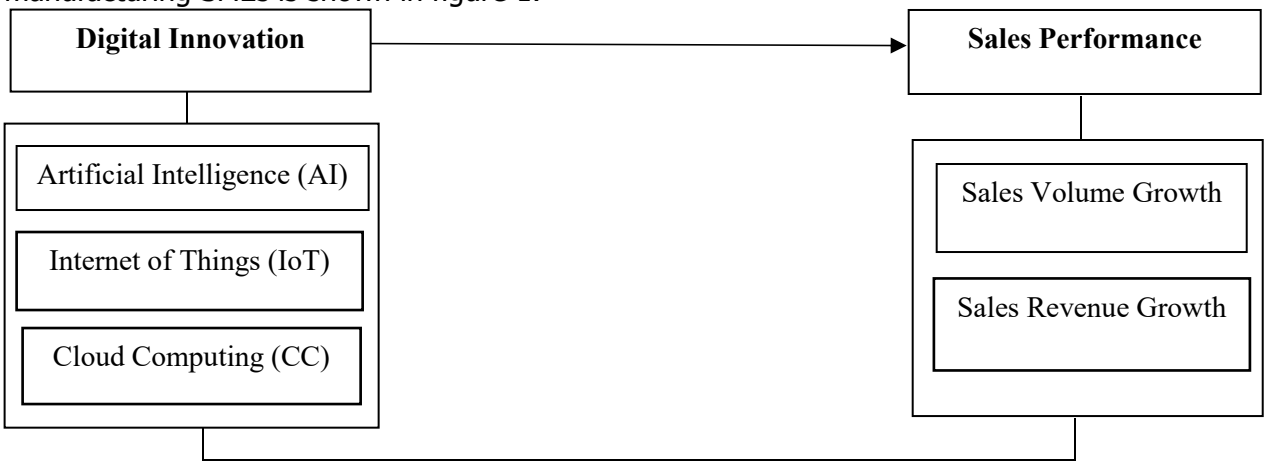


Fig 1: Conceptual framework of digital innovation and sales performance of food products manufacturing SMEs

## Aim and Objectives of the Study

The aim of this study is to examine the relationship between digital innovation and sales performance of food products manufacturing SMEs in Nigeria. The specific objectives of the study are to:

1. determine the relationship between artificial intelligence and sales volume growth of food products manufacturing SMEs in Nigeria;
2. ascertain the relationship between artificial intelligence and sales revenue growth of food products manufacturing SMEs in Nigeria;
3. find out the relationship between internet of things and sales volume growth of food products manufacturing SMEs in Nigeria;
4. determine the relationship between internet of things and sales revenue growth of food products manufacturing SMEs in Nigeria.
5. ascertain the relationship between cloud computing and sales volume growth of food products manufacturing SMEs in Nigeria;
6. determine the relationship between cloud computing and sales revenue growth of food products manufacturing SMEs in Nigeria.

## Research Questions

The following research questions are developed in the course of the study:

1. What is the relationship between artificial intelligence and sales volume growth of food products manufacturing SMEs in Nigeria?
2. To what extent does artificial intelligence relate to sales revenue growth of food products manufacturing SMEs in Nigeria?
3. How does internet of things relate to sales volume growth of food products manufacturing SMEs in Nigeria?

4. To what extent does internet of things relate to sales revenue growth of food products manufacturing SMEs in Nigeria?
5. What is the relationship between cloud computing and sales volume growth of food products manufacturing SMEs in Nigeria?
6. To what extent does cloud computing relate to sales revenue growth of food products manufacturing SMEs in Nigeria?

**Research Hypotheses**

The following hypotheses were formulated in this study:

$Ho_1$: There is no significant relationship between artificial intelligence and sales volume growth of food products manufacturing SMEs in Nigeria.

$Ho_2$: There is no significant relationship between artificial intelligence and sales revenue growth of food products manufacturing SMEs in Nigeria.

$Ho_3$: There is no significant relationship between internet of things and sales volume growth of food products manufacturing SMEs in Nigeria.

$Ho_4$: There is no significant relationship between internet of things and sales revenue growth of food products manufacturing SMEs in Nigeria.

$Ho_5$: There is no significant relationship between cloud computing and sales volume growth of food products manufacturing SMEs in Nigeria.

$Ho_6$: There is no significant relationship between cloud computing and sales revenue growth of food products manufacturing SMEs in Nigeria.

**Review of Related Literature**

**Concept of Digital Innovation**

Digital innovation is the process whereby an organization adopts modern digital technologies in their business operations to advance, compete and differentiate their products and services in the marketplace (Nylen & Holmstrom, 2015). Digital innovation is embarked upon by business firms to improve their business processes and models, customer experience as well as their overall performance (Fichman et al, 2014). Hoddap and Hanelt (2022) stated that the aim of digital innovation is to use new technologies to improve business processes and gain a competitive advantage over other competing firms in the industry. Yasa et al (2019) observed that digital innovation is a continuous effort by an organization to upgrade its digital tools, equipment and technologies to grow the business, strengthen the internal systems and improve business models to give customer a positive experience. This could be done by adopting artificial intelligence or machine learning processes to optimize data pattern recognition or when implementing cloud services (Yasa et al, 2019). This initiative promotes open-mindedness which is essential when looking for new technologies that can improve the business processes. Even after adopting a new technology, a company needs to continue to look for other areas where they can adopt digital innovation.

