DIGITAL TRANSFORMATION AND SUPPLY CHAIN PERFORMANCE OF FAST-MOVING CONSUMER GOODS MANUFACTURING FIRMS IN KENYA

BY

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A RESEARCH PROJECT REPORT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE, UNIVERSITY OF NAIROBI

NOVEMBER 2023

DECLARATION

This research project is my work and has not been presented to any academic institution for examination purposes

Signature……MWG…… Date……29/11/2023……

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D67/37244/2020

This research project has been submitted for examination with my approval as the university supervisor.

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DEDICATION

I dedicate this project to my family for unconditional love, inspiration, encouragement and unending support throughout my academic journey.

ACKNOWLEDGMENT

I want to thank God for His strength during my studies and for providing the strength to complete my master's degree.

I also want to thank my family who offered emotional and financial assistance that I needed during my studies.

Lastly, I would also like to thank my lecturers at the University of Nairobi, particularly my supervisor Ernest Akelo, for his guidance and supervision during my research project.

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ABBREVIATIONS AND ACRONYMS

AOTS	Association for Overseas Technical Cooperation and Sustainable Partnerships
CDO	Chief Data Officer
CEO	Chief Executive Officer
CRM	Customer Relationship Management
ERP	Enterprise Resource Planning
FMCGs	Fast-Moving Consumer Goods
GDP	Gross Domestic Product
IOTs	Internet of Things
IT	Information Technology
KAM	Kenya Association of Manufactures
KNBS	Kenya National Bureau of Statistics
M	Mean
NSE	Nairobi Stock Exchange
RBV	Resource-Based View
RPA	Robotic Process Automation
SCM	Supply Chain Management
SCP	Supply Chain Performance
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
TAM	Technology Acceptance Model

ABSTRACT

In the era of technological advancements, there is an increased desire to modernize supply chain processes with new solutions with objectives to enhance operational efficiencies. Digital transformation continues to penetrate different spheres of business operations, with increasing advances in digital applications for diverse business processes. This has seen increased integration of digital solutions in processes including supply chain operations. The purpose of this study was to determine how digital transformation has impacted supply chain performance of Fast-Moving Consumer Goods (FMCGs) manufacturing firms in Kenya. Supply chain processes have attracted increased interest and scrutiny considering increased breakthroughs and technological advances. There has been little investigation on the effect of digital transformation on supply chain performance, which warranted the need for this study. The study examined digital tools, innovation and automation as digital transformation variables and their effect on supply chain performance for FMCGs manufacturing firms. The study employed descriptive research design with the target population being all FMCGs manufacturing firms in Kenya. Simple random sampling technique was used with a sample size of 95 FMCGs manufacturing firms within Nairobi which are licensed and registered by KAM since 80% of firms registered by the KAM are located within Nairobi. Supply chain managers in these firms were the unit of analysis and a structured questionnaire with closed-ended questions was used as tool for data collection. Both descriptive and multiple regression techniques were used in data analysis. The study found that digital tools which include social media platforms, analytical tools, artificial intelligence and websites have been utilized by FMCGs manufacturers. Innovation and automation also influenced supply chain operations and performance of FMCGs manufacturers. The study concluded that digital transformation has contributed towards enhancing supply chain performance of FMCGs manufacturers resulting in; reduced operational costs, enhanced levels of operational efficiency, increased operational speeds and enhanced product quality. The study recommends FMCGs manufacturing firms to increase funding towards upscale of present digital platforms for them to continue accruing increased performance on supply chain processes. The study also recommends increased training and capacity development in digital applications to build a sufficient workforce with up-to-date skills on digital processes for FMCGs manufacturing operations.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Tamara (2018) stated that the next era in supply chain management (SCM) is being ushered in by digital transformation, where stakeholders connect in entirely new ways, causing a disruption and doing away with conventional company structures. The aim of digital transformation can be explored from different perspectives as they focus on innovation in the current procedures, products and different organizational functions. The digital era has improved supply chains, the Covid 19 pandemic especially increased this transformation globally. Helo (2016) noted that various organizations are trying to achieve efficiency and increase their agility and flexibility to acquire value in the industry to satisfy the ever-changing customers' needs and market volatility. Ullah (2019) observed that companies can reduce time spent on development of products, create innovation and become more flexible. Martinez (2020) noted that the use of technology is not transformational if it does not influence the entire company's way of conducting operations, system, way of thinking, culture and drives the evolution of the entire business model. Kane (2014) indicated that despite acknowledged advantages, the simple use of technology is not enough. Globally, talent and experience exist over a large area. However, firms are not able to follow innovation freely despite their capability (Burchardt & Maisch, 2019).

This study was founded on two theories, one is the Diffusion of Innovations Theory (DOI) that elaborates the push an idea or product information gains and communicates in a particular community or population. As a result of this communication, people existing in the said community take on the innovation, behavioral change or the planned product information (Rogers, 1995). The DOI theory is usually seen as an important change model for showing digital innovation where it is changed and shown in ways that satisfy the requirements across all degrees of adopters. Emphasis is also put on the value of peer networking and communication within the implementation process (Rogers, 1962). The second theory is Technology Acceptance Model (TAM) which is a major research model in research of factors of IT and information systems willingness to predict intention and acceptance of information systems and IT by individuals. The theory states that two key factors affect the implementation of digital resources in a firm, namely convenience and functionality. TAM assumes that application of digital solutions in an organization is contingent on two major elements: perceived usefulness and ease of use. In the past

years TAM has been considered as a major theory by the IT industry (Lucas & Spitler, 1999; Venkatesh & Davis, 2000).

Chia (2009) stated that the criteria of measuring performance should be based on the objectives of an organization and have a precise scope to ensure sufficient data collection and analysis. The different reasons for developing supply chain performance metrics are distinguishing success, knowing if consumers are getting satisfied, ensuring good decision making, tracking progress and finding out any challenges to identify areas of improvement. Firms in the FMCGs sector function in a very cut-throat and multiplex environment, this has pushed them to make sure availability of their products to safeguard their market dominance since customers can substitute their merchandise with those of their rival companies. Conventional supply chain is irrelevant to companies trying to control the volatile market and the ever-changing consumer needs; rather, they need to have precise and prompt information to thrive in the dynamic market (Tissayakorn, Akagi, & Song, 2013). Digital transformation has aided FCMGs organizations by providing comprehensive information promptly to reinforce effective decision making, improved business processes and increased productivity.

1.1.1 Digital Transformation

Schwertner (2017) defined Digital Transformation (DT) as the use of digital tools to create modern strategic business plans, systems and programs that lead to increased revenue, competitive edge, and more adaptability. Bloomberg (2018) stated that digital transformation requires the company to handle change in a better way, resulting in change being a main competency as the business becomes consumer driven. Such flexibility will promote ongoing digitalization plans but should not be disorganized with them. Taghipour (2014) noted that the conventional view of the linear supply chain and its development for firms is paving a path to digital supply networks, where business divisions are separated within the enterprise and all stakeholders are linked to the whole supply network, allowing for full visibility, responsiveness, involvement and flexibility. To anticipate changes and restructure themselves properly, digital supply networks are created to mitigate the impact. Digital transformation is determined by the combination of many digital tools, which is an inevitable revolution. Digitization of supply chain leads to decrease in inefficiencies and cost reduction while increasing agility—main drivers for advancing resiliency.

