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**THE ROLE OF ICT ON SUPPLY CHAIN MANAGEMENT PRACTICES IN THE
SERVICE INDUSTRY. A POST COVID-19 PERSPECTIVE**

BY

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**A THESIS SUBMITTED TO THE DEPARTMENT OF SUPPLY CHAIN AND
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DECLARATION

I hereby declare that this thesis is a product of my own and to the best of my knowledge, it contains my original work and no previous material publication by another person, except for instances where due references and acknowledgment has been given in the text. The content of this work has not been submitted to any other University or tertiary institution for an award of any degree, diploma, or certificate in either Ghana or abroad. I have also acknowledged any assistance that has contributed to the success of this thesis.

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DEDICATION

To my loving family, for their unwavering support and inspiration throughout my academic journey. This thesis is dedicated to each of you. Thank you for being my rock.



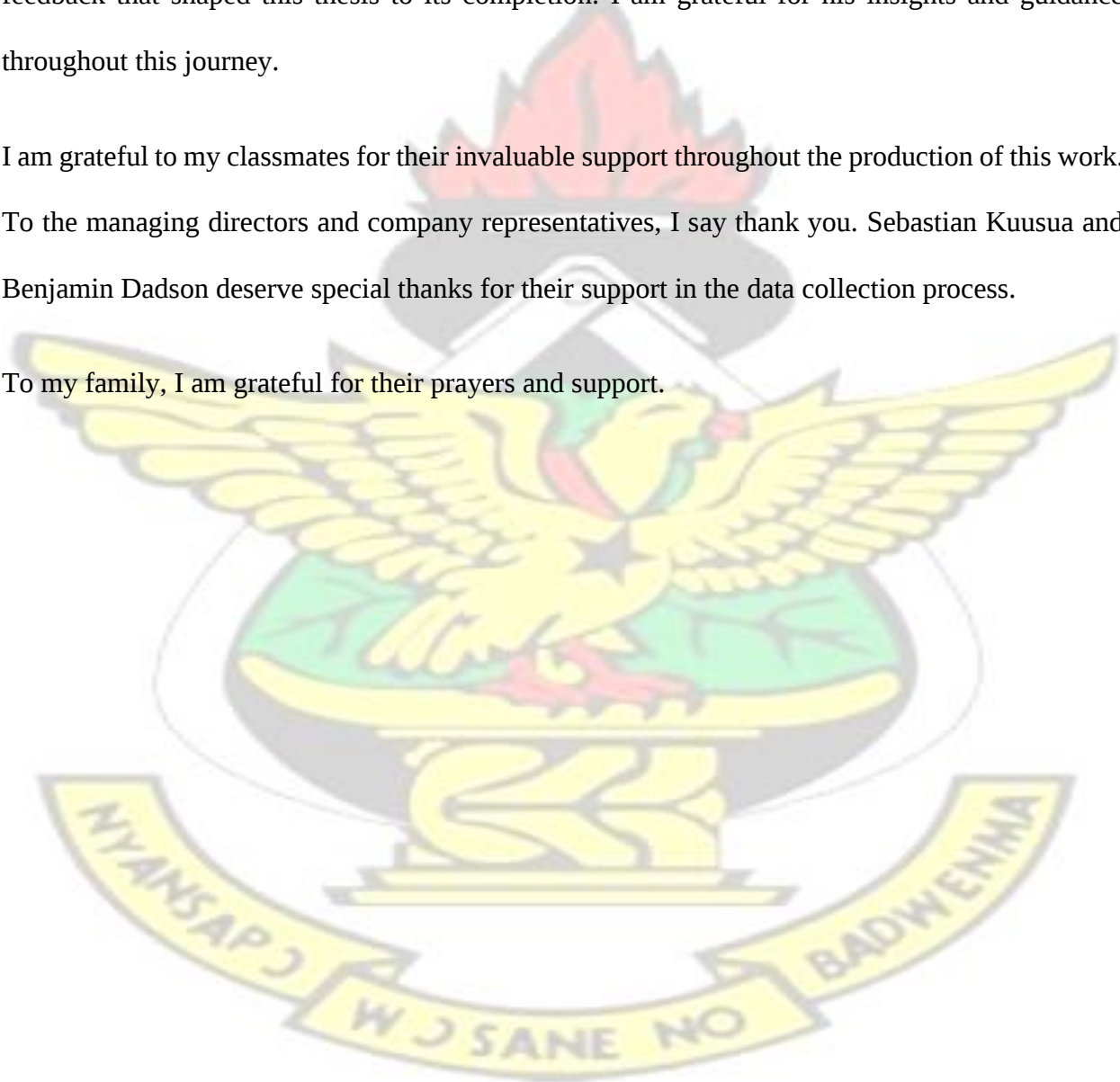
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ABSTRACT

The effective integration and utilization of Information Communication Technology (ICT) in business operations have proven to significantly enhance overall efficiency in various aspects, such as communication, production, and supply chain management. The service industry, being a crucial sector and major contributor to the economy, relies heavily on ICT advancements to drive its growth and productivity. This study focuses on investigating the role of ICT in supply chain management practices within the service industry of Ghana. Employing a quantitative method, the study sheds light on the widespread adoption of ICT tools by Ghanaian service organizations to optimize their supply chain practices. The research reveals that these technological advancements have led to notable improvements in supply chain efficiency, agility, and resilience, particularly in the post-Covid-19 era, as businesses adapt to the evolving business landscape. Key findings emphasize the significance of ICT in overcoming communication barriers, fostering collaboration with supply chain stakeholders, and leveraging real-time data insights for informed decision-making. However, the study also highlights the need for further efforts to fully embrace the adoption of cutting-edge technologies like Artificial Intelligence (AI) and Internet of Things (IoT) to maximize their potential benefits. In conclusion, this research demonstrates the transformative impact of ICT on supply chain management practices in the service industry, providing valuable insights to guide businesses in enhancing their operations and competitiveness.

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CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Business operations are becoming ever-competitive in the world with the integration of information technology in businesses (Akpan et al., 2020) . The integration and use of information technology in businesses have been identified as very relevant in ensuring improved efficiency in business (Karademir, 2019). Business operations from various fronts have shown consistent improvement with technology adoption in business as one of the factors that have enhanced business sustainability and efficiency (Muduli et al., 2020). Scientific evidence has revealed that the advancement of technology is one of the main innovations that has augmented business sustainability and efficiency (Rossi et al., 2020). The advancement of technology in business has aided in many aspects of business operations from production planning to final delivery to the consumer (Kittipanya-ngam & Tan, 2019). ICT integration in various business operations has shown significant improvement in business operations (Yang et al., 2020). For instance, there is existing evidence that, ICT has improved business in the area of communication, production, and supply chain. Management of the supply chain in an organization is an important issue in organizational operations as it has shown significant nexus with organizational performance (Saber et al., 2019) .

Supply chain management (SCM) is a comprehensive approach that coordinates the flow of products from producers to end consumers (Aji et al., 2020). This intricate network involves a series of strategic actions implemented by companies to ensure a smooth distribution process from the producer to the final consumer (Ab Rashid & Bojei, 2020). In the service industry, the

supply chain process is comparable to a composite network that interconnects multiple entities, much like a "farm to fork" approach (Dooley et al., 2018). This elaborate web of activities encompasses various elements such as supplier partnerships, meeting customer demands, product movement, and information sharing throughout the supply network (Sjah & Zainuri, 2020). At the core of effective supply chain management are critical practices such as comprehending and managing customer needs, ensuring efficient goods delivery, promoting integration, and facilitating information sharing across the entire supply chain (Anggraini et al., 2018). These practices constitute the foundation of successful SCM implementations within organizations.