Digital innovation is crucial to the growth and survival of a company. According to Zarzadzania et al (2019), any company that fails to adopt emerging technology stands the risk of becoming irrelevant to customers and the implication of this is business failure. Blockbuster is a typical example of companies that fail due to its inability to embrace new technology (Zarzadzania et al, 2019). According to Zarzadzania et al (2019), Blockbuster failed to adopt new and emerging technology such as video streaming while competing with new arrival of Netflix and this was the main reason behind the downfall of the company. Shah et al (2023) argued that the adoption of new technologies helps a company to differentiate itself from competitors and make competing firms irrelevant in the industry. With the adoption of new digital technologies, companies can improve their workflows, operational efficiency and business processes (Calderon-Monge &

Ribeiro-Sariano, 2021). It also enable a company to process data with speed and accuracy (Calderon-Monge & Ribeiro-Sariano, 2021). Soluk and Kammerlander (2021) stated that a company that adopt new digital technology such as Artificial Intelligence (AI)-enabled chatbots for their users can improve customer experience. Digital innovation can help a company to improve its business processes, customer experience, data capabilities, business flexibility, and improve its competitiveness (Kurilova & Antipov, 2020).

**Dimensions of Digital Innovation**

Digital innovation takes various dimensions. However, the dimensions of digital innovation considered in this study are artificial intelligence, internet of things and cloud computing.

**Artificial Intelligence (AI)**

Artificial intelligence is defined as the intelligence of machines or software (Kurilova & Antipov, 2020). It is act of making a digital computer or software think intelligently like the human mind. As a computer science discipline, artificial intelligence studies the intelligent of machines and their abilities to perform the tasks that are usually performed by human beings (Yoo et al, 2012). It involves developing a system, machine or software that is capable of performing human intelligent functions such as the ability to reason, understand meaning, generalize and learn from past experiences (Schallmo et al, 2017). Artificial intelligence software or system is developed by carefully studying the human brain and critically analyzing the pattern and cognitive processes (Zarzadzania et al, 2019). Examples of artificial intelligence technologies are web search engines like Google search; recommendation systems which are used by Netflix, Amazon and YouTube; understanding human speech such as Google Assistant, Alexa and Siri; self-driving cars such as Waymo, creative and generative tools like ChatGPT and Al art; and superhuman play and analysis in strategy games like chess (Zarzadzania et al, 2019). Since the development of digital computer in the 1940s and the numerous innovations that have taken place, it has been established that digital computers have attained the performance levels of human beings as they can be programmed to carry out specific tasks like medical diagnosis, handwriting, voice recognition or chatbots; and complex tasks like discovering proofs for mathematical theorems or playing chess with great proficiency (Fichman et al, 2014).

Artificial intelligence is rapidly revolutionizing the business world by automating the manual and labour-intensive tasks that are associated with running a business (Kohli & Melville, 2019). For example, artificial intelligence is used in making demand forecasting, customer sentiment analysis, automated inventory management, and cashier-less technology (Roman & Rusu, 2022). Hoddap and Hanelt (2022) noted that artificial intelligence such as machine learning and predictive analytic tools can be used to collect, process and analyze data and use the information for predicting, forecasting, informing and helping entrepreneurs to make accurate decision. Advanced artificial intelligence such as advanced CRM software and interactive chat programs are also used for behavioural analysis which would help entrepreneurs to gain valuable insights into different market segments as well as improving the different touch points in customer service delivery (Shah et al, 2023). Through repeated interactions, this advanced CRM software and chat programs learn consumer's behaviour, understand their preference, develop a detailed customer profile and used the information to deliver personalized and proactive outbound marketing such as making recommendations, providing rewards and developing content (Shah et al, 2023). As digital system and software are advancing, entrepreneurs who are able to acquire new and more advanced artificial intelligence would set themselves apart from other competitors and become market leaders (Schallmo et al, 2017). The application of advanced artificial intelligence in the selling process helps entrepreneurs to manage and predict customer buying behaviour, automate

repetitive tasks, identify cross-selling and upselling opportunities and improve demand forecasting (Vey et al, 2017).