Chopra and Meindl (2013) observed that the accessibility of real-time data has exploded in most supply chains with digitalization as the driver leading to the emergence of tools and software mainly focused on improving strategy and planning decisions. There are important possibilities that still exist to come up with systems that enable: the automation of supply chain processes, such as order tracking and fulfilment, and the creation of fast observations depending on actual information to validate supply chain stakeholders, for example those warehousing and logistics. This enables smarter and faster decisions to be made that can be revised every so often. Martinez (2020) stated that the use of technology is not transformational if it does not influence the entire company's way of conducting operations, system, way of thinking, culture and drives the evolution of the whole business model. Despite acknowledged advantages, simple use of digital tools is not enough (Kane, 2014). Globally, talent and experience exist over a large area. However, firms are not able to follow innovation freely despite their capability (Burchardt & Maisch, 2019).

1.1.2 Supply Chain Performance

Agami (2012) defined metrics of performance in SCM as an approach that indicates if supply chain organizations have improved or reduced. To evaluate the capability of the supply chain system, short chain supply performance can be streamlined. A system was created by Beamon (1999) where supply chain performance indicators included three categories of capability of production, capability and flexibility. Ogunyemi and Ibrahim (2012) were of the opinion that there is still no single statement from earlier academics concerning the best supply chain performance indicators. For example, to measure supply chain performance Hong and Jeong (2007) endorsed efficiency, responsiveness, delivery reliability, cost and flexibility as indicators. In the same year Lee (2007) used dependability and cost management measures to perform the same evaluation. supply chain performance was measured by Sezen (2008) by examining resource performance, production and flexibility. To measure supply chain performance Vanichchinchai and Igel (2009) choose responsiveness, flexibility and variable of cost.

Gunasekaran (2004) added that many companies recently are continually left out in ongoing improvement in the supply chain. Lack of outlining the performance metrics and indicators is one of the causes that firms are not able to succeed in utilizing their supply chain. In accordance with these publications academics thus resolved to endorse three supply chain performance measures: first, resource indicators associated with the ability of utilizing resources in supply chains, for

example inventory levels and cost. Production output is the next indicator which involves customer response time, timely delivery time and flexibility indicators. Manufacturing firms of FMCGs encounter the issue of how to give cost-effective and efficient responses to have the upper hand in the dynamic environment. To identify the idea of measurement of performance, all aspects of SCM performance have to be examined at the same time. Measurement of the effects of SCM performance is also important because they influence a company's performance (Green, McGaughey & Casey, 2006). Consumer responsiveness time is a vital performance indicator of the supply chain since it entails the delivery lead time and the order placement lead time. This element is implemented regarding the potential of the supply chain to react to a shift in consumer demand and achieve timely orders (Beamon, 1999; Edget & Snow 1997; Uncles, Dowling, & Hammond, 2003). This research project strived to assess the impact of digital transformation in supply chain performance of manufacturing firms of FMCGs in Kenya.

1.1.3 Fast-Moving Consumer Goods Manufacturing Firms in Kenya

Ogunlela (2018) observed that the FMCG industry constitutes part of the biggest sectors globally. The industry is mainly made up of firms that provide products that are affordable and in regular demand. FMCGs can be defined as goods that sell very quickly without attracting a huge cost. They can also be described as vital or nonvital products that are bought regularly, and they also have a short shelf-life. FMCGs short shelf life is because most of these goods are perishable and get bad rapidly. Consumables, cosmetics, processed foods, soft drinks, plastic goods, shaving products, soaps, detergents, toiletries, glassware and batteries among others are some of the wide ranges of products categorized as FMCGs (Mandrinos, 2014). According to Obwocha and Osoro (2023) there are 95 FMCGs manufacturing firms in Nairobi, Kenya. In recent years the FMCGs industry in Kenya has been experiencing rapid growth due to many firms, both local and foreign, getting into the manufacturing sector to take a stake of the market.

Wasamba (2018) The FMCG industry mainly consists of companies providing inexpensive goods on demand and performs outstandingly during inflation periods as customers stop spending on luxury to get necessities. Industry has also contributed to offering employment opportunities, which has in turn contributed to the growth of the economy. International main firms in the FMCG industry include Jonson & Johnson, Unilever, Diageo, Procter & Gamble and Coca-Cola. The main companies in Kenya are BAT, Nestle, Bidco, Unga Ltd, Diageo, Procter & Gamble and Coca

Cola. The classification of FMCGs includes Personal hygiene, liquid refreshment, household cleaning utensils, food and liquid refreshment (KPMG, 2006). Wasonga (2012) noted that some local FMCGs firms are experiencing challenges due to more innovation and added competition in the market which has resulted in some of the goods to be out of date. According to Graham and Frankenberger (2015), FMCG companies have been facing a lot of difficulties in the past two decades, which include competition, economic decline and public relations problems. Most FMCGs firms are experiencing operational challenges such as Kenya Airways, Mumias Sugar Company and Sony sugar company (Letting & Muthoni, 2013; Chesula & Nkobe, 2018). These challenges can be resolved through implementation of digital tools which will influence supply chain performance and improve organization performance.

1.2 Research Problem

A broad range of industries have been disrupted by digital transformation, specially manufacturing, medical healthcare, banking, telecommunication and automotive (Nadeem, 2018). Ortstad and Sonono (2017) conducted research for a sizable bank in Sweden on how consumer relationship management is impacted by digital transformation. The results of the research identified improved satisfaction with digitally aligned consumers due to the relationship with consumers becoming more automated and less personalized. Wanjihia (2021) did a study on the effect of digital transformation on performance in the industry of paint manufacturers in Kenya. The study concluded that 43.2% of the performance of the manufacturers of paint in Kenya could be as result of the magnitude of change in management and digital intensity. A study was done by Jayabalan, Makhbul, Nair and Subramaniam (2021) on how digitalization has impacted human resource management (HRM) strategies in the industry of vehicle manufacturing. The results of the research identified that the present and future needs of industrial revolution and digitization technologies are related to HRM practices in manufacturing the industry.

Banga (2019) conducted a study with documented observation from the manufacturing organizations in India value capture and digital technologies. The conclusion was that companies that have great levels of an experienced workforce and digital potential had an estimate of 4-5% better products compared to their counterparts with low levels of an experienced workforce and digital potential. Mulumbi (2021) did research on the how the growth of life insurance organizations registered in the Nairobi stock exchange (NSE) in Kenya have been affected by

digitalization. The research established that the development of life insurance organizations did not have any relation with the internal efficiency aspect of digitalization. A comprehensive literature review on the impact of digital transformation by Nadeem (2018); Ortstad and Sonono (2017); Wanjihia (2021); Jayabalan et al. (2021); Banga (2019) and Mulumbi (2021) show that most research has focused on digital transformation in different industries and regions. In recent years digital transformation has gained more attention from researchers and scholars, However, there is minimal research on digital transformation in FMCGs manufacturing firms. Past studies failed to provide a link between digital transformation and FMCGs manufacturing companies in Nairobi, Kenya. This necessitated the need for this study to close the existing gap.

1.3 Research Objectives

The general objective of the research was to determine the impact of digital transformation on supply chain performance in manufacturing firms of FMCGs in Kenya.