Whilst some of the actors in the service supply chain industry are identified as intermediate between producers of services and the consumers of services through the transfer of services and relevant information, there are other categories of actors in the supply chain industry who transform the real services needed into the consumable state for customers. The existence of these actors in the service supply chain makes the supply chain a complex one with various activities. Also, the perishable nature of many services has made supply chain management in the service industry a complex task (Giedelmann-L et al., 2022). For instance, the nature of the supply chain in the food industry which is under the service sector, and the physical characteristics of food have led to the description of its supply chain management as the "perishable food supply chain" as food items mainly change their storage and transportation (Aung & Chang, 2014). The traditional food supply chain in the service sector in the literature is criticized as a factor that is contributing to the increasing rate of food wastage as the perishable nature of food when passing through the supply chain always results in a significant quantity of the food being wasted (Pheto, 2018). Most Scholars has shown increasing attention to the unique challenges associated with supply chain design within this industry, particularly in regards to efficient scheduling and timely

product delivery (Kshetri, 2018). To enhance responsiveness and flexibility in service supply, reducing lead times has emerged as a viable approach for managing work in progress, inventory, and achieving better results (Binsfeld & Gerlach, 2022). The adoption of information communication technology in supply chain management has been identified as a means to mitigate delays and ensure quality throughout the supply chain process (Parashar et al., 2020). Quality management has been recognized as the most primary objective in supply chain management within the service industry. As a result, companies in this sector are increasingly mindful of adhering to strict quality standards while also managing inventory, suppliers, and fostering innovation (Schaltegger, 2020). By doing so, they aim to optimize their supply chain operations and achieve optimal performance.

1.2 Problem Statement

In the functioning of both advanced and developing economies, services hold a paramount significance. They play a pivotal role in driving economic activities, and the present state of many nations' economies can be attributed to the immeasurable contributions of the service industry. Services possess unique attributes - they are intangible, inseparable, heterogeneous, and perishable, making them indispensable in various aspects of life. In recent times, there has been a remarkable growth in the service sector, leading to a surge in the generation of information linked to service marketing, as noted by (Boksberger & Melsen, 2011). This, in turn, has led to numerous articles being published, reflecting the increasing focus on this aspect. However, the service industry is not without significant challenges in supply chain management, which results in considerable product losses reaching the final consumer, as pointed out by (Balraj & Vetrivel, 2016). It has been noted by (Kumar et al., 2020a) and

(Schanes & Stagl, 2019) that over half of all food grown for services in this sector is lost both before and after reaching consumers, which is especially concerning in the food service segment. Information and communication technology (ICT) has played a crucial role in the transformation and facilitation of many business approaches in recent years by accelerating processes and operations to guarantee that the supply chain's central actor is satisfied. Since there has been a continuous increase in consumer expectations, ICT comes into play facilitating and ensuring that in as much as the key actor in the supply chain is satisfied, sufficient returns are made available for the effective implementation of better supply chain management practices to keep the flow running effectively in the chain. It is important to note that ICT is the largest employer globally (Singh et al., 2020), so it is important to assess how it affects supply chain management practices so that key supply chain participants in the service sector can choose the best methods and implement change more effectively. Research by Imran (2012) shows that investment in information systems enables banks to introduce new products and services, grow their market share, cut operating expenses, and enhance customer service.

Companies that have incorporated the use of computer systems in their daily operations over the past few years have profited immensely from information management and the ongoing decision-making required of businessmen to advance organizational development (Soto-Acosta & Meroño-Cerdan, 2008). The rate of ICT usage and need in the operations of the service industry reached a higher level during Covid-19 where no contact was required in carrying out business transactions. At first, many sectors of the service industry including the banking sector, food delivery and restaurants, the hospitality sector, and many others faced dire challenges in offering services but the implementation of key ICT tools was realized to enable the running of most business activities despite many lockdowns. The utilization of information communication

technology will improve communication and monitoring among different actors, reduce delivery times in the industry, and ensure supply chain efficiency, according to other study recommendations, which also emphasized the need for it. According to Wen et al. (2018), using ICT effectively will enable the supply chain to respond quickly and perform better.

The existing literature on the role of ICT has a lot of publications related to Supply Chain Management (SCM) of service industries. However, there is a noticeable scarcity of publications specifically addressing supply chain management practices in the context of the services industry (Chu et al., 2020). Even though the success of the service industry and operations heavily relies on integration and technology adoption, the literature has not thoroughly explored the supply chain management practices from this perspective. The Covid-19 pandemic has accelerated the significance of Information Communication Technology (ICT) and Internet-of-Things (IoT) technologies in various service industries, particularly those reliant on virtual platforms for their operations (Molaei et al., 2020). Among the major sectors significantly affected, the service industry stands out due to its need for quick time-to-market, reliability, and maintaining high product quality (Chowdhury et al., 2021).

During the pandemic, Ghanaian service businesses such as restaurants, food delivery, and hospitality suffered significant interruptions (Aduhene & Osei-Assibey, 2021). Despite its importance, researchers have ignored the critical function of information and communication technology (ICT) and the mediating role of supply chain management methods in the service industry. To address this research gap, this study intends to evaluate the impact of ICT adoption in Ghana's service industry, with a specific focus on supply chain management techniques in the aftermath of the Covid-19 outbreak. By shedding light on this aspect, the study aims to provide

valuable insights into how ICT adoption can effectively enhance supply chain management practices in the service industry, especially from a post-Covid-19 perspective.

1.3 Research Objectives

The purpose of this research is to look into the impact of ICT on supply chain management methods in the service industry. A post-Covid-19 viewpoint. The following specific targets have been targeted to attain this goal:

1. To determine the ICT tools adopted in the service organization.
2. To investigate the impact of ICT on supply chain management practices
3. To assess the role of ICT on supply chain management practices after covid-19 pandemic in the service organization.

1.4 Research Questions

The following questions are presented as a guide for examining the study's aims.

1. Which ICT tools have been adopted in the service organization?
2. What is the impact of ICT on supply chain management practices.
3. What is the role of ICT on supply chain management practices after the covid-19 pandemic?

1.5 Significance of the Study

The service industry is a key sector in most countries that derives the economy and it represents the largest industrial segment and contributor to Ghana's GDP. This study is significant since it is going to examine the role of ICT on supply chain management practices in this important sector. As a result, the study will contribute significantly to the academic literature by presenting empirical evidence on the major roles ICT has on the supply chain of the service industry after the covid-19 pandemic. The data that will be collected and analyzed in the service industry will

assist to address the gap and as a result, provide relevant insight for the literature. The study will provide a practical ground on which most businesses could leverage the use of key ICT tools to improve and speed up many aspects of business activities that are carried out in the supply chains of the service industry in post covid-19 having experienced a huge loss of resources during the covid-19 pandemic. Also, this study will assist in policy implementation and policy framework establishment that will facilitate the use of ICT in Ghana by businesses in the service sector and improve the operation of firms in this industry in the country. Finally, it will help the government and other regulatory agencies in the service sector of Ghana to know their roles in enhancing the use of ICT in supply chain practices.

1.6 Summary of Methodology

The purpose of this research is to thoroughly explore the impact of information and communication technology (ICT) on supply chain management practices in the service industry, particularly in the post-Covid-19 period. To achieve this, a quantitative research method will be used. The research process will begin with a thorough literature review to extract insights from existing studies, case reports, and industry publications. The primary data collection will involve conducting surveys among supply chain managers in diverse service companies. Quantitative data will be analyzed using appropriate statistical tools like SPSS and Microsoft Excel. By analyzing the gathered data, this study will provide a significant understanding of the transformative impact of ICT on supply chain management practices in the service industry post-Covid-19. Moreover, the research will provide practical recommendations for companies to optimize their supply chain strategies in response to the evolving business environment.

1.7 Scope of the study

The aim of this study is to examine the effect of Information and Communication Technology (ICT) on supply chain management practices in the service industry, with a particular focus on the post-Covid-19 perspective. ICT has had a significant global impact on economies worldwide, including Ghana, encompassing a range of applications, systems, and devices that facilitate interactions between organizations (government and businesses) and individuals in the digital realm. Conversely, supply chain management deals with the flow of goods and services, including the processes involved in transforming raw materials into finished products. In view of this, the study will investigate the role played by these applications, systems, and devices in shaping the movement of goods and services within the service industry in the era following the Covid-19 pandemic. The study will be confined to the service industry of Ghana the leading contributor to the country's GDP. Ghana's service sector is made up of public administration services (defence, taxation, judicial, and social services), Business services, Education, health and social work, Information and communication, financial and insurance services, distributing services, personal services, and tourism. The study will solicit relevant information regarding the part ICT has played in the supply chain practices of these individuals and organizations after covid-19.