**Internet of Things (IoT)**

The internet of things has continued to transform the business world, ushering an era of operational efficiency and enhanced customer experience. The adoption of IoT in the informal sector is projected to witness significant growth due to some key drivers. Some of the key drivers in the IoT in the informal sector is the increasing demand for seamless, and Omni-channel buying experience (Korte et al, 2021). Sprenger et al (2017) posited that the IoT devices facilitate online and offline business transactions, offering customers a consistent experience across every touch point. Even the COVID-19 pandemic accelerated the adoption of IoT in the informal sector as contactless business transactions were performed for the safety of customers (Hoddap & Hanelt, 2022). Today, a good number of small and medium sized entrepreneurs adopt IoT solutions and used them to increase their customer base and grow their businesses. Entrepreneurs of all sizes can leverage IoT to automate and improve their inventory management, create more targeted marketing campaigns that are based on real-time customer data, and reduce energy consumption through smart lighting system (Soluk & Kammerlander, 2021). Nylen and Holmstrom (2015) argued that the adoption of innovative IoT technology enable entrepreneurs to create smart business and increase customer engagement with their brand through regular interaction and personalized customer experience. For example, Kodisoft interactive tablet was developed for restaurant business owners to enable their customers browse menus, make order and play games. With support from IoT Hub and machine learning, this tablet leverage customer behaviour and data trends which allow restaurant operators to increase customer engagement (Calderon-Monge & Ribeiro-Sariano, 2021). Thus, a business that is equipped with RFID tags and sensors helps the entrepreneur to monitor inventory in real-time, prevent or reduce out-of-stock situations (Yasa et al, 2019). In addition, entrepreneurs can use IoT-driven data analytic tools to gain valuable insights into customer behaviour, and optimize their warehouse layouts and placement of products for increased sales (Roman & Rusu, 2022). Srinivasan and Venkatraman (2018) argued that entrepreneurs who collaborate with IoT solution providers and adequately invest in IoT infrastructure are likely to tap into the exciting opportunities and remain competitive in the evolving business landscape.

**Cloud Computing**

Cloud computing is a digital software, platform or infrastructure that is used to deliver different types of services over the internet (Shah et al, 2023). Cloud computing is one of the digital innovations that has revolutionized the business world. It has transformed the way in which businesses carry out their operations including data storage and interaction with their customers (Schallmo et al, 2017). Cloud computing can take the form of Software as a Service (SaaS), Infrastructure as a Service (IaaS) or Platform as a Service (PaaS). Some of the cloud-driven solutions include file sharing and data storage (e.g. Dropbox), big data analysis (e.g. Civis Analytics), data governance (e.g. Carbonite) and Cyber security (e.g. force point) (Fitzgerald et al, 2013). Cloud computing is widely used in the manufacturing sector. For example, 3d printing is often used in the manufacturing sector because it provides more design flexibility and accuracy (Sprenger et al, 2017). Schallmo et al (2017) noted that manufacturers use cloud-driven solutions for managing their supply chain, logistics operations, warehouse and inventory records. Srinivasan and Venkatraman (2018) stated that SMEs in the manufacturing sector can use cloud-driven solutions to manage their inventories, customer order, customer data and give customers a positive experience. They can also use cloud-driven solutions for data storage and back-up.

With the growing demand for food products and the increased competition, manufacturing SMEs in the food industry in Nigeria need to use all the advanced digital technologies available in order to thrive. Calderon-Monge and Ribeiro-Sariano (2021) posited that SMEs can use cloud computing to simplify their workflows, reduce costs and improve customer experience. In addition, SMEs can use cloud computing to manage prices, keep track of competitors' prices, analyze historical sales trends and use the information to set competitive prices for their products (Roman & Rusu, 2022). The utilization of cloud services would enable owners of SMEs to keep real-time data, monitor and track inventories, and manage customer order (Srinivasan & Venkatraman, 2018). With the adoption of cloud-driven solutions, SMEs in the manufacturing sector can manage their warehouse remotely from anywhere because the cloud allow them to access real-time stock volume at any inventory location or delivery center (Lamberton & Stephen, 2016). Cloud-driven solutions have certain advanced analytical capabilities that allow manufacturers to understand customers' requirements based on their reviews and feedback (Nylen & Holmstrom, 2015). With this information, manufacturers can produce new products with the essential features that customers want and also decide to discontinue the products based on the feedback from customers (Nylen & Holmstrom, 2015; Schallmo et al, 2017).

**Concept of Sales Performance**

Sales performance is the outcome of the selling operations of a firm for a given period of time (Hanmaikyur, 2020). It shows how well a firm is doing in its selling operations (Ogwuche et al, 2018). Djoni et al (2016) defined sales performance as the overall accomplishment of a company in its selling activities for a given period of time. It can be assessed based on the volume of goods sold or the revenue generated from the selling operations of a company for a given period of time (Djoni et al, 2016). Sales performance of a company needs to be determined periodically. With the sales records, the company will be able to know its current sales figure and work towards improving its sales performance in the following year (Sufian et al, 2020). Ogwuche et al (2018) opined that a company can determine its sales performance by comparing its actual sales with the forecast sales for a specific period. If the actual sales for a year exceeds the sales forecast made by the company for the same period under review, the company can be said to have obtained a good sales performance; but where the actual sales made by the company falls short of the forecast sales, the company can be said to have attained a poor sales performance. Ahmed et al (2022) stated that a good sales performance is the major source of profitability growth. Besides profitability growth, good sales performance generates incomes for the expansion of the organization (Tsado & Santas, 2018). Tsado and Santas (2018) further stated that a good sales performance gives an organization a competitive advantage over its rivals in the same industry. Zang et al (2020) noted that sales performance is influenced by the number of new customers acquired as well as the number of old customers retained. According to them, if a company acquires new customers and retain the existing customers, its sales performance will improve but where the company fails to acquire new customers and the old and existing customers defect to other competing firms, the sales performance of the company will decrease drastically.