The objectives of the study included:

i. To establish the degree of adoption of digital transformation in the supply chain operations of Manufacturing organizations of FMCGs in Kenya.
ii. To determine the drivers of digital transformation in manufacturing companies of FMCGs in Kenya.
iii. To establish the effect of digital transformation on supply chain performance of manufacturing companies of FMCGs in Kenya.

1.4 Value of the Study

This research aimed to give an idea on the drivers and effects of digital transformation on supply chain performance together with the degree that digital transformation has been implemented by manufacturing organizations of FMCGs in Kenya. The study findings provided practical recommendations whose application by supply chain managers of manufacturing firms of FMCG will accrue enhanced levels of supply chain performance. The findings will offer supply chain managers access to regional market, crucial success elements and solutions to problems experienced in the Kenyan market through successful digital transformation in SCM. The research builds on the current knowlege on digital transformation in supply chain performance and submits recommendations on areas that require further study and examination by researchers in the future

so as to derive important deductions by supply chain students and professionals. Findings arrived in this study enriches existing knowledge on digital transformation as an enabler of SCM activities, and its impact on digital transformation on supply chain performance especially in manufacturing organizations of FMCGs in Nairobi, Kenya.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The chapter was centered towards various elements of digital transformation and how they have impacted SCM performance of manufacturing companies of FMCGs in Nairobi, Kenya. We reviewed various studies previously carried out regarding the influence of digital transformation on supply chain performance with a specific interest on manufacturing organizations of FMCGs in Kenya. The segments of this chapter incorporated a greater perspective of effects of digital transformation on supply chain performance, drivers of digital transformation within manufacturing companies of FMCGs in Kenya and the degree of adoption of digital transformation in the supply chain operations of Manufacturing firms of FMCGs. The chapter also provided a comprehensive conceptual framework.

2.2 Theoretical Foundation

The research was built off two theories, DOI theory and TAM since their exponents' explanations align with the topic in expounding digital transformation and supply chain performance of manufacturing organizations of FMCGs in Nairobi, Kenya.

2.2.1 Diffusion of Innovation Theory

Toews (2003) noted that the DOI was examined first by the French sociologist Gabriel Tarde in 1903. Later, Ryan and Gross (1943) established the adopter categories that were used again in the current theory that has been advocated by Everett Rogers. Introduction of the idea of opinion leaders, followers and media interaction to influence these groups has been credited to (Katz,1957). Rogers (1962) is the exponent of DOI theory, that originated from the area of poetic research, communication function to explain the flow a design gets and disseminates in a specific community. Due to this dissemination, the population in that community implement the new design and modify their actions. The implementation procedure suggests that a person undertakes a specific task differently in comparison with the previous performance. The main characteristic of implementation is that the individual's view about the design, behavior shown, product must be current or modern. It is the change of view that is the main ingredient for the dissemination procedure.

Bass (1969) came up with an DOI model that proposed different groups of adopters of innovation: innovators, early adopters, early majority, late majority, and laggards (Mahajan, Muller & Srivastava, (1990); Martinez & Polo, (1996). The speed of implementation of innovation is affected by two types of communication: mass media and word of mouth. Rodgers (2003) explains that there is no concurrent implementation of a current product, behavior or design in a community or company rather the procedure entails people who implement the innovation at a higher rate compared to others. The four elements in the diffusion process include: innovation, the community that is affected by the innovation, how communication is done in that community and time. The studies in this field discovered that the first implementers of innovation show distinct behavior in comparison to late implementers of a similar innovation despite the two groups being in the same community. Therefore, when developing a new trait, design or product aimed at a specific community, developers must acknowledge the habits of the society to know promoters or obstacles to implementing of an innovation. The theory was therefore associated with this research since it highlighted how an idea, product or practice is adopted in a firm, where in this situation is how digital transformation has been implemented in manufacturing firms and impacted supply chain performance.

2.2.2 Technology Acceptance Model

The TAM was modified from the Theory of Reasoned Action Ajzen and Fishbein (1980) and first put forward by Davis (1986), assumes that application of digital solutions in an organization is decided by two major elements: perceived usefulness and ease of use. In the past years TAM has been considered as a major theory by the IT industry (Lucas & Spitler, 1999; Venkatesh & Davis, 2000). Venkatesh and Bala (2008) noted that convenience is the level which workers trust that the digital solutions increased their output. Different aspects impact convenience of data systems which are product standard of digital use; personal standard; appropriate role of the intended system; output evidence or perceptible results of digital execution; convenience of using the solutions. TAM has been used in different IT and information system areas. Moon and Kin (2001) broadened the TAM to interpret the users' acknowledgment of World-Wide-Web context. Lin (2007) presented TAM to explain the e-stock users' behavioral motive.

Chen and Chen (2009) reevaluated the TAM to recognize the vehicle telematics users' usage objective. Stern (2008) suggested a modified TAM to examine the consumers' acceptance of

online auctions. Serenko (2007) refined TAM to evaluate consumers' acceptance of interface agents in everyday work applications. Venkatesh (2008) defined convenience as the level that an individual trusts the implementation of digital systems will be effortless. Outside elements impacting convenience of utilization of data systems are computer effectiveness that a person trusts in the capability of utilizing digital tools. Convenience positively impacts the plan to utilize the system leading to adaption of the technology. The theory outlines an organization's decision to implement a current innovation. In addition, the two factors are connected to internal and external factors. The theory was of relevance since this research evaluated how digital transformation has been utilized as a specific resource and capabilities of the organization that can be employed in promoting superior supply chain operations in manufacturing firms of FMCGs in Kenya.

2.3 Adoption of Digital Transformation

Digital transformation is the application of digital tools to completely boost the productivity or influence of a company. In a technologically revolutionized organization, technological solutions allow upgraded procedures, involved workforce, and up to date business models (Deloitte, 2018). Covid-19 pandemic enlightened many manufacturing companies to utilize technology to attain productivity. Several Kenyan manufacturing firms have not completely implemented digitization but in recent years they have realized the importance of doing so. This is because the companies are seeing more advantages, namely increased output in the short terms and the common standard of the cycle of production. Despite digitalization having changed various sectors, digital transformation in FMCGs sector is yet to sully pledge implementation (Martin, 2017). However, to implement digital plans companies invested in various innovations to boost management of quality, warranty and operations, developing procurement, sourcing and stock management along with stakes in product and order composition.

Digital transformation in organizations goes beyond just understanding the digital technology and tools but require management support (Reddy & Reinartz, 2017; Heavin & Power, 2018). Lack of support by company's management to develop and implement digital technology will lead FMCGs manufacturing firms to risk gaining a competitive edge (Ko, 2021). According to a report in 2022 by South African business management software provider SYSPRO Covid-19 came with great enlightenment for companies. In future digital transformation will boost resource productivity and reduce costs, advance operational procedures, improve internal partnership among stakeholders,

boost customer service and enhance personnel output. The report shows that the largest challenge in the automation industry is supply chain and material handling challenges coming after that is engagement with stakeholders. To tackle these disruptions, manufacturing firms have implemented different ways of pushing their products in the market which include investing in industrial IoT, e-commerce, analytics and big data and in partnership innovations.