1.8 Limitations of the Study

The study is presented with certain limitations that might restrict it. First, the study is undertaken within the jurisdiction of Ghana. This implies that it is constrained within geographic location since it primarily examines the role of ICT on supply chain management practices in the service industry in post covid-19 in only the Ghanaian setting. As a result, the conclusion reached in this study has its applications on only Ghana and cannot be applied to other jurisdictions due to the

difference in cultural, social, and economic activities. Secondly, the focus of the study is on post-covid-19 which means the data, results, and conclusion that is reached would be difficult to align to certain practices and key issues that occurred preceding covid-19. Finally, the study is limited to only the service industry and only after covid-19 conditions implying that survey questionnaires administered to respondents will produce self-reported information which could be biased.

1.9 Organization of the Study

The study is divided into five major chapters. The first chapter will give a general overview of the study, by outlining major elements like the background, problem statement, objectives, and research questions. It will also include the significance of the study, a summary of the methodology, limitations, and the organization of the study. The following chapter provides a review of the literature. Relevant concepts on the topic in this study will be reviewed in the conceptual review, and the theoretical foundation will be presented to help examine the role of ICT tools in the supply chain processes of firms in the service industry in post covid-19. This chapter also provides the empirical review and the development of the framework for the concepts and the hypothesis. The third chapter will present the research methodology, which includes the methods and strategies employed to fulfill the study's objectives. The data analysis, findings, and discussions will be presented comprehensively in chapter four. Finally, chapter five will include a summary of the findings, the study's conclusion, and recommendations for future research, policy, and practice.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The literature review chapter focuses on the analysis and integration of relevant literature in the context of researching the effects of information and communication technologies on supply chain management practices in the service industry in the aftermath of the Covid-19 outbreak. The review is centred around five key areas of the literature about this phenomenon, which includes the conceptual review, theoretical literature, empirical review, conceptual framework, and hypothesis development. These five main sections are presented and discussed in detail within the literature review.

2.2 Conceptual Review

This section of the study aims in outlining concepts that are pertinent to the subject matter of this study. Various key concepts that are relevant and provide in-depth knowledge geared toward achieving the objectives of this study are reviewed from the literature and are well-defined.

2.2.1 Supply Chain Management (SCM)

The service industry's supply chain (SC) is a complicated network of interrelated businesses involved in the transportation of products, services, funds, and information from the source to the clients (Mentzer et al., 2001). The flow of services, information, and material processing, which includes activities related to demand, transformation, and supply, are traditionally part of supply chains (Sinaga et al., 2019). The term "supply chain management" (SCM) is utilized to comprehend and manage these supply chain activities (Sinaga et al., 2019). Although the term SCM is widely used in both academic and practical contexts, there is a degree of ambiguity in its

interpretation. SCM is defined in various ways by different authors - some perceive it as related to the operational aspects of product flows, while others view it as a management philosophy or a lens for process management (Croom et al., 2000). It is crucial to distinguish between Supply Chain Orientation and Supply Chain Management (Mentzer et al., 2001). Mentzer et al. (2001) define Supply Chain Orientation as a management philosophy in which firms realize the strategic importance of controlling various flows within a supply chain. It entails visualizing the complete supply chain and successfully controlling the overall product flow from suppliers to end users, with a primary focus on increasing customer satisfaction (Min & Mentzer, 2004).

Supply Chain Management (SCM) entails the implementation of Supply Chain Orientation across companies within the supply chain, aiming to strategically coordinate business functions for long-term performance improvement (Mentzer et al., 2001). In the context of contemporary trade and research, SCM is widely recognized as a multidisciplinary concept with a focus on enhancing organizational efficiency and profitability in delivering goods and services to end customers (Saleheen et al., 2018). (Chow et al., 2008) present two perspectives of SCM: a global and strategic approach encompassing demand, operations, procurement, and logistics process management, or a hierarchical and strategic approach involving supply and demand planning, sourcing, manufacturing, inventory tracking, and order fulfillment. The literature offers diverse insights into SCM from various angles, including purchasing and supply, logistics management, operations management, marketing, organizational theory, and information management systems (S. Li et al., 2006).

Some researchers predominantly view SCM through the lens of purchasing and supply functions, defining it as the integration of the supply base and all purchasing decisions and activities related to supplier management (K.-C. Tan et al., 1998). This approach underscores the significance of

procurement policies, supply management, and supplier development, evaluation, and coordination as fundamental elements of SCM (Ho et al., 2002). Beyond traditional perspectives, supply chain management practices encompass varying perceptions and classifications that challenge the notion of SCM solely revolving around a company's engagement with its suppliers (Ho et al., 2002). This alternative perspective highlights the importance of supply chain integration, wherein companies collaborate with diverse business partners beyond just suppliers. Additionally, this viewpoint emphasizes the integral role of considering all members of the supply chain, including customers, as crucial stakeholders in SCM (Ho et al., 2002).

Diverse perspectives exist with regards to Supply Chain Management (SCM) and its scope. One viewpoint associates SCM with logistics and transport, defining it as the management of material, product, and information flows throughout the supply chain (Chopra & Meindl, 2007). However, this perspective has been criticized for its limited focus, as it restricts SCM to logistics, disregarding its broader implications (Ho et al., 2002). Another classification examines SCM through macro stages, including customer relationship management, internal supply chain management, and supplier relationship management, emphasizing the significance of managing relationships and collaboration across the supply chain (Sinaga et al., 2019). Taking a process-oriented approach, SCM involves the integration and management of key business processes across the entire value chain, as defined by the Global Supply Chain Forum (GSCF) (Lambert et al., 1998). This inclusive definition highlights SCM's collaborative nature among all members of the logistics chain, aiming to add value for customers and stakeholders (Ho et al., 2002). The Supply Chain Operations Reference (SCOR) model, with its five key processes: plan, source, make, deliver, and return, plays a crucial role in achieving SCM efficiency and optimization

through managerial resources and business process reengineering (Saleheen, Habib, Supply, et al., 2018).

The integration of Information and Communication Technology (ICT) in SCM practices is becoming increasingly relevant in the post-Covid-19 service industry, enabling real-time collaboration, efficient data exchange, and supply chain visibility (Basu et al., 2016). This incorporation of ICT solutions enhances resilience and responsiveness, ensuring sustained competitiveness and customer satisfaction in the dynamic post-pandemic environment. The evolving paradigm of SCM is characterized by a nonlinear complex network, facilitating efficient interactions among suppliers and partners, regardless of size, location, or product range (Elomri, 2015). Emphasizing a network approach, SCM underscores the various linkages, including coordination, integration, and collaboration, between supply chain partners (Haddouch et al., 2019b). Successful management of financial, information, and product/service flows necessitates the establishment of synergistic relationships within the supply chain, aiming to maximize value for customers and generate profit for each member (Elomri, 2015). (Cooke, 1997) presents a comprehensive definition of supply chain management (SCM) that underscores its function in coordinating and successfully integrating all activities across the supply chain, ranging from the raw material stages to the final customer, to achieve a competitive edge. The strategic coordination within the supply chain is crucial, particularly where inter-organizational dependencies are concerned. The deployment of information systems further amplifies coordination mechanisms between firms (Elomri, 2015).