**Measures of Sales Performance**

Sales performance of firms can be measured using various criteria. For instance, Ojra et al in Ahmed et al (2022) stated sales performance can be measured in terms of unit sales volume, dollar sales volume, contribution to profit, number of new customers, and the like. In this study, sales performance is measured in terms of sales volume growth and sales revenue growth.

**Sales Volume Growth**

Sales volume growth refers to the increase in the quantity of goods sold by a company for given period of time (Groza et al, 2016). When a company experiences increase in the volume of goods

sold in the present year when compared to the previous year, it is said to have achieve sales volume growth (Groza et al, 2016). Every company strives to grow their sales volume. Zang et al (2020) stated that a firm that is able to achieve sales volume growth would experience profitability growth and business growth. Lawal and Adejuwon (2023) noted that SMEs want to achieve sales volume growth in the midst of competition from their larger rivals. This is because sales volume growth would help SMEs to grow their businesses, maximize profitability and improve their competitiveness. Silvano and Mbogo (2022) posited that growth in sales volume appears to be the key to business sustainability. According to them, no business can survive without consistently increasing its sales volume. Ojo et al (2015) maintained that sales volume indicates how well a product is doing in the marketplace against other competing brands. If the volume of sales is increasing periodically, it indicates that the product is performing in the marketplace in terms of generating sales and this sales volume growth signifies business growth and survival.

**Sales Revenue Growth**

Some companies generated revenue from various activities or investment. However, the revenue generated from the selling activities of the company is known as sales revenue. When the sales revenue grows periodically from year to year, it implies that the company is experiencing sales revenue growth (Zang et al, 2020). Therefore, sales revenue growth is the increase in the revenue generated from the selling operations of a company for specific period of time (Zang et al, 2020). Sales revenue growth is key to business growth and survival. When the sales revenue of a company is growing from year to year, it implies that the profit margin of the company is growing in the same rate and the business is expected to survive (Silvano & Mbogo, 2022). SMEs are channeling their energy and efforts towards achieving sales revenue growth because they understand the contributions of sales revenue to the overall growth and survival of their businesses (Muola, 2017; Ahmed et al, 2022). Without consistently growth in the sales revenue, it will be impossible or extremely difficult for the business to grow and survive (Muola, 2017). For this reason, every company strives to increase their sales revenue. Hanmaikyur (2020) noted that a company that is able to increase its sales revenue is likely to declare dividend consistently and attract more investors to the company.

**Theoretical Review**

This study is anchored on the innovation diffusion theory which was developed by E.M. Roger (1962). The innovation diffusion theory explains how an idea or new product gains momentum and spreads (diffuses) through a specific population or social system over time (LaMorte, 2022). The theory explains that new idea or product gains momentum among a specific population through communication which is done via a number of channels over time. The four major elements of the diffusion process are innovation, communication channels, time and social system; while the key players in the theory are the innovators, early adaptors, early adopters, early majority, late majority and laggards (LaMorte, 2022). The main focus of this theory is to see the people within the social system adopt the new ideas, behaviour or products. However, the key to adoption is based on a number of factors which include the relative advantage (the degree to which an innovation is seen to be better than the idea, program or product that it replaces), compatibility (that is, how consistent the innovation is with the values, experiences and needs of the potential adopters), complexity (how difficult the innovation is to understand and use), triability (the extent to which the innovation can be tested or experimented with before a commitment to adopt is made), and observability ( the extent to which the innovation provides tangible results) (LaMorte, 2022). It is only through this means that diffusion is possible. A typical example of this theory is digital computer. Since 1990 to date, majority of the educated professionals began to adopt this new digital technology and discover the importance of using it.

These professionals were able to demonstrate the benefits of computer and then other people began to use it.

The innovation diffusion theory is relevant in explaining the diffusion of digital innovation in the informal sector in Nigeria. The theory argues that digital innovation spreads among SMEs through the process of communication. This implies that artificial intelligence, internet of things and cloud computing as new digital technologies gain momentum through communication among entrepreneurs within the social system. The diffusion of innovation theory tends to see that more entrepreneurs within the social system adopt these new technologies. Since the development of artificial intelligence, internet of things and cloud computing technologies, majority of the entrepreneurs in developed countries have adopted them and discover the benefits of using them. As these entrepreneurs were able to show the benefits of using these new technologies, other entrepreneurs in developing countries like Nigeria have began to use them.

**Empirical Review**

Previous studies have been conducted digital innovation and sales performance of firms. For instance, Yasa et al (2019) carried out a study to determine the role of digital innovation in mediating the relationship between digital capability and business performance. The researchers adopted the survey research design where questionnaire was used to obtain data from 75 SMEs' managers in the IT sector in Denpasar city. The data collected were analyzed using Path Analytical Modeling and Sobel test technique. The findings revealed that digital capability has a significant positive relationship with business performance and that digital innovation has a significant mediating effect on the relationship between digital capability and business performance of SMEs in the IT sector in Denpasar city.