2.4 Drivers of Digital Transformation

The influence of utilizing digital transformation varies with different industries for example, for advanced industries digital transformation is very important (Rogers, 2016; Westerman, 2014). Other industries especially the manufacturing industry also been impacted by digitization due to many firms utilizing digital tools to be more competitive in the market, to boost demand for digital tools, to satisfy consumers or for business (Berman, 2012; Fitzgerald, 2014). The innovations of digital transformation are revolutionary since they are now an important part of the community and day to day lives (Bounfour, 2015). The drivers of digital transformation can be perceived as internal and external causes that influence companies to utilize digital transformation. Companies implement digital technologies within their operations do as to manage the changes that are happening in the industries, they are part of.

Customer behaviors and expectations are mainly what influences companies to implement digital transformation (Haffke, 2017; Schmidt, 2017), other triggers include technological strategies and competition in the company's market (Berghaus & Back, 2017). Companies experience new competitive opposition and keep up with growing competitors and new firms joining the industry (Berghaus, 2017). In addition, firms encounter the influence of digitization by competitors showing digital innovation, new firms joining the market with challenging digital business strategies and technological advances that push firms be part of company change (Haffke, 2016). Additionally, if the push intensifies and adds up fast it may lead the company to show its digital intentions by creating a Chief Data Officer (CDO) to push (Haffke, 2016). Berghaus (2017) also determined that some firms experienced regulatory changes that pushed the companies to reconsider how they conduct their operations and change their firm.

2.5 Effects of Digital Transformation on Supply Chain Performance

Digital transformation enables companies to create innovation and improve productivity, transparency, and flexibility (Batista, 2021). In the manufacturing business DT and innovation

improves efficiency and decreases costs associated with production. Manufacturing firms of FMCGs in Kenya previously prioritize reduction in processing costs of goods this resulted to exclusive cost of goods. The growth in integration of DT that has resulted in industrialization and aided in decreasing in additional costs. For example, to lower costs associated with manufacturing the introduction of DT in manufacturing has lowered production cycles and increased the level of product innovation. This has been entirely by DT by establishing systems that have more speed and efficient to launch this has resulted to more agility and customization, versatility and innovation. The manufacturing industry of FMCGs in Kenya is very regulated thus it is key for companies in the industry to have a competitive edge cloud computing is helping achieve less time for more accurate forecasting, strategic sourcing, SCM, standard audits and optimization. Digital transformation implements digital tools to come up with new business processes and broaden the business environment that is there. Organizations are going through digital transformation to enhance system integration by implementing digital technology and tools (Tavana, 2022).

Digital transformation has resulted to intelligence in the manufacturing industry of FMCGs that has resulted to reduced costs and increased reliability of digital tools, it has also provided accurate data on SCM performance. Cloud-based technology has enabled manufacturing processes to be improved that has led to precision which has allowed for easy recognition of bottlenecks and adjusting accordingly. Another effect of integrating digital transformation supply chains in manufacturing firms of FMCGs in Kenya, is the ability of the digital tools to perform throughout without malfunction. This leads to the possibility of having a positive influence on the growth of the industry in the estimated timeline. Furthermore, enhancement of supply chain operation and facilitation of decision that are efficient will increase. Kaldero (2018) stated that technologically proficient supply chain managers can advocate for choosing the right digital tools to match the needs of their innovation process, motivate taking risks and implementation of innovation and improve their supply chain performance by introducing a data and model inspired attitude to have a competitive edge the digital economy.

2.6 Empirical Literature Review

Research was done by Ortstad et al. (2017) for a major bank in Sweden on the influence of DT on customer relationship management (CRM). The study used descriptive analysis to examine how CRM has been improved through the utilization of digital tools. Data was collected through

conducting interviews with bank mid-level and senior management. The outcome of the research was there was significant progress in DT of CRM however, there was minimal incorporation of digitization in other operations within the bank this led to less effectiveness of the digital strategy. Wanjihia (2021) examined the influence of DT strategieson production among paint manufacturers in Kenya. This research employedacross-sectional survey and determined that there exists a strong correlation between the intensity of change in management, digitization and production of paint manufacturers in Kenya and the two elements contributed to 43.2% of the production. The outcome of the study was that organizational transformation is advocated by management and is established on DT which majorly impacted the production of paint manufacturers than just implementing different digital tools in the absence of support from management.

Jayabalan et al. (2021) studied how HRM activities have been influenced by digitization in the vehicle manufacturing industry. The study by getting and analyzing data through IBM SPSS (Version 27) statistical software found out that apart from compensation the rest of elements in human resource are greatly influenced by digital technologies. Banga (2019) conducted research in manufacturing companies in India that focused on digitization and modernization in global value chains. The study specifically gave actual proof on the influence of digitization on improvement of product in the industry. The evidence indicated that when other factors are constant, rise in digital utilization in the company has a major positive impact on the product standard. Mulumbi (2021) studied how expansion of life insurance companies registered on the NSE in Kenya have been impacted by innovation. The results of the study revealed revolutionary transformation and external opportunities as elements for digitization on expansion of life insurance companies.

2.7 Summary of Empirical Review

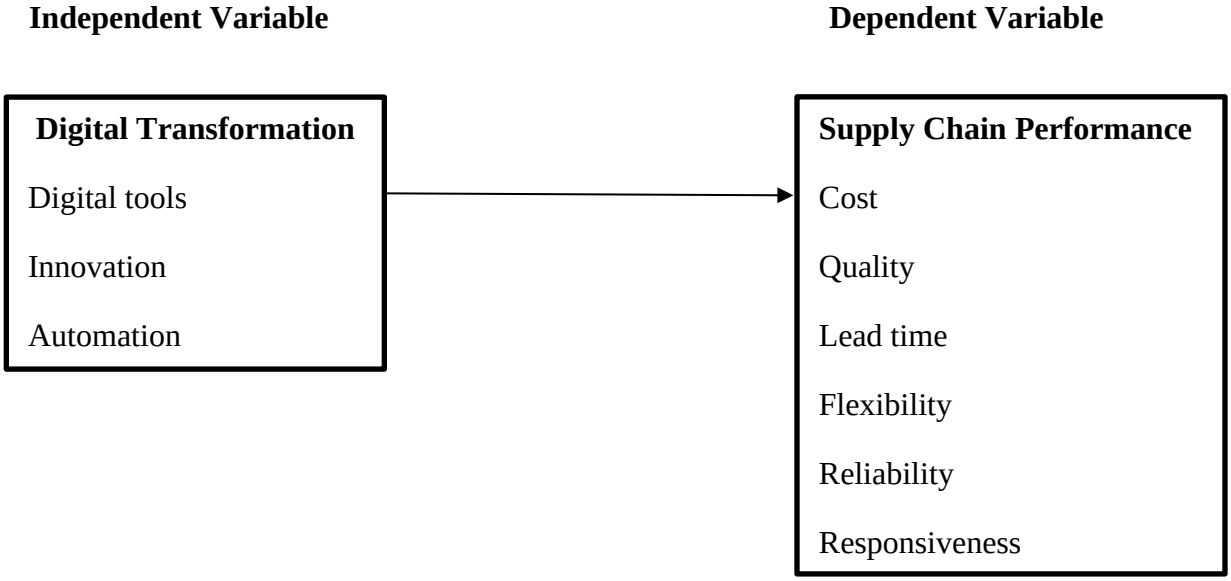
Study Topic and authors	Research Methodology	Findings	Knowledge Gap(s)	Focus of Current Study
Impact of digital transformation on CRM for a large bank in Sweden (Ortstad et. al, 2017).	A descriptive designwas used, and data was collected through conducting interviews with bank team members and managers.	Minimal incorporation of digitization in bank operations led to less effectiveness of the digital strategy.	The study was conducted from the bank's perspective not from a manufacturing perspective.	This research focused on digital transformation in manufacturing firms of FMCGs in Nairobi, Kenya.
Wanjihia (2021) examined the influence of digital transformation strategies on production among paint manufacturers in Kenya.	A cross-sectional survey was used which was aimed at paint manufacturers in Nairobi.	There is significant digital transformation if there is support by management than just implementing different digital tools without management's support.	This study specifically targeted the paint manufacturers in Kenya excluding FMCGs manufacturers.	This research focused on how digital transformation had influenced manufacturing firms of FMCGs in Nairobi, Kenya.
The impact of digitalization on HRM practices in the vehicle manufacturing sector (Jayabalan et.al, 2021)	The research used quantitative research method and undertook a positivist assumption research philosophy that aimed to test hypotheses and derived outcomes and conclusions.	Apart from compensation the rest of elements in human resource are greatly influenced by digital technologies.	The study targeted the area of human resource management and did not include supply chain performance in any way.	This study examined the impact of digital transformation on supply chain performance of manufacturing organizations of FMCGS.