The multidisciplinary nature of SCM has resulted in varied definitions, where some approaches concentrate on specific traditional functions like purchasing or distribution, while others adopt a global perspective, viewing SCM as the integration of processes involving all supply chain

members (Storey et al., 2006). Global perspectives highlight the importance of coordination and integration among different stakeholders to create value for customers and enhance overall performance and competitive advantage. In the era of globalization, SCM is envisioned as an extended enterprise connecting businesses in different locations, facilitating alliances to achieve competitive advantage (Saleheen et al., 2018). SCM encompasses materials/supply management, from the supply of basic raw materials to the final product, and even possible recycling and re-use. By focusing on how firms utilize their suppliers' processes, technology, and capabilities to enhance competitive advantage, SCM extends traditional intra-enterprise activities by bringing trading partners together with the common goal of optimization and efficiency (Croom et al., 2000). The core of SCM is the network of organizations that are involved in the production and distribution processes, and that generate value in the form of products and services for the end consumer (Hult et al., 2007).

2.2.2 Supply Chain Management Practices

As researchers explore the adoption of a supply chain orientation in the service industry, it becomes essential to implement a range of practices within the organization and throughout the logistics chain. SCM practices are described as the activities that organizations engage in to achieve effective supply chain management. (Li et al., 2006) . However, existing literature reflects diverse perspectives on SCM practices, with much of the current theoretical and empirical research focusing solely on either the upstream or downstream side of the supply chain, or specific aspects and viewpoints of SCM (Li et al., 2006). To present a comprehensive view of SCM practices in the service industry, this literature review adopts a multidimensional concept, encompassing both the upstream and downstream aspects of the supply chain. The selected SCM practices include Integration, strategic supplier partnership, customer relationship management,

and information sharing (Mentzer et al., 2001; Min et al., 2004). These practices aim to address various dimensions of SCM, such as behavioral integration, mutual information sharing, shared risks and rewards, cooperation, alignment of goals, customer-oriented focus, process integration, and fostering long-term relationships between partners (Min et al., 2004).

Moreover, the literature also highlights other SCM practices that are relevant to the service industry, such as supply chain integration, information sharing, customer service management, geographical proximity between partners, and just-in-time practices (K.-C. Tan et al., 1998). Additionally, focus on core competencies, utilization of inter-organizational coordination systems, and reduction of intermediate stocks through delayed differentiation are emphasized (Alvarado et al., 2001). Long-term relationships with suppliers, effective communication, the existence of inter-functional teams, and supplier commitment play pivotal roles (Chen et al., 2004). Furthermore, factors impacting SCM practices in the service industry include strategic partnerships with suppliers, customer relationships, level of information sharing, and the quality of information sharing (Li et al., 2006). Additionally, SCM practices involve long-term relationships with suppliers, reducing the number of suppliers, and involving suppliers in the design and production process (Li et al., 2006). In the service industry, SCM practices encompass customer segmentation based on service needs, customization of the logistics network to match service requirements, assembling the final product as close to the final market as possible, strategic sourcing management to reduce total cost, adopting a broad supply chain technology strategy, and using performance measures to assess collective success (Anderson et al., 2007). Inter-organizational coordination, just-in-time production, and delivery practices are also of importance (Zhou & Benton, 2007). SCM practices in the service industry are found to encompass customer relationship management, supplier partnership, information sharing,

customer contact development, communication, and speed, all of which play significant roles (Chow et al., 2008). Additionally, the development of closer partnerships with major suppliers and centralized coordination of data are recognized as crucial elements (Croom et al., 2000).

2.2.3 ICT and SCM practices

Information and Communication Technology (ICT) encompasses a set of technologies used to analyze, store, disseminate information, and promote interoperability, efficiency, cost reductions, and machine-to-machine interactions, all aimed at enhancing a firm's performance (Perales et al., 2018). Numerous previous studies have underscored the significance of ICT in supply chain management and its impact on firm performance (Chow et al., 2008; Kassem et al., 2019) (Kassem et al., 2019; Christopher, 2016; Yu, 2015; Baihaqi and Sohal, 2013; Prajogo and Olhager, 2012). In the realm of digitalization, the role of ICT has transcended being merely auxiliary; instead, it actively contributes to sustaining competitive advantages for supply chains (Han et al., 2017). The literature reveals that integrating SCM practices with ICT leads to improved effectiveness and efficiency in service delivery industries (Amarnath et al., 2018; Chan et al., 2012; de Mattos & Laurindo, 2017; J. Han et al., 2009; Marinagi et al., 2015; Siddh et al., 2017; Truong & Hara, 2018). However, it is observed that the utilization of ICT in service industries is comparatively lower than in other sectors (Chong et al., 2009; El Bilali & Allahyari, 2018; Wolfert et al., 2017). ICT resources can be harnessed as a valuable asset for firms and stakeholders when employed efficiently within the supply chain (Ali & Kumar, 2011; Harris et al., 2015; Keček et al., 2019). By enhancing communication and influencing operational and overall performance, ICT plays a vital role (Bayo-Moriones et al., 2013; Tatoglu et al., 2016; Yunis et al., 2018). Information technologies facilitate better coordination among supply chain members and positively impact information sharing (Alderete et al., 2018; Zhang et al., 2016;

Mohammadi et al., 2012; Evans, 2007). At the process level, ICT resources contribute to generating value for firms. Studies have shown that technological innovation moderates the relationship between ICT and process productivity (Kijek & Kijek, 2019). For instance, case-based research in India demonstrated that ICT-enabled services lead to better decision-making for educated farmers in agricultural supply chains (Ali & Kumar, 2011). Moreover, mobile-based services have been advocated to reduce risks in agricultural service delivery for Indian farmers, providing quality information at their fingertips (Mittal & Hariharan, 2018). ICT plays a crucial role in sharing information rapidly across the supply chain (Daneshvar Kakhki & Gargeya, 2019). It also aids in the development of new buyer-supplier relationships that prove valuable for supply chain partners (Caputo and Walletzky, 2017; Wamba et al., 2015) (Caputo et al., 2017; Fosso Wamba et al., 2015). The use of ICTs has been found to foster supplier relationship development and reduce costs by integrating tasks across the value chain (Luisa Dos Santos Vieira et al., 2013; Scuotto et al., 2017).

2.2.4 SCM Practices and the Service Industry

The Service Industry has become an area of immense interest for researchers, managers, and consultants, particularly with a specific focus on Supply Chain Management (SCM) practices (Hamister, 2012; J. H. Han et al., 2017). These SCM practices encompass a wide array of strategies and methodologies adopted by firms to improve the effectiveness and efficiency of their supply chain management, leading to streamlined processes, improved customer satisfaction, and cost reduction (Li et al., 2006). Among these practices, the concept of "best supply chain practices" refers to initiatives that exert influence over specific supply chain processes or even the entire supply chain structure, aiming to optimize performance and achieve competitive advantages (Cuthbertson & Piotrowicz, 2008; Gardner et al., 2019). The relationship

between SCM practices and organizational performance has been extensively researched and explored, with a specific focus on the service industry in India (Banerjee & Mishra, 2017; Luzzini et al., 2015; Vencataya et al., 2016). Notably, within this industry, SCM practices have demonstrated a significant impact on firms, playing a pivotal role in their success and growth trajectory, though the extent of this influence may vary across different organizations and sectors (Banerjee and Mishra, 2017). Studies have consistently shown that firms that strategically implement and adopt effective SCM practices experience improved service quality, reduced operational costs, enhanced supply chain visibility, and better overall organizational performance (Gold and Schleper, 2017; Gharakhani, 2012).

One of the key aspects driving the effectiveness of SCM practices in the service industry is their ability to achieve a harmonious balance between forecasting and distribution, facilitating better resource allocation and optimized inventory management (Truong et al., 2017; Tatoglu et al., 2016; Spina et al., 2015). By optimizing these aspects, service-oriented organizations can achieve higher operational efficiency, ensuring timely delivery of services and meeting customer demands more effectively. Furthermore, emerging research has pointed towards the positive correlation between SCM practices and profitability for service-oriented organizations (Kumar & Kushwaha, 2018). The strategic alignment of SCM practices with the organization's overall business objectives enables better cost control, improved utilization of resources, and reduced lead times, ultimately contributing to improved financial performance. The cumulative insights from the literature review unequivocally underscore the substantial influence of SCM practices on the overall performance of service firms. However, it is vital to recognize that the specific nature and magnitude of this influence are contingent upon the unique contexts and circumstances of individual organizations, as well as the specific intricacies of the service industry they operate

in. As the service industry continues to change and evolve, the significance of further research and exploration of SCM practices cannot be overstated. The evolving business landscape, technological advancements, and changing customer demands necessitate continual evaluation and adaptation of SCM practices to stay competitive and deliver value to customers. Thus, efforts to explore and implement effective SCM practices remain paramount for organizations seeking to establish and maintain a competitive edge within their respective markets.