Roman and Rusu (2022) empirically examined the relationship between digital technologies and the performance of small and medium enterprises in European Union (EU) countries. Their study adopted the cross-sectional survey research design where data on SMEs were collected from 27 EU countries based on the statistics available at the European Commission, OECD and Investment Bank surveys. The data collected were analyzed using content analysis technique and the results showed that digital technologies have positive relationship with the performance of small and medium enterprises in European Union (EU) countries.

Shah et al (2023) explored the role of digital technology and digital innovation in improving firm performance in a digital economy. Their study adopted the cross-sectional survey research design and quantitative research approach. The researchers used a structured questionnaire to collect data from 396 employees in working in Pakistan's ICT companies while the Structural Equation Modeling (SEM) was used for data analysis. The findings revealed that digital capability, digital orientation and digital transformation have positive and significant relationship with firm performance. The study also found a significant positive relationship between digital innovation and firm performance. The study equally revealed that digital innovation mediates the relationship between (digital capability, digital orientation and digital transformation) and firm performance.

Zarzadzania et al (2019) examined digital innovation as the key factor in changing organizational identity into a digital organizational identity. Their study adopted the survey research design where interview was used to collect data from 71 managers of large manufacturing firms in Slovenia. The data collected were analyzed using thematic analysis. The findings revealed that digital innovation such as artificial intelligence, internet of things and cloud computing technologies are capable of changing organizational identity into a digital organizational identity. The study also revealed that digital innovation has positive impact on organizational performance.

Kurilova and Antipov (2020) carried out a research to determine the impact of digital innovation on company performance in Russia. The researchers utilized addictive technologies, internet of things, rapid prototyping, cloud computing, big data and digital double as their dimensions of digital innovation and relate them to company performance. Their study employed the qualitative research approach where data were collected from secondary sources. The data collected were analyzed using content analysis technique and the findings showed that digital innovation has positive impact on company performance.

Corvello et al (2022) explored the impact of digital transformation on the works of owners of entrepreneurial firms. Their study adopted the multiple case study design where eight (8) cases of entrepreneurial firms were studied. The firms include both small and medium sized firms with high and low technology in India. The data for the study were collected from owners of entrepreneurial firms through semi-structured questionnaire and interview. The data collected were analyzed in a structural way using both within and cross-cases analytical tools. The findings revealed that the daily work of entrepreneurs have been transformed digitally. The study also revealed that the use of different digital tools is interrelated and largely depends on the dynamic nature and characteristics of the business environment.

**Gap in Reviewed Literature**

From the literature reviewed, two major gaps were noted. First, it was observed that none of the previous studies conducted on digital innovation relate the concept and its dimensions (artificial intelligence, internet of things and cloud computing) to sales performance of firms. Secondly, it was observed that most of the studies conducted on digital innovation and performance focused on the IT sector in Denpasar city and India as well as large manufacturing companies in Slovenia while empirical studies that examined the relationship between digital innovation and sales performance of food products manufacturing SMEs in Nigeria are lacking. This has created a gap in literature which this study intends to fill to broaden the knowledge on digital innovation from the Nigerian perspective.

**METHODOLOGY**

This study is a positivist research and correlational study. The population of this study consisted of all the 2,763 manufacturing SMEs with e-commerce in Nigeria (SMEDAN and National Bureau of Statistics, 2017). A sample size of 349 e-commerce manufacturing SMEs was used in this study. The sample size was determined using the Taro Yamene's formula. The 349 manufacturing SMEs was selected purposively based on the criteria that they manufacture food products and adopt e-commerce in their business operations. The sampling unit consisted of entrepreneurs of the selected food products manufacturing SMEs in Nigeria. The data were collected through the administration of questionnaire to the respondents. The questionnaire was made up of 25 items with structured responses such as Strongly Agree, Agree, Disagree and Strongly Disagree. The four (4) rating scales of responses were assigned numerical values to show their weight such as Strongly Agree = 4, Agree = 3, Disagree = 2 and Strongly Disagree = 1. The questionnaire was validated and its reliability was determined using Cronbach Alpha method. Having validated and confirmed the reliability of the instrument, the questionnaire was administered to the respondents (entrepreneurs) across selected states in Nigeria with the aid of five (5) trained research assistants. A total of 349 copies of questionnaire was distributed to the respondents and 288 copies were collected. The data collected were analyzed statistically while the hypotheses were tested using Spearman Rank Order Correlation Coefficient (rho). The correlation analysis was carried out using the SPSS version 24 and the results were presented and discussed in relation to previous studies.