Study Topic and authors	Research Methodology	Findings	Knowledge Gap(s)	Focus of Current Study
Banga (2019) conducted a research in the vehicle manufacturing companies in India that focused on digitization and modernization in global value chains.	The research used method-of-moments estimations on vehicle manufacturing companies in India.	The evidence indicated that when other factors are constant, rise in digital utilization in the company has a major positive impact on the product standard.	The research did not examine how digital transformation affected supply chain performance of manufacturing companies specifically for FMCGs in Kenya.	This study addressed how digital transformation has influenced manufacturing firms of FMCGs in Nairobi, Kenya.
Mulumbi (2021) studied how expansion of life insurance companies registered on the NSE in Kenya have been impacted by innovation.	A descriptive methodology was employed with the subject of the study being life insurance companies listed on the NSE.	Results of the research unveiled revolutionary transformation and external opportunities as elements for digitization on expansion of life insurance companies.	The research focused on life insurance firms rather than manufacturing firms of FMCGs.	The current research focused on digital transformation in manufacturing firms of FMCGs in Nairobi, Kenya.

Source: Researcher (2023)

2.8 Conceptual Framework

The conceptual framework indicates the correlation between the independent and dependent variables (Kombo, 2006). The independent variable in this research was digital transformation and was operationalized by digital tools, innovation and automation. The dependent variable was supply chain performance and was operationalized by cost, quality, lead time, flexibility, reliability and responsiveness. The connection between the two was depicted in the figure below:



Source: Researcher (2023)

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The chapter discussed the approach that was applied while gathering data for the study. This included research design, target population, sample design, data collection as well as data analysis.

3.2 Research Design

According to Kothari (2012) a research design is the alignment of circumstances to allow for data gathering and evaluation in a way that helps achieve the purpose of the research. A descriptive research design was used for this study, which allowed broad examination of the data facilitating the demonstration of the impact of digital transformation on supply chain performance of manufacturing firms of FMCGs in Kenya.

3.3 Target Population

Zikmund, Babin, Carr and Griffin (2012) defined population as the number of items that can be a part of specific research. The research's target population were all FMCGs manufacturing firms in Nairobi County since according to the KAM 2023 80% of firms registered with the body are in Nairobi. According to Obwocha and Osoro (2023) there are 95 FMCGs manufacturing firms in Nairobi who are members of KAM. The objective for selecting these organizations was because they have incorporated clear SCM principles and utilize great practices in SCM.

3.4 Sample Design

According to Paton (2002) the chosen sample size rests on the objective of the research, the available resources and time and the questions the researcher wants answered. The sample design that was used for this study is a census sampling approach, where all the FMCG manufacturing companies in Nairobi were sampled in the study. This sample was important in coming up with reliable and accurate data on digital transformation within FMCGs companies supply chain operations. This meant that the sample size was 95 entities of the FMCGs manufacturing firms which formed the unit of observation whereas the respondents who included supply chain managers formed the unit of analysis.

3.5 Data Collection

Questionnaire method was used to collect data, this is because according to Mugenda and Mugenda (2008) questionnaires are tailored to convey a particular objective, research question or test

hypothesis. Primary data was used in the research the questionnaires were administered to supply chain managers in 95 FMCGs firms through e-mail. This is due to the ability to collect information quickly and easier analysis of the data. The questionnaire had three sections: demographic information was gathered in the first section; the second section put together information on the degree of digital transformation and lastly the third section collected data on supply chain performance.

3.6 Data Analysis

Information was gathered through questionnaires and typed into excel version 16 then exported to Statistical Package for Social Sciences (SPSS) version 23. Descriptive analysis was used to find out the degree to which manufacturing firms of FMCGs in Kenya have implemented digital transformation in their supply chain operations and in identifying the drivers of digital transformation in manufacturing firms of FMCGs in Kenya. Multiple regression analysis technique was used to determine the impact of digital transformation on supply chain performance of manufacturing organizations of FMCGs in Kenya.

The regression model that was deployed to analyze the data was:

$$Y = A + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \acute{\varepsilon}$$

Where;

Y = Supply chain performance

$\beta_{1,2,3}$ = Beta-coefficients for digital tools, innovation and automation

X_1 = Digital tools

X_2 = Innovation

X_3 = Automation

$\acute{\varepsilon}$ = Error term

CHAPTER FOUR: DATA ANALYSIS, FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the results of the analysis from the primary data that was gathered from the supply chain managers of 95 FMCGs in Nairobi. The research objectives were to find out the degree to which manufacturing firms of FMCGs in Kenya have implemented digital transformation in their supply chain operations, identify the drivers of digital transformation in manufacturing firms and establish the impact of digital transformation on supply chain performance in manufacturing organizations of FMCGs in Kenya.

4.2 Response Rate

To understand the impact of digital transformation on supply chain performance, supply chain managers drawn from 95 FMCGs manufacturers in Nairobi were selected to participate in the research, 95 questionnaires were sent to the respondents and 74 respondents successfully responded to in time for data analysis, which equates to 78% response rate. According to Creswell and Clark (2017), a response rate of 70% and above is very good for data analysis as the result would reflect a perception of the larger population on the ground. Therefore, in the current study, (*N = 74)*.

4.3 Demographic Information Findings

The demographic information captured in the research included; experience within the manufacturing industry, education level, ownership structure, size and years of existence of the company within the industry.

4.3.1 Level of Education and Experience in the Manufacturing Sector

The demographic items examined that related to the respondents were the experience in the level of education and experience within the manufacturing sector of the respondents, which were tabulated in table 4.1 using frequencies and percentages.

Table 4.1 Level of Education and Experience in Manufacturing Sector

	Frequency	Percent
Education level		
Diploma	8	10.8%
Undergraduate	41	55.4%
Postgraduate	25	33.8%
Experience		
1 - 5 years	14	18.9%
6 - 10 years	18	24.3%
11 - 15 years	26	35.1%
Over 15 years	16	21.6%

Source: Research Data (2023)

From the summarized data on the education level of the respondents, 55.4% had attained an undergraduate degree, 33.8% had attained a post-graduate degree and finally, 10.8% of respondents had attained a college diploma level of education. The findings show that significant portion of the respondents had attained high level of education, this can be interpreted as most respondents in the study had the skills and knowledge to understand and interpret the questionnaire on how digital transformation has impacted supply chain performance.