2.3 Theoretical Review

Supply Chain Management (SCM) encompasses the comprehensive integration, planning, coordination, and control of all business processes and activities within the supply chain, aimed at delivering superior value to consumers while optimizing costs and satisfying the requirements of various stakeholders, including government and NGOs (Van der Vorst, 2004) . This strategic approach involves the coordination of traditional business functions both within individual companies and across businesses within the entire supply chain, with the ultimate goal of enhancing the long-term performance of each company and the overall supply chain. In this study, we employ the Resource-Based View (RBV), Transaction Cost Economics (TCE), and the Technology Acceptance Model (TAM) to assess the impact of Information and Communication Technology (ICT) on supply chain management practices in the service industry post-covid-19.

2.3.1 Resource-Based View (RBV)

The Resource-Based View (RBV), initially proposed by (Wernerfelt, 1984), offers a managerial framework that identifies strategic resources capable of providing a competitive advantage to a firm. By leveraging these resources, a firm can attain sustainable competitive advantage. RBV asserts that firms are unique due to their possession of diverse resources, leading to different strategic approaches based on their distinct resource combinations. Through RBV, managerial

attention is directed towards the firm's internal resources to identify assets, capabilities, and competencies that can potentially lead to superior competitive advantages. In our study on the value of Information and Communication Technology (ICT) in digitally enabled supply chains, we primarily draw upon RBV to understand how technology creates value (Zhu and Kraemer, 2012).

The RBV attributes the enhancement of firm performance to valuable resources or resource bundles (Barney, 1991; Peteraf, 2013). Within the context of ICT value creation, one perspective is the indirect role of ICT in firm performance. Process performance improvements in supply chain integration mainly revolve around revenue generation and cost reduction (Mukhopadhyay and Kekre, 2012). From the RBV standpoint, these improvements stem from resource synergy along the supply chain. Effective Supply Chain Management (SCM) endeavors to synchronize supply, production, and delivery (Lee et al., 2012). To achieve this, firms must harness the Internet's connectivity to establish an inter-firm digital platform, facilitating real-time information sharing and enhancing resource coordination across the supply chain (Lee, 2014). The digital platform fosters connections among distinct resources owned by supply chain partners, converting them into bundles of interdependent resources that complement each other, as advocated by the RBV's concept of resource synergy (Conner, 2011).

Furthermore, the integration across different stages of the supply chain enables each partner to focus on their specific operations, reducing the need for redundant resources and enhancing resource utilization while lowering operational costs. Horizontal partners can further achieve cost reduction through resource synergy (Lee, 2012).

2.3.2 Transaction Cost Economics (TCE)

Transaction Cost Economics (TCE), introduced by Coase in 1937, provides a theory that delves into organizational efficiency, with a specific focus on structuring and governing complex transactions to minimize inefficiencies. TCE's perspective is highly applicable in understanding the significance of coordination costs among economic entities in markets, underscoring a firm's vital role in efficiently coordinating transactions (Williamson, 2015). In this context, ICT assumes a critical role in reducing coordination costs and enhancing transactional efficiencies in supply chains. By empowering digitally enabled integration capabilities, ICT can substantially elevate supply chain performance through improved information sharing and communication capabilities (Zhu and Kraemer, 2015). Consequently, the implementation of ICT in supply chain and logistics management has garnered substantial attention from both the business and academic communities. Lee and Wang (2011) have explored the potential of Internet-based collaboration to mitigate the bullwhip effect in supply chains, effectively demonstrating the benefits of technology application within the supply chain context. This technology-driven approach has the potential to enhance various aspects, including supply chain agility, reduced cycle time, improved efficiency, and punctual product delivery to customers. As a result, the integration of ICT in supply chain practices holds great promise for driving positive outcomes and optimizing overall supply chain performance, especially in the dynamically transformed landscape post Covid-19 promptly.

2.3.3 Technology Acceptance Model (TAM)

In the context of examining the impact of ICT on supply chain management practices in the service industry, particularly from a post Covid-19 perspective, the Technology Acceptance Model (TAM) by Davis (1989) stands as one of the most influential theories explaining the

adoption of ICT. TAM provides a theoretical framework aiming to predict and explain ICT usage behavior, shedding light on the factors that lead potential adopters to either accept or reject the use of information technology. The core constructs in TAM, perceived usefulness and perceived ease of use, are fundamental determinants of system use, predicting users' attitudes towards adopting the system. Perceived usefulness refers to the belief that using a particular system would enhance job performance, while perceived ease of use reflects the belief that using the system would be effortless (Davis, 1989). However, the adoption of ICT in supply chain management practices faces challenges related to security and reliability concerns. Fear of potential data breaches and fraud inhibits the adoption of ICT in organizations, leading to reluctance in conducting online transactions involving personal information (Olusegun et al., 2016). The lack of trust in supply chains can also be attributed to the potential risks of data or money theft (Olusegun et al., 2016).

Successful companies, on the other hand, have leveraged ICT to develop focused e-business solutions that enhance customer service and contribute to operational success factors (Lim & Palvia, 2001). Electronic Data Interchange (EDI), for instance, positively impacts order cycle time, distribution flexibility, and product availability, among other elements crucial to business operations (Lim and Palvia, 2011).

Furthermore, ICT in supply chain management has enabled streamlined logistics flows, reduced inventory, improved customer service, and facilitated efficient information transfer (Graham et al., 2013). The integration of ICT has also led to a reduction in cycle time, minimization of the bullwhip effect, and enhanced distribution channels' effectiveness (Levary, 2010). Vendor-Managed Inventory is one such ICT-enabled practice that fosters information sharing between buyers and sellers, allowing for better forecasting and inventory management (Levary, 2010).

These advancements indicate the significant role of ICT in optimizing supply chain management practices within the service industry, particularly in the dynamic landscape post Covid-19.

2.4 Empirical Review

In the realm of managing supply chains and enhancing firm performance, the integration of Information and Communication Technology (ICT) has grown increasingly indispensable (Perales et al., 2018). Extensive research has underscored the pivotal role of ICT in Supply Chain Management (SCM) practices and its profound impact on supply chain effectiveness and efficiency (Baihaqi & Sohal, 2013; Christopher, 2016; Kassem et al., 2019; Prajogo & Olhager, 2012; Yu, 2015). By fostering collaboration and integration across functional departments and engaging both upstream and downstream partners, ICT emerges as a critical driver for bolstering SCM practices (J. H. Han et al., 2017; G. Li et al., 2009; Tsai & Pawar, 2018; Yu, 2015). In the digital era, ICT transcends its auxiliary role, actively contributing to sustained competitive advantage for supply chains (J. H. Han et al., 2017). Through ICT implementation, the bullwhip effect can be minimized, and supply chain performance significantly improved (Cegielski et al., 2012; C. Li, 2013; Vanpoucke et al., 2014).

In the domain of service industries, SCM practices backed by ICT have been shown to enhance effectiveness and efficiency (Amarnath et al., 2018; Truong and Hara, 2018; Siddh et al., 2017; De Mattos and Laurindo, 2017; Marinagi et al., 2015; Wang et al., 2012; Han et al., 2009). However, despite its potential, the utilization of ICT in agri-food chains lags behind other industries (El Bilali and Allahyari, 2018; Wolfert et al., 2017; Chong et al., 2009).