## RESULTS AND DISCUSSION

The results of the correlation analysis carried out on digital innovation and sales performance were presented in this section. The data collected on digital innovation dimensions such as artificial intelligence, internet of things and cloud computing were correlated with those data obtained on sales performance measures such as sales volume growth and sales revenue growth of food products manufacturing SMEs using the SPSS version 24. The results are presented in the tables below:

**Table 1: Result of correlation analysis between artificial intelligence and sales volume growth of food products manufacturing SMEs**

| | | | Artificial Intelligence | Sales Volume Growth |
|---|---|---|---|---|
| Spearman (rho) | Artificial Intelligence | Correlation Coefficient | 1.000 | .622** |
| | | Sig. (2 tailed) | . | .001 |
| | | N | 288 | 288 |
| | Sales Volume Growth | Correlation Coefficient | .622** | 1.000 |
| | | Sig. (2 tailed) | .001 | . |
| | | N | 288 | 288 |

**Correlation is significant at 0.01 levels (2 tailed)
*Correlation is significant at 0.05 levels (2 tailed)

Source: SPSS Generated Output

Table 1 contains the result of the correlation analysis carried out between artificial intelligence and sales volume growth of food products manufacturing SMEs in Nigeria. The result shows that artificial intelligence is strongly and positively correlated to sales volume growth of food products manufacturing SMEs (rho = .622**) and this correlation is significant at 0.01 level as indicated by the symbol **. Based on this result, the null hypothesis ($Ho_1$) is rejected and the alternate hypothesis is accepted. This implies that we then accept that there is significant relationship between artificial intelligence and sales volume growth of food products manufacturing SMEs in Nigeria.

**Table 2: Result of correlation analysis between artificial intelligence and sales revenue growth of food products manufacturing SMEs**

| | | | Artificial Intelligence | Sales Revenue Growth |
|---|---|---|---|---|
| Spearman (rho) | Artificial Intelligence | Correlation Coefficient | 1.000 | .717** |
| | | Sig. (2 tailed) | . | .001 |
| | | N | 288 | 288 |
| | Sales Revenue Growth | Correlation Coefficient | .717** | 1.000 |
| | | Sig. (2 tailed) | .001 | . |
| | | N | 288 | 288 |

**Correlation is significant at 0.01 levels (2 tailed)
*Correlation is significant at 0.05 levels (2 tailed)

Source: SPSS Generated Output

Table 2 shows the result of the correlation analysis carried out between artificial intelligence and sales revenue growth of food products manufacturing SMEs in Nigeria. The result indicates that artificial intelligence has a strong and positive correlation with sales revenue growth of food

products manufacturing SMEs (rho = .717**) and this correlation is significant at 0.01 level as indicated by the symbol **. Therefore, the null hypothesis ($Ho_2$) is rejected and the alternate hypothesis is accepted. This means that we then accept that there is significant relationship between artificial intelligence and sales revenue growth of food products manufacturing SMEs in Nigeria.

**Table 3: Result of correlation analysis between Internet of Things (IoT) and sales volume growth of food products manufacturing SMEs**

| | | | Internet of Things (IoT) | Sales Volume Growth |
|---|---|---|---|---|
| Spearman (rho) | Internet of Things (IoT) | Correlation Coefficient | 1.000 | .769** |
| | | Sig. (2 tailed) | . | .001 |
| | | N | 288 | 288 |
| | Sales Volume Growth | Correlation Coefficient | .769** | 1.000 |
| | | Sig. (2 tailed) | .001 | . |
| | | N | 288 | 288 |

**Correlation is significant at 0.01 levels (2 tailed)
*Correlation is significant at 0.05 levels (2 tailed)

Source: SPSS Generated Output

Table 3 presents the result of the correlation analysis carried out between Internet of Things (IoT) and sales volume growth of food products manufacturing SMEs in Nigeria. The result shows a strong and positive correlation between Internet of Things (IoT) and sales volume growth of food products manufacturing SMEs (rho = .769**) and the symbol ** indicates that this correlation is significant at 0.01 level. Based on this result, the null hypothesis ($Ho_3$) is rejected and the alternate hypothesis is accepted. This implies that there is significant relationship between Internet of Things (IoT) and sales volume growth of food products manufacturing SMEs in Nigeria.

**Table 4: Result of correlation analysis between Internet of Things (IoT) and sales revenue growth of food products manufacturing SMEs**

| | | | Internet of Things (IoT) | Sales Revenue Growth |
|---|---|---|---|---|
| Spearman (rho) | Internet of Things (IoT) | Correlation Coefficient | 1.000 | .705** |
| | | Sig. (2 tailed) | . | .001 |
| | | N | 288 | 288 |
| | Sales Revenue Growth | Correlation Coefficient | .705** | 1.000 |
| | | Sig. (2 tailed) | .001 | . |
| | | N | 288 | 288 |

**Correlation is significant at 0.01 levels (2 tailed)
*Correlation is significant at 0.05 levels (2 tailed)

Source: SPSS Generated Output

Table 4 depicts the result of the correlation analysis carried out between Internet of Things (IoT) and sales revenue growth of food products manufacturing SMEs in Nigeria. The result indicates that Internet of Things (IoT) has a strong and positive correlation to sales revenue growth of food products manufacturing SMEs (rho = .705**) and the symbol ** indicates that this correlation is significant at 0.01 level. Consequently, the null hypothesis ($Ho_4$) is rejected and the alternate hypothesis is accepted. This means that there is significant relationship between Internet of Things (IoT) and sales revenue growth of food products manufacturing SMEs in Nigeria.