For the experience in the manufacturing industry, 35.1% were in the manufacturing industry for 11 – 15 years, 24.3% were in the industry for 6 – 10 years, 21.6% were in the industry for over 15 years and finally, 18.9% of respondents were in the manufacturing sector for a period of 1 – 5 years. The results imply that, substantial portion of the current supply chain managers have had work experience within the manufacturing sector for at least a decade. This further implies that they were able to understand how digital transformation has impacted supply chain performance as sought by this study.

4.3.2 Ownership Structure, Size and Years of Existence of the company

The demographic items examined that related to the company were ownership structure, size and years of existence of the company, which were presented in table 4.2, tabulated in frequencies and percentages.

Table 4.2 Ownership Structure, Size and Years of Existence of the company

	Frequency	Percent
Ownership structure		
Local	32	43.2
Global	10	13.5
Both	32	43.2
Size of the company		
0 - 100 workers	32	43.2%
100 - 500 workers	27	36.5%
500 - 1000 workers	12	16.2%
Over 1000 workers	3	4.1%
Years of existence of the company		
1 - 10 years	22	29.7 %
11 - 20 years	29	39.2 %
21 - 30 years	17	23.0 %
Over 30 years	6	8.1 %

Source: Research Data (2023)

From the summarized findings in table 4.2, ownership within FMCGs manufacturing firms in Nairobi, is 43.2% locally owned and another equivalent 43.2% is both locally and globally owned, while 13.5% of FMCGs manufacturing firms drawn global ownership structure. The results imply diversity in ownership of FMCGs Company both local and global, which highlights the dynamism in operations of FMCGs manufacturers.

For the size of the FMCGs manufacturing companies' majority of the firms, 43.2% have less than 100 workers, 36.5% have 100 – 500 workers, 16.2% have between 500 – 1000 workers and only 4.1% companies have over 1000 workers. This finding shows that most of FMCGs manufacturing firms operating in Nairobi can be classified as Small and Middle-Sized enterprises, with a marginal number of large scales FMCGs companies.

From the summarized results of most of the firms, 39.2% have existed for period of 11 – 20 years, 29.7% have existed for 1 – 10 years, 23.0% have existed for 21 – 30 years and finally 8.1% have existed for over 30 years. The findings imply that, substantial number of FMCGs manufacturing firms have existed for a moderate period of over 2 decades, which reflects substantial experience

in the local market. In addition, small number of FMCG manufacturers with over 30 years shows that growth in FMCGs firms is complex.

4.4 Descriptive Analysis

This section analyses descriptive characteristics of study variables; digital transformation and supply chain performance for FMCGs manufacturing firms. Descriptive techniques were adopted using measures of central tendencies including mean and standard deviation.

4.4.1 Descriptive Statistics for Digital Transformation

The computation in table 4.3 highlights descriptive statistics for digital transformation among manufacturing companies in FMCGs sector. A 5-point scale, where 1 = very low extent, 2 = low extent, 3 = moderate extent, 4 = large extent and 5 = very large extent. The respondents were asked to measure the degree of digital transformation within FMCGs manufacturing firms.

Table 4.3 Digital Transformation

Indicators for digital transformation	N	Mean	Std. Deviation
Digital Tools			
Social media used	74	4.41	.720
Analytical tools used	74	4.04	.650
AI is implemented in the company	74	4.41	.618
Website is in place and used to communicate with various stakeholders	74	4.26	.598
Innovation			
Top management supported new ideas	74	3.84	.951
There has been a growth in implementation of digitization in various sectors of the operations within the organization	74	4.18	.783
New business models implemented in recent years	74	4.38	.613
New products introduced in the recent years	74	4.24	.679
Automation			
There is an ERP system in place that integrates all organization operations	74	4.30	.635
IOTs has been implemented in business operations	74	3.76	1.070
There are sensors in place that give alerts whenever changes occur	74	4.39	.593
Manufacturing operations have been streamlined	74	4.31	.661
Aggregate	**74**	**4.21**	**0.714**

Source: Research Data (2023)

The results indicate that FMCGs manufacturing firms have embraced marketing the company's products through social media to a large extent *(M= 4.41, SD= 0.720)*. They have also embraced analytical tools within business operations to a large extent *(M= 4.04, SD= 0.650)*, and have largely implemented Artificial Intelligence *(M=4.41, SD= 0.618)*. Results also show that a substantial number of FCMGs manufacturers have invested in a website which is utilized in

undertaking communications with stakeholders, to a large extent *(M=4.26, SD= 0.598)*. The results imply that FMCGs firms have embraced utilization of digital tools in their daily operations indicative that they gained value in their operations.

The data collected on innovation show that in FMCGs firms' new ideas get support from top management to a moderate extent *(M=3.84, SD= 0.95)*. Also, FMCGs manufacturers have recorded growth in implementation of digitization across various sectors of operations within the organization to a large extent *(M=4.1, SD= 0.783)*. Results also show that FMCGs manufacturers have been adopting business models in recent years to a large extent *(M= 4.38, SD= 0.613)*, and have been largely introducing new products *(M= 4.24, SD= 0.679)*. The results imply that FMCGs manufacturers have incorporated innovative strategies to improve their supply chain operations.

The findings on automation show that FMCGs manufacturing firms have embraced the use of ERP systems enabling integration of organization operations to a large extent *(M= 4.30, SD= 0.635)*. Results also show that FMCGs manufacturers have adopted the use of IOTs in business operations to a moderate extent *(M= 3.76, SD= 1.070)*. Results show that FMCGs manufacturers have integrated automate sensors which give alerts whenever changes largely occur *(M= 4.39, SD= 0.593)*. Also, results indicated that FMCGs firms have largely streamlined manufacturing operations *(M= 4.31, SD= 0.661)*. Finally, the results imply that digital transformation has substantially been scaled up across FMCGs manufacturing firm operations with an aggregate *(M= 4.21, SD= 0.714)*.

4.4.2 Descriptive Statistics for Supply Chain performance

Descriptive statistics on supply chain performance were equally explained using means and standard deviation. Respondents' views were computed using a 5-point scale for supply chain performance where; 1 = very low extent, 2 = low extent, 3 = moderate extent, 4 = large extent and 5 = very large extent.

Table 4.4 Supply Chain Performance

Factors of supply chain performance	N	Mean	Std. Deviation
Costs			
Production costs have decreased	74	4.12	.776
operational costs have decreased	74	4.05	.700
Lead time			
Ordering turnover has improved	74	4.20	.721
Delivery lead time has reduced	74	4.18	.765
Flexibility			
Process flexibility has increased	74	4.20	.662
Organization's adaptation to changes has improved	74	4.22	.688
Reliability			
Accuracy has improved	74	4.09	.830
Increased reliability in the ERP system	74	4.19	.676
Responsiveness			
Improved responsiveness to any issue that arises	74	4.27	.764
Reduction in response time	74	4.16	.777
Quality			
Product quality has improved	74	3.89	1.001
Quality costs have reduced	74	4.20	.662
Aggregate	**74**	**4.148**	**0.752**

Source: Research Data (2023)

The results show that FMCGs manufacturers have reported; decreased production costs, where *(M= 4.12, SD= 0.776)*, and reduction in operational costs, where *(M= 4.0, SD= 0.700)*, improvement in ordering turnover, where *(M= 4.20, SD= 0.721)*, and reduction in delivery lead time, where *(M= 4.18, SD= 0.765)*.