ICT resources play a vital role in adding value to firms and stakeholders through efficient supply chain practices (Keček et al., 2019; Harris et al., 2015; Ali and Kumar, 2011). By enabling effective communication and impacting overall firm performance, ICT emerges as a critical

enabler for SCM capabilities and coordination among supply chain members (Yunis et al., 2018; Tatoglu et al., 2016; Bayo-Moriones et al., 2013). The adoption of ICT resources leads to improved process productivity and facilitates buyer-supplier relationships (Kijek and Kijek, 2019; Caputo and Walletzky, 2017; Wamba et al., 2015). Moreover, ICT facilitates supplier relationship development, cost reduction, and integration across the value chain (Scuotto et al., 2017; Saviano and Caputo, 2013; Luisa dos Santos Vieira et al., 2013) (Bologna et al., 2013; Luisa Dos Santos Vieira et al., 2013; Scuotto et al., 2017). The potential of ICT in enhancing supply chain management practices in the service industry is vital, particularly in the transformative landscape post Covid-19.

2.5 Conceptual Framework

The conceptual framework for investigating the relationship between ICT adoption and its impact on service industry supply chain management practices is based on four important SCM practices: integration, strategic supplier partnership, customer relationship management, and information sharing. The framework seeks to comprehend how ICT deployment effects various SCM practices, resulting in increased supply chain efficiency and overall performance in the post-Covid-19 era.

1. **ICT:** This variable represents the extent to which the Service Industry embraces and integrates Information and Communication Technology (ICT) into its supply chain operations.
2. **Dependent Variables: SCMP**
 - a) **Supply Chain Integration:** This variable measures the degree of coordination and collaboration among supply chain partners within the Service Industry, resulting from the adoption of ICT.

- b) **Strategic Supplier Partnership:** This variable assesses the level of strategic alliances and partnerships with suppliers in the Service Industry, enabled by the integration of ICT.
- c) **Customer Relationship Management:** This variable evaluates the quality of customer interactions and satisfaction achieved through ICT-enabled communication and personalized services.
- d) **Information Sharing:** This variable examines the transparency and efficiency of data sharing among supply chain partners within the Service Industry, facilitated by ICT adoption.

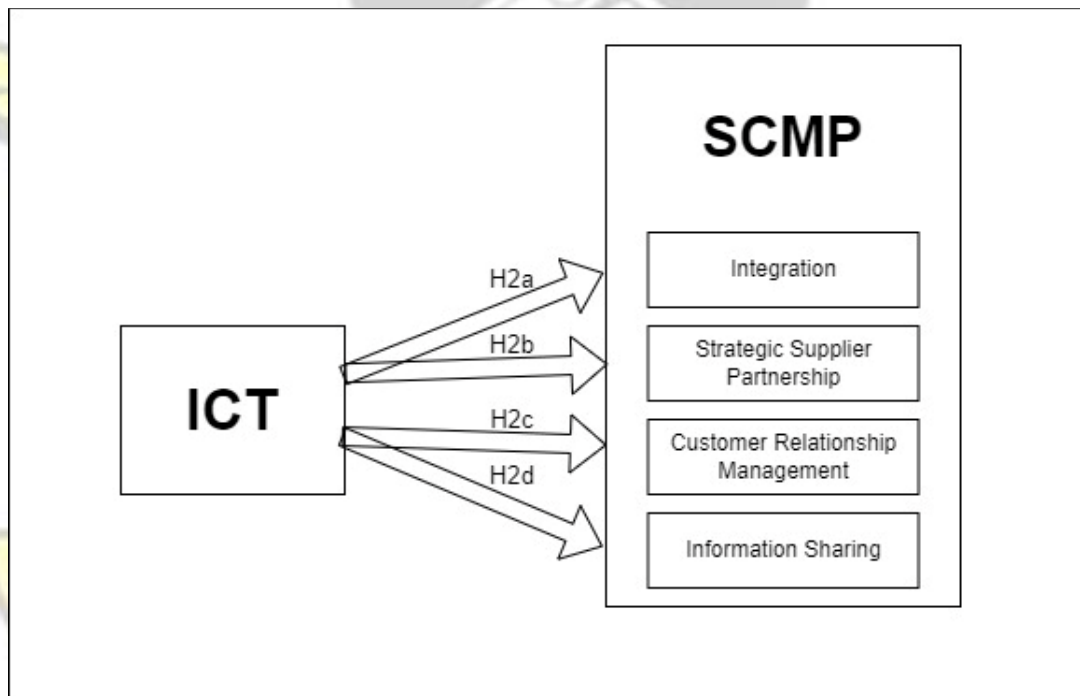


Figure 2.1 Conceptual Framework (Source: Author's Construct)

The conceptual framework (see Figure 2.1) illustrates how the adoption of ICT in the Service Industry influences SCM practices, which, in turn, leads to improvements in supply chain

efficiency, supplier relationships, customer satisfaction, and information sharing. Through this framework, researchers and practitioners can better understand the interplay between ICT and SCM practices and devise strategies to optimize supply chain performance in the dynamic post Covid-19 landscape of the Service Industry.

2.6 Hypothesis Development

2.6.1 Areas of supply chain management in the service industry where ICT is implemented

The empirical literature on supply chain management has identified various areas and instances where ICT is applied in the supply chain in the service industry (Craighead et al., 2020). The review of the literature reveals that ICT is used in the supply chain in many industries. The empirical literature in this study on the study area is discussed below. The service industry in world is evidenced to have different areas where information technology is applied (Kayikci et al., 2022). Among the various areas where ICT is implemented in the supply chain industry is food services (Hobbs, 2021). The literature has identified that the food services or the foodstuff market have recently seen the application of information technology in the field (Rejeb et al., 2021). The service industry from the evidence in the literature has seen various ICT tools being applied in the food services market. That is, the supply chain for the services industry has identified various technological tools that are applied in the industry. There are various evidence of ICT tools adoption and applicability in the supply chain in the service industry.

Also, there are other areas like food delivery where ICT tools are used. The food delivery sector has recently seen various firms that dwell on information and communication technology for their operations (Rejeb et al., 2021). There exist various food delivery firms in the industry that have been identified in the literature with the use of ICT tools that have augmented the operations of these firms. That is, findings in various studies have shown the food delivery sector as one of the

areas in the industry where information communication technology is widely used in the industry (McAdams et al., 2019). Additionally, the food processing sector has revealed that various information and communication tools are used in the sector (Nakat & Bou-Mitri, 2021). The supply chain in the food processing and food preparation within the restaurants is based on evidence from the literature studies conducted in this line. The results from the literature of this study lead to the formulation of the hypothesis that various areas of the service industry in Ghana have adopted ICT in their operations following the Covid- 19 pandemic.

H1: The service industries in Ghana have significantly adopted ICT in their operations

2.6.2 The Role of ICT on Supply Chain Management Practices in the Service Industry in Ghana

The implementation of Information and Communication Technology (ICT) within Supply Chain Management Practices (SCMP) is no longer merely an advantageous strategy but has become an essential part of enhancing the service industry's efficiency, particularly in emerging economies like Ghana. Integration is one of the key areas where ICT plays a vital role. Through the seamless fusion of various processes, departments, and partners within the supply chain, ICT enables a holistic approach to management (Prause, 2019). This integration facilitates real-time decision-making and responsiveness, reflecting the dynamic nature of modern business environments. Strategic supplier relationships have been equally transformed by ICT. In the past, establishing and maintaining supplier relationships was a complex and time-consuming process. Now, with the aid of ICT, businesses can efficiently manage their interactions with suppliers, creating a more collaborative and transparent relationship that aligns with both short-term needs and long-term strategies. Seamless information sharing across the supply chain has also been a significant gain from ICT implementation. Information sharing is crucial in managing demand, aligning

inventory levels, and coordinating between different supply chain actors. With the aid of ICT, information flows quickly and accurately, reducing errors, improving alignment, and ultimately driving customer satisfaction. However, the road to these benefits is not without challenges. Internal factors such as organizational readiness, leadership alignment, resource availability, and technological governance can act as barriers (Kozioł-Nadolna & Beyer, 2021). These obstacles require careful navigation, including staff training, clear strategic vision, and ongoing investment in technology and process improvements. External factors present additional complexity, with economic, legal, and technological aspects potentially influencing the effectiveness of ICT application (Leskova et al., 2020). Economic fluctuations, changes in regulations, and rapid technological advancements require constant monitoring and adaptation, adding layers of complexity to ICT integration within the supply chain. Yet, the potential rewards make overcoming these challenges a priority. An optimized supply chain, achieved through the successful integration of ICT, offers not only enhanced efficiency but also adaptability and resilience. The need for these qualities has been accentuated in the aftermath of the Covid-19 pandemic, which exposed the vulnerabilities of traditional supply chain models and accelerated the need for digital transformation. Consequently, the following hypotheses will guide the study:

H2a: *The implementation of ICT within SCMP positively impacts integration*

H2b: *The integration of ICT in SCMP has a positive impact on supplier relationships.*

H2c: *The implementation of ICT within SCMP positively impacts customer relationship management*

H2d: *Information Sharing is positively affected by the implementation of ICT within SCMP*

2.6.3 Relevance of ICT on the Supply Chain of Service Industry in Ghana After the Covid-19 Pandemic

Literature emphasizing the effects of Information and Communication Technology (ICT) on the supply chain in the service industry reveals consistent findings regarding the positive impact of technology. Various studies have underscored how the integration of ICT has revolutionized traditional supply chain management practices, contributing to improved efficiency, agility, and collaboration (Shiralkar et al., 2021). In the planning phase, ICT facilitates accurate forecasting and demand planning, allowing organizations to align their resources effectively. This strategic alignment has been observed to reduce wastages and enhance responsiveness across various industries (Ghonim et al., 2022). When it comes to scheduling, ICT plays a vital role in orchestrating complex supply chain tasks, ensuring that all components are synchronized. This technological orchestration leads to timely execution, which is paramount in today's fast-paced service industry (Jaradat et al., 2016). Enhancing overall operations is another area where ICT has shown a remarkable impact. From procurement to distribution, ICT tools have enabled real-time tracking, analytics, and decision-making, transforming the traditional supply chain into a more dynamic, responsive, and customer-centered entity. In the specific context of Ghana's service industry, the literature indicates a burgeoning recognition of how ICT adoption improves operations and supply chain management (Fu, X., & Hou, J., 2020). The studies reveal that both small and large service organizations in Ghana have benefited from ICT, overcoming geographical barriers, enhancing communication with suppliers, and improving overall efficiency. The Covid-19 pandemic has brought these findings into sharp relief, highlighting the essential role of ICT in ensuring reliability, timely delivery, and marketing improvements (Van der Vorst et al., 2005). During a time when physical movement was restricted, ICT became a

lifeline for many service industries, not only in Ghana but globally. The technology allowed for uninterrupted supply chain functions, adapting to the challenges of the pandemic, and ensuring the continuity of essential services. This growing body of evidence underscores the importance of further study, particularly in the Ghanaian context and in the aftermath of the global pandemic. Ghana's unique socio-economic landscape, coupled with the transformative impact of Covid-19 on business processes, presents a compelling case for examining how ICT can be leveraged further. Thus, the study will explore the following hypothesis:

H3: *In the post-Covid-19 scenario, the application of ICT will continue to have positive impacts on supply chain management in the Service industry in Ghana.*



CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter is divided into many areas that are critical to the study design. In the first section, we delve into the research design, including the population and sampling technique, sample size, sources of data, data collection methods, and instruments used, as well as the analysis technique, reliability and validity testing, and research model. The second section, meanwhile, specifically focuses on the target population of the study area. By thoroughly examining these sections, we acquire a better grasp of the research design and the factors that are essential to its success. With a clear understanding of the research design and study area profile, we can make informed decisions about data collection and analysis, ensuring that our research is both reliable and valid.

3.2 Research Design

A research design serves as a methodological plan that guides the researcher in addressing research questions and providing answers (Ali & Kumar, 2011). It outlines the structure, plan, and strategy of the study, ensuring a systematic approach to answering the research questions (Kerlinger, 1973). In this study, grounded on an ontological perspective, the objective is to get a better understanding of the significant role played by ICT in transforming supply chain management practices in the services industry. To achieve this, a quantitative research method is necessary. Given the nuanced nature of the research topic, which focuses on identifying areas in the supply chain that have been implemented in the industry, an in-depth study is warranted. It should be noted that the study's goal is to provide a snapshot of the problem rather than generalizable answers, making the case study design particularly appropriate (Rudolph et al., 2015). The research design adopted for this study is a combination of descriptive and explanatory

research design. A descriptive research design aims to describe the current situation, characteristics, or behavior of a phenomenon, using quantitative data and statistical analysis (Bhattacharjee, 2012). An explanatory research design aims to explain the causal relationships, effects, or outcomes of a phenomenon, using hypotheses testing and inferential statistics (Saunders et al., 2019). This research design is suitable for the research objectives and hypothesis, as it allows the researcher to describe the extent and patterns of ICT adoption and utilization in the service industry, and to explain the impact and implications of ICT on the supply chain management practices and performance. The research design also enables the researcher to test the hypotheses derived from the literature review and the theoretical framework, and to draw conclusions and recommendations based on the findings.

To ensure diversity and representativeness, a representative sample of businesses operating in the service industry will be selected using random sampling techniques. Data collection will involve the administration of survey questionnaires designed to gather quantitative data on the extent of adoption and utilization of ICT-enabled strategies across numerous sectors of supply chain management. The quantitative data collected was thoroughly analyzed using relevant statistical techniques, like descriptive statistics to identify significant patterns and relationships, and inferential statistics to test the hypotheses and examine the causal effects. Charts and graphs will also be used to show the trends in the adoption of ICT tools in the service industries.

3.3 Population

This study's target population consisted of Ghana-based businesses that engaged in supply chain management and had implemented or considered implementing e-commerce strategies. Relevant and meaningful data could be obtained from the chosen population so that conclusions could be drawn and inferences that applied to businesses in Ghana's supply chain and e-commerce

landscape could be made. This population included service organizations, encompassing a wide range of sectors such as financial and banking, healthcare, transportation and logistics, education and training, and others. It involves service companies, institutions, and establishments that offer various services to customers and clients in Ghana. The unit of analysis was individual businesses or organizations. The research focused on studying and analyzing the practices, strategies, and outcomes of specific businesses operating in Ghana. Each business or organization served as a separate unit of analysis, and data was collected and analyzed at the individual company level. The research aimed to understand how e-commerce strategies were implemented within the supply chain network design of each organization and examined the factors that contributed to the success or effectiveness of this relationship.

By studying multiple businesses as individual units of analysis, the research gained insights into the diverse approaches, challenges, and outcomes related to the extent of usage of these ICT tools before and after Covid-19. In order to draw broader conclusions and make generalizations regarding the relationship between e-commerce and supply chain network design in the context of the target population, the data were then combined and thoroughly examined.

3.4 Sample Size and Sampling Technique

The sampling method involves population sampling and the use of data collected as research information (Saunders et al., 2018). By reviewing the sample data, the sampling approach gave many methods for the researcher to limit the amount of data obtained, as well as any possible population or item. A simple random sample procedure was used to choose individual survey participants. To ensure that all respondents had an equal chance of being selected for the survey, a simple random selection procedure was applied. In all, a total of one hundred and fifty (150) respondents were selected to participate in the data collection using questionnaires.