**Table 5: Result of correlation analysis between cloud computing and sales volume growth of food products manufacturing SMEs**

| | | | Cloud Computing | Sales Volume Growth |
|---|---|---|---|---|
| Spearman (rho) | Cloud Computing | Correlation Coefficient | 1.000 | .638** |
| | | Sig. (2 tailed) | . | .001 |
| | | N | 288 | 288 |
| | Sales Volume Growth | Correlation Coefficient | .638** | 1.000 |
| | | Sig. (2 tailed) | .001 | . |
| | | N | 288 | 288 |

**Correlation is significant at 0.01 levels (2 tailed)
*Correlation is significant at 0.05 levels (2 tailed)

Source: SPSS Generated Output

Table 5 presents the result of the correlation analysis carried out between cloud computing and sales volume growth of food products manufacturing SMEs in Nigeria. The result shows a strong and positive correlation between cloud computing and sales volume growth of food products manufacturing SMEs (rho = .638**) and the symbol ** indicates that this correlation is significant at 0.01 level. Based on this result, the null hypothesis ($Ho_5$) is rejected and the alternate hypothesis is accepted. This implies that there is significant relationship between cloud computing and sales volume growth of food products manufacturing SMEs in Nigeria.

**Table 6: Result of correlation analysis between cloud computing and sales revenue growth of food products manufacturing SMEs**

| | | | Cloud Computing | Sales Revenue Growth |
|---|---|---|---|---|
| Spearman (rho) | Cloud Computing | Correlation Coefficient | 1.000 | .693** |
| | | Sig. (2 tailed) | . | .001 |
| | | N | 288 | 288 |
| | Sales Revenue Growth | Correlation Coefficient | .693** | 1.000 |
| | | Sig. (2 tailed) | .001 | . |
| | | N | 288 | 288 |

**Correlation is significant at 0.01 levels (2 tailed)
*Correlation is significant at 0.05 levels (2 tailed)

Source: SPSS Generated Output

Table 6 contains the result of the correlation analysis carried out between cloud computing and sales revenue growth of food products manufacturing SMEs in Nigeria. The result shows that cloud computing is strongly and positively correlated to sales revenue growth of food products manufacturing SMEs (rho = .693**) and the symbol ** indicates that this correlation is significant at 0.01 level. As a result of this, the null hypothesis ($Ho_6$) is rejected and the alternate hypothesis is accepted. This means that there is significant relationship between cloud computing and sales revenue growth of food products manufacturing SMEs in Nigeria.

**Discussion of Findings**

This study found a significant relationship artificial intelligence and sales volume growth of food products manufacturing SMEs in Nigeria. This finding was deduced from the result of the correlation analysis carried out on the two variables. The result revealed that artificial intelligence is strongly and positively correlated to sales volume growth of food products manufacturing SMEs (rho = .622**) and this correlation is significant at 0.01 level (see table 1). Based on this result,

the null hypothesis ($Ho_1$) was rejected and the alternate hypothesis was accepted. This implies that there is significant relationship between artificial intelligence and sales volume growth of food products manufacturing SMEs in Nigeria. This finding is supported by Calderon-Monge and Ribeiro-Sariano (2021) which reported that artificial intelligence has the capability of increasing the sales of business firms. Hoddap and Hanelt (2022) also supported this finding when they revealed that companies that utilize artificial intelligence are likely to experience sales growth.

This study also found a significant relationship between artificial intelligence and sales revenue growth of food products manufacturing SMEs in Nigeria. This finding emerged from the result of the correlation analysis carried out on the two variables. The result revealed that artificial intelligence has a strong and positive correlation with sales revenue growth of food products manufacturing SMEs (rho = .717**) and this correlation is significant at 0.01 level (see table 2). Therefore, the null hypothesis ($Ho_2$) was rejected and the alternate hypothesis was accepted. This means that we then accept that there is significant relationship between artificial intelligence and sales revenue growth of food products manufacturing SMEs in Nigeria. This finding is consistent with the research conducted by Roman and Rusu (2022) which reported that artificial intelligence contributes significantly in boost the sales volume of firms. Yasa et al (2019) also agreed with this finding when they revealed that artificial intelligence enable companies to improve their sales performance.

This study equally reported a significant relationship between Internet of Things (IoT) and sales volume growth of food products manufacturing SMEs in Nigeria. This finding emanated from the result of the correlation analysis carried out on the two variables. The result showed a strong and positive correlation between Internet of Things (IoT) and sales volume growth of food products manufacturing SMEs (rho = .769**) and this correlation is significant at 0.01 level (see table 3). Based on this result, the null hypothesis ($Ho_3$) was rejected and the alternate hypothesis was accepted. This implies that there is significant relationship between Internet of Things (IoT) and sales volume growth of food products manufacturing SMEs in Nigeria. This finding is in line with the research conducted by Shah et al (2023) which reported that companies are likely to improve their sales performance if they adopt internet of things. Fichman et al (2014) also supported with this finding when they stated that the internet of things helps companies to achieve sales growth.