In addition, findings show that FMCGs manufacturers have reported; increased processes flexibility where *(M= 4.20, SD= 0.662)*, improvement in adaptation to changes where *(M= 4.22, SD= 0.688)*, improvement in accuracy levels, where *(M= 4.09, SD= 0.830)*, and increased reliability in ERP systems where *(M= 4.19, SD= 0.676)*.

The results also show that FMCGs manufacturing firms have registered; improvement to responsiveness on issues arising where *(M= 4.27, SD= 0.764)*, reduction in response time where *(M= 4.16, SD= 0.777)*, improvement in product quality where *(M= 3.89, SD=1.001)*, and reduction quality costs where *(M= 4.20, SD= 0.662)*. Finally, results show that FMCGs manufacturing firms have recorded overall enhanced supply chain performance with aggregate *(M= 4.148, SD= 0.752)*.

4.5 Multiple Regression Analysis

The study adopted multiple regression analysis to find out whether digital transformation influences supply chain performance.

Table 4.5 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.624[a]	.389	.363	.35707

a. Predictors: (Constant), Automation, Innovation, Digital tools

Source; Research Data (2023)

The findings in table 4.5, presents model summary for the multiple regression test between digital transformation factors; digital tools, innovation, and automation against supply chain performance. The test deduces; *($R = 0.624$, $R^2 = 0.389$)*. These findings affirm, existence of a strong positive association *($R = 0.624$)* between digital tools, innovation, and automation and supply chain performance. The findings also imply that digital transformation factors: digital tools, innovation, and automation account for 38.9% variability in supply chain performance. This also means 61.1% of variability in supply chain performance attributed to factors external to digital tools, innovation, and automation.

Table 4.6 ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.690	3	1.897	14.875	.000[b]
	Residual	8.925	70	.128		
	Total	14.615	73			

a. Dependent Variable: Supply chain performance

b. Predictors: (Constant), Automation, Innovation, Digital tools

Source: Research Data (2023)

The Analysis of variance (ANOVA) results in table 4.6 for multiple regression test between digital transformation factors including automation, innovation and digital tools against supply chain performance. Test deduced; *F (3, 70) = 14.875, p-value = 0.000 (p < 0.01)*. The results imply the model for digital transformation factors integrating digital tools (X_1), innovation(X_2), and automation (X_3) is fit and significant to predict supply chain performance at 0.01 significance level. It implies we reject null hypothesis, and accept alternative that digital transformation tools including, automation, innovation, digital tools influence supply chain performance. This affirms existence of statistical association between digital transformation factors notably; automation, innovation, digital tools, and supply chain performance which is significant at 0.01 significance level.

Table 4.7 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.672	.431		3.877	.000
	Digital tools	.760	.121	.878	7.628	.000
	Innovation	.272	.100	.329	2.721	.008
	Automation	.398	.114	.429	3.489	.001

a. Dependent Variable: Supply chain performance

Source: Research Data (2023)

The coefficients outputs in table 4.7 presents coefficients for regression test between multivariate regression analysis of digital transformation factors including; digital tools, innovation and automation versus supply chain performance. The test deduces; *A=1.672 p-value=0.000 (p <*

0.01), β_1 = 0.760, p-value= 0.000, β_2 = 0.272 p-value=0.000 (p <0.01), β_3 = 0.398 p-value = 0.001 (p < 0.01).

The multiple regression model for this test is: $Y = A + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \acute{\varepsilon}$, where Y = supply chain performance, $\beta_{1,2,3}$ beta-coefficients for digital tools, innovation and automation, X_1 = digital tools, X_2 = innovation, and X_3 = automation, $\acute{\varepsilon}$ = error term.

The Model equation for the study is therefore;

Supply Chain Performance = 1.672 + 0.76*Digital tools + 0.272*Innovation + 0.398*Automation

The results indicate that for every unit change in digital tools will trigger 0.76 units change in supply chain performance, for every unit change in innovation will result in 0.272 units change in supply chain performance and finally for every unit change in automation, shall trigger 0.398 units change in supply chain performance. These findings imply that a positive change in digital transformation factors including digital tools, innovation and automation will result in a positive change on the supply chain performance of FMCGs manufacturing companies.

4.6 Discussion of Findings

The study established that digital tools have a positive effect on supply chain performance for FMCGs manufacturers. The findings agree with Büyüközkan and Göçer (2018) highlighted the importance of digital supply chain in driving technological integration across wide scope of supply framework to enhance operations. The findings are also in alignment with findings by Shahadat et al. (2023), who established that digital supply chain processes enhanced operational capabilities for garment manufacturers resulting in enhanced competitive advantage resulting to supply chain performance being boosted. The study also aligns with Ortstad and Sonono (2017) findings who established how consumer relationship management is impacted by digital transformation. The findings also agree with Wanjihia (2021) who concluded that 43.2% of the performance of the manufacturers of paint in Kenya could be as result of the magnitude of change in management and digital intensity. The study also aligns with Jayabalan et al. (2021) identified that the present and future needs of industrial revolution and digitization technologies are related to HRM practices in manufacturing the industry.

The study also established that embracing innovation contributes in positively driving supply chain performance for FMCGs manufacturing firms. This is in-line with Shan and Shi (2020), whose study found that collaborative innovation within technology application for supply chain processes impacted positively on supply chain performance for Chinese enterprises. Even though the outcome was insignificant, collaboration in technology innovation was driven by management collaboration across the supply chain. Also, the findings agree with conclusions by Ibrahim, Karollah and Mahdani (2023) who established that e-procurement strategy impacted positively in supply chain performance and contributed substantially to driving innovation for supply chain technologies. The results of the study also align with Banga (2019) who concluded that companies that have great levels of an experienced workforce and digital potential had an estimate of 4-5% better products compared to their counterparts with low levels of an experienced workforce and digital potential.

Finally, the study established that automation strategy impacted positively on supply chain performance for FMCG manufacturing firms. This finding is supported in conclusions made by Andiyappillai (2021) and Mohsen (2023). The findings are also supported by Andiyappillai (2021) whose study on automation for supply chain process established that it contributed towards elimination of unnecessary production costs, reduced human errors and sped up time consuming processes. The findings also in line with Mohsen (2023), whose study on AI application in supply chain management was found to positively impact on critical processes including, forecasting demand, logistics operations management, sales projections, marketing support, production planning and inventory management.

CHAPTER FIVE: SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This section covers summary of findings, conclusions and recommendations on the impact of digital transformation on supply chain performance for FMCGs manufacturers in Nairobi.

5.2 Summary of the Findings

The main objective in this research was to determine the impact of digital transformation on supply chain performance for manufacturing companies in FMCGs sector in Kenya. The respondents in the research were supply chain managers within FMCGs manufacturing companies in Nairobi. A significant portion of the demographic information about respondents indicates that high academic attainment was a fundamental requirement amongst senior supply chain managers. Equally, most supply chain managers for FMCGs firms have worked for a long time in the industry, which gave them deep understanding on trends relating to digital transformation of supply chain practices in the FMCGs sector. The analysis first evaluated how digital tools have impacted supply chain performance and most of the results indicate that, digital transformation had a direct impact on most aspects of supply chain performance. Digital tools have become very integral in conducting operations for many manufacturing firms and social media platforms, analytical tools, artificial intelligence and website integration have gained increased usage across supply chain operations for FMCGs manufacturers in Kenya.