This study discovered a significant relationship between Internet of Things (IoT) and sales revenue growth of food products manufacturing SMEs in Nigeria. This finding was obtained from the result of the correlation analysis carried out on the two variables. The result showed that Internet of Things (IoT) has a strong and positive correlation to sales revenue growth of food products manufacturing SMEs (rho = .705**) and this correlation is significant at 0.01 level (see table 4). Consequently, the null hypothesis ($Ho_4$) was rejected and the alternate hypothesis was accepted. This means that there is significant relationship between Internet of Things (IoT) and sales revenue growth of food products manufacturing SMEs in Nigeria. This finding is supported by Korte et al (2021) who noted that internet of things has significant influence on sales performance of firms. Yoo et al (2010) also agreed with this finding when they revealed that companies can achieve sales revenue growth if they create business that encourage the internet of things.

This study found a significant relationship between cloud computing and sales volume growth of food products manufacturing SMEs in Nigeria. This finding emerged from the result of the correlation analysis carried out on the two variables. The result showed that a strong and positive correlation between cloud computing and sales volume growth of food products manufacturing SMEs (rho = .638**) and this correlation is significant at 0.01 level (see table 5). Based on this

result, the null hypothesis ($Ho_5$) is rejected and the alternate hypothesis is accepted. This implies that there is significant relationship between cloud computing and sales volume growth of food products manufacturing SMEs in Nigeria. This finding is supported by Schallmo et al (2017) who noted that cloud computing has positive influence on sales performance of business firms. Kurilova and Antipov (2020) also agreed with this finding when they revealed that companies can increase the sales volume through the adoption of cloud computing.

Finally, it was reported that cloud computing has a significant relationship with sales revenue growth of food products manufacturing SMEs in Nigeria. This finding emanated from the result of the correlation analysis carried out on the two variables. The result showed that cloud computing is strongly and positively correlated to sales revenue growth of food products manufacturing SMEs (rho = .693**) and this correlation is significant at 0.01 level. As a result of this, the null hypothesis ($Ho_6$) was rejected and the alternate hypothesis was accepted. This means that there is significant relationship between cloud computing and sales revenue growth of food products manufacturing SMEs in Nigeria. This finding is supported by Yoo et al (2012) who noted that cloud computing has the capability of increasing the sales revenue of business firms. Fitzgerald et al (2013) also agreed with this finding when they revealed that companies can use cloud computing to improve their sales performance and achieve business growth.

## CONCLUSION

From the findings, it was concluded that digital innovation has the capability of improving the sales performance of food products manufacturing SMEs in Nigeria. The adoption of digital innovation such as artificial intelligence, internet of things and cloud computing has been proved to be a significant tool for improving the sales performance of food products manufacturing SMEs in Nigeria. The study confirmed that sales performance of food products manufacturing SMEs can be improved through the adoption of artificial intelligence, internet of things and cloud computing. When digital innovation is implemented by food products manufacturing SMEs, the problem of poor sales performance of the firms will be resolved as SMEs in the food products manufacturing sector will experience massive increase in their sales volume and sales revenue.

## RECOMMENDATIONS

The following recommendations are provided for the study:

1. That, food products manufacturing SMEs in Nigeria should adopt artificial intelligence such as web search engines like Google search; recommendation systems which are used by Netflix, Amazon and YouTube; and generative tools like ChatGPT and Al art as it would improve their business processes and models, give customer a positive experience and improve their sales performance.
2. That, food manufacturing SMEs in Nigeria should adopt innovative IoT technology as it would enable them create a smart business, interact with customers regularly, personalize customer experience and increase customer engagement with their brand.
3. That, entrepreneurs in the food manufacturing sector in Nigeria should adopt Kodisoft interactive tablet with support from IoT Hub and machine learning as it would not only enable their customers browse menus and make order but would also enable them (entrepreneurs) understand customer behaviour and data trends which will help to increase customer engagement and sales.
4. That, entrepreneurs of food products manufacturing SMEs in Nigeria should equip their business with RFID tags and sensors as it would enable them monitor inventory in real-time and prevent out-of-stock situations.
5. That, entrepreneurs in the food products manufacturing sector in Nigeria should use IoT-driven data analytic tools in their business operations as it would enable them gain

valuable insights into customer behaviour, and optimize their warehouse layouts and placement of products for increased sales

6. That, entrepreneurs should collaborate with IoT solution providers and adequately invest in IoT infrastructure as it would enable them tap into the exciting opportunities and remain competitive in the evolving business landscape.
7. That, entrepreneurs in the food products manufacturing sector in Nigeria should adopt cloud computing technology such as 3d printing in their manufacturing operations as it would make their design more flexible and accurate.
8. That, food products manufacturing SMEs in Nigeria should use cloud-driven solutions to manage their inventories, customer data, customer order and logistics operations as it would give customers a positive experience and improve their sales performance.
9. Finally, it is recommended that food products manufacturing SMEs in Nigeria should adopt cloud-driven solutions in their file sharing and data storage (e.g. Dropbox), big data analysis (e.g. Civis Analytics), data governance (e.g. Carbonite) and Cyber security (e.g. force point) as it would improve their data storage and back-up as well as their interaction with their customers.

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