The study also sought to determine how innovation impacted on supply chain performance of FMCGs manufacturing companies and the results show that FMCGs manufacturing companies have increasingly embraced new ideas relating to digital tools. Companies in FMCGs manufacturing sector have increasingly deployed digital solutions across varied sections of supply chain operations. Further, results show that FCMGs companies continue to shape and align their supply chain operational business models with emerging digital solutions. Digital innovation has also contributed to enabling FMCGs firms to develop new products and processes boosting operations in the supply chain. The study also evaluated the effect of automation through adopting digital solutions and its outcome on supply chain performance. The findings show that FMCGs manufacturers have embraced automation for operations across supply chain and continue to up-scale downstream to the market. This has been achieved through rolling out ERP systems to

support operations and have accrued positive outcomes in enhancing and boosting production and operational activities.

The study established that digital transformation has received substantial application within FMCGs firms and continues to enjoy increased scaling-up though many other firm operations. Digital tools have eliminated numerous aspects of red tapes across the supply chain for FMCGs firm operations, as integrating digital tools cuts reliance of manual systems prone to errors and inefficiencies. Study reports that digital transformation has solidified aspects of operational reliability which positively enhances effectiveness of supply chain operations for FMCGs firms.

5.3 Conclusions

The study concludes that digital transformation has a positive effect on supply chain performance of FMCGs manufacturing companies in Kenya. Digital transformation for FMCGs firms is driven by digital tools, innovation and automation of processes across entirety of business operation in the supply chain. Digital solutions integration in operations has a positive impact on areas of critical operational importance including operational costs, operational flexibility, operational speed, operational efficiency and product quality.

The study concludes that firms in FMCGs sector are continuously embracing and integrating digital solutions to boost operational efficiency and concurrently reduce operational and production costs. On operational aspect, integration of digital solutions has ensured stability and predictability of operations, enabling proper production and distribution forecasts, which are critical in enabling timely and speed in attending to orders and delivery across the supply chain. Such efficiencies are necessary in guaranteeing operational continuity.

The study concludes that digital transformation has contributed to enhanced levels of accuracy and reliability in supply chain operations for FMCGs firms. Also, digital solutions have contributed to enhancing and maintaining quality from shopfloor across the supply chain to the market. Product quality is a central attribute in maintaining a competitive edge in a vibrant marketplace. Digital transformation aids FMCGs firms sustain their competitive edge across the supply chain which results in enhanced overall business performance and success.

5.4 Recommendations

The research recommends FMCGs manufacturers should add budget allocation specifically to finance digitization strategy in business operations. Such budget should go towards creation of digital operations team with mandate to oversee transition of manual processes which have equivalent digital options in effort to boost both supply chain process and overall firm business operations.

The study also recommends personnel training should be prioritized in the digital echo system. FMCG firms should mandate their Human Resources departments to undertake the duties of identifying technical gaps and recruiting appropriate personnel to operate the digital operations. The digital workforce should equally be sufficiently armed with the latest skills and tools for executing digital operations across the supply chain of FMCG manufacturing companies.

The research also recommends participation in research and development of tailored digital solutions for FMCG firms. Apart from recruiting professional crew to operate the digital portfolio, FMCG manufacturers should take the initiative in researching advances in digital solutions, by looking at existing operational problems that can be solved using digital tools. Investing in research on opportunities for digital growth will give FMCG manufacturers a competitive edge in future advances on the frontier of digital solutions for business growth.

The study also recommends cooperation with other industry stakeholders within the FMCG sector on matters regarding self-regulation in the area of uptake of modern and advance in digital solutions. Self-regulation on matter regarding digital advancement will ensure that future advances in digital solutions shall follow ethical and legal guidelines and protect industry from proliferation of dangerous application that may harm the sector and society at large.

5.5 Suggestions for Further Studies

The focus in this research was to determine the impact of digital transformation on supply chain performance for FMCGs manufacturing firms in Kenya. Future studies should consider identifying how the regulatory framework has affected supply chain performance.

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APPENDIX I: INTRODUCTION LETTER

Mercy Wacera Gitau
University of Nairobi
Department of Management Science
P.O. BOX 30197-00100
Nairobi, Kenya.

Dear Participant,

REF: ACADEMIC RESEARCH DATA COLLECTION

I am undertaking a Master of Science in Supply Chain Management program at the University of Nairobi. I am doing an academic study on "The Impact of Digital Transformation on Supply Chain Performance in Manufacturing Firms of Fast-Moving Consumer Good in Kenya" as part of the program.

This letter's objective is to politely seek your support completing the attached questionnaire for gathering data. Kindly polite the questionnaire honestly and do not indicate your name anywhere. The data collected will only be used for academic research and handled with the greatest discretion.

I anticipate your response; I appreciate your support.

Yours sincerely,
Mercy Wacera Gitau.

APPENDIX II: RESEARCH QUESTIONNAIRE

Section A: Demographic information

Please tick appropriately

a) What duration have you been in the manufacturing sector?

1-5 years { } 11- 15 years { }

6-10 years { } Over 15 years { }

b) Kindly show your highest level of education?

Certificate { } Undergraduate { }

Diploma { } Postgraduate { }

c) What is the ownership structure of the organization?

Local { } Both{ }

Global { }

d) What is the size of the company?

0-100 workers { } 500-1000 workers { }

100-500 workers { } Over 1000 workers { }

e) How many years has your company been existent in the manufacturing industry?

1-10 years { } 21-30 years { }

11-20 years { } Over 30 years { }

Section B: Digital Transformation

Please indicate the degree to which the following has been implemented in your organization (1 - Very low extent; 2 – Low extent; 3 – Moderate extent; 4 – Large extent; 5 - Very large extent)

Digital Tools	**1**	**2**	**3**	**4**	**5**
1. social media is used to market the company's products					
2. Analytical tools are used in the business					
3. Artificial intelligence is implemented in the company					
4. There is a company website in place that is used to communicate to its various stakeholders					
Innovation					
1. New ideas are supported by top management					
2. There has been a growth in implementation of digitization in various sectors of the operations within the organization					
3. The company has implemented new business models in recent years					
4. New products have been introduced in the recent years					
Automation					
1. There is an ERP system in place that integrates all organization operations					
2. IOTs has been implemented in business operations					
3. There are sensors in place that give alerts whenever changes occur					
4. Manufacturing operations have been streamlined					

Section C: Supply Chain Performance

Please indicate the extent that digital transformation has influenced the following supply chain indicators (1 - Very low extent; 2 – Low extent; 3 – Moderate extent; 4 – Large extent; 5 - Very large extent)

Indicator	**1**	**2**	**3**	**4**	**5**
Costs					
1. Production costs have decreased					
2. operational costs have decreased					
Lead time					
1. Ordering turnover has improved					
2. Delivery lead time has reduced					
Flexibility					
1. Process flexibility has increased					
2. Organization's adaptation to changes has improved					
Reliability					
1. Accuracy has improved					
2. Increased reliability in the ERP system					
Responsiveness					
1. Improved responsiveness to any issue that arises					

2. Reduction in response time					
Quality					
1. Product quality has improved					
2. Quality costs have reduced					