3.5 Sources of Data

There are typically two types of data sources that are frequently utilized, namely primary data and secondary data. Primary data is gathered directly from the source, usually from respondents or participants, and can be acquired via various methods such as surveys, interviews, focus groups, and observation. Because primary data is obtained straight from the target population or sample, it is considered more trustworthy and precise. Secondary data, in contrast, is collected by someone else and is often found in pre-existing sources such as books, journals, government reports, and databases. Although secondary data is easier and faster to obtain, its accuracy and reliability depend on the quality of the source from which it is obtained. In the context of this study, primary data would be the appropriate source of data. In this study, the researcher utilized primary data sources that were acquired through the use of questionnaires. Concerning collecting data, the researcher will enlist the aid of research assistants to facilitate the process. In the event that some respondents may find certain items on the research instrument difficult to comprehend, the researcher or the research assistants will endeavor to explain their understanding without influencing their response.

3.6 Data Collection Method

In research, specific tools must be employed to acquire the essential information or data in order to attain the desired outcome. There exist numerous significant instruments, such as questionnaires and interview schedules, which are utilized for this purpose (Wagner, 2020). The structured questionnaire administered to companies in the supply chain sector served as the primary source of data. The questionnaire was thoughtfully designed to gather pertinent information about the utilization of ICT tools in service industries. The questionnaire was distributed to a sample of companies representing various industries and sizes in the study area

of Ghana. The questionnaire included Likert scale questions to assess the level of adoption of these ICT tools before and after the Covid-19 pandemic. To guarantee the credibility and dependability of the data, considerable focus was placed on the creation and testing of the questionnaire. Moreover, a preliminary assessment was carried out with a limited number of respondents to pinpoint any possible problems or uncertainties in the questionnaire. Although the purpose of data collection is to approximate the situation under study, a sceptical attitude and regular steps were taken back to avoid bias (Straw & Corbin, 1990).

Table 3.1 Constructs and Measures of ICT Impact on Supply Chain Management in the Service Industry Post-COVID-19

CONSTRUCTS	ITEMS USED IN MEASURING CONSTRUCTS	SOURCES
ICT	Level of Adoption of the following ICT tools before the covid-19 pandemic	(Bag et al., 2021;
	ICT1. Data Management Software (eg. Oracle)	Mishra,
	ICT2. Online communication platforms (eg. Zoom, Skype)	2020; Pérez-
	ICT3. Task Management Software	López et al.,
	ICT4. Mobile Apps for Real-time Updates	2021)
	ICT5. Electronic Data Interchange (EDI)	
	ICT6. Supplier Relationship Management (SRM) software	

ICT7. Enterprise Resource Planning (ERP)

ICT8. Customer Relationship Management (CRM)

software

ICT9. Transportation Management System (TMS)

ICT10. Inventory Management Software

ICT11. Artificial Intelligence (AI) for demand forecasting and planning

ICT12. GPS and location tracking

Level of Adoption of the following ICT Tools after the covid 19

ICT13. Data Management Software (eg. Oracle)

ICT14. Online communication platforms (eg. Zoom, Skype)

ICT15. Task Management Software

ICT16. Mobile Apps for Real-time Updates

ICT17. Electronic Data Interchange (EDI)

ICT18. Supplier Relationship Management (SRM) software

ICT19. Enterprise Resource Planning (ERP)

ICT20. Customer Relationship Management (CRM) software

ICT21. Transportation Management System (TMS)

ICT22. Inventory Management Software

	ICT23. Artificial Intelligence (AI) for demand forecasting and planning	
	ICT24. GPS and location tracking	
SCMP	Integration I1. The integration of ICT tools has enhanced internal communication processes within our organization I2. The use of ICT tools has improved the efficiency of resource allocation across our supply chain I3. ICT tools have increased the visibility of inventory and stock levels at various stages of the supply chain I4. The adoption of ICT tools has contributed to a reduction in delays and bottlenecks in our supply chain operations Strategic Supplier Partnership SSP1. The utilization of ICT tools has enabled us to effectively track and monitor the performance of our strategic suppliers SSP2. ICT tools have facilitated timely and accurate communication of demand forecasts and production schedules to our strategic suppliers. SSP3. The adoption of ICT tools has fostered improved collaboration with strategic suppliers, particularly in new product development initiatives SSP4. The use of ICT tools has strengthened our ability to manage and mitigate risks associated with our strategic suppliers Customer Relationship Management	(Ajmal et al., 2023; Zaid et al., 2021)

CRM1. ICT tools have nurtured a culture of open communication and knowledge sharing among our supply chain partners

CRM2. The adoption of ICT tools has streamlined joint decision-making and problem-solving processes with partners in the supply chain

CRM3. ICT tools have contributed to enhanced alignment of goals and objectives among various entities within the supply chain

CRM4. The use of ICT tools has positively influenced our organization's responsiveness to dynamic market conditions through collaborative efforts

Information Sharing

IS1. ICT tools have improved the accuracy and reliability of information shared among our supply chain partners

IS2. The adoption of ICT tools has resulted in enhanced data security and privacy during information sharing processes

IS3. ICT tools have facilitated real-time tracking and monitoring of goods in transit, leading to improved coordination

IS4. The use of ICT tools has empowered our organization to respond more effectively to disruptions and unexpected events within the supply chain

3.7 Research Instrument

A research instrument refers to any tool that is utilized to gather data from respondents, including but not limited to empirical observations, questionnaires, and interviews (Saunders et al., 2018). For the purposes of this study, well-constructed questionnaires will be utilized as the research instrument in accordance with the research objectives. The use of questionnaires as a research instrument provides various advantages, such as cost effectiveness, convenience, and time efficiency (Rahi, 2017). Among other reasons, questionnaires will be utilized for the survey.

3.8 Data Analysis

Saunders et al. (2018) stipulated that research analysis is the ability to disaggregate data and clarify the nature of the components and the relationship between them. The data was analyzed by the researcher utilizing the Statistical Package of Social Sciences (SPSS) and Microsoft Excel. The collected questionnaire data underwent a comprehensive analysis process to extract valuable insights. Initially, the responses were compiled and cleaned to ensure accuracy. Descriptive analysis provided a snapshot of participants' attitudes through calculations of frequencies, standard deviations, and averages. Correlation assessments revealed relationships between variables, and where applicable, statistical tests were conducted. The interpretation of these findings led to conclusions aligned with the research objectives. The results were presented through charts, discussing implications, connections to existing knowledge, and potential practical applications. This rigorous analysis ensured a robust understanding of participants' perspectives and enhanced the study's validity.

3.9 Reliability and Validity

To guarantee the reliability of the data, the Cronbach's alpha coefficient was computed for the research variables, and the resulting value exceeded the ideal threshold of 0.7 (Taber, 2018).

Additionally, to ensure both reliability and validity of the data, the research instrument, which will be in the form of a questionnaire, will be scrutinized via peer review and by the supervisor. The data was collected randomly from respondents who were willing and able to respond to the survey, with little or no direct assistance from the researcher.

3.10 Profile of the Study Area

The core focus of this study is the service industry in Ghana, a critical contributor to the country's GDP and a significant provider of employment opportunities. This industry spans a variety of sectors such as retail, healthcare, education, banking, and hospitality, each characterized by intangible products, direct customer interactions, and a reliance on human resources. Over the past decade, Ghana has made remarkable strides in ICT adoption, which has had a transformative impact on its service industry. The role of ICT extends beyond communication, evolving into an integral part of information management, customer service, operational efficiency, and crucially, supply chain management. The COVID-19 pandemic has emphasized the vital role of ICT in the Ghanaian service sector, ensuring business continuity by enabling remote work, facilitating online transactions, and allowing for digital supply chain management. This reliance on ICT has continued into the post-pandemic era, redefining the "new normal" within Ghana's service industry. Despite being less visible than in manufacturing, supply chain management in the service industry plays an equally vital role, involving the coordination of people, activities, and resources to ensure seamless service delivery. In the post-pandemic environment, the Ghanaian service industry is confronted with the challenge of integrating the accelerated digital transformation into long-term strategies, including incorporating ICT into supply chain management practices to ensure resilience and efficiency. Consequently, this study will explore

this integration within the Ghanaian context, providing insights that could potentially shape the future of supply chain management in Ghana's service industry.

3.11 Ethical Consideration

Given the importance of ethical considerations in research studies, the researcher made every effort to ensure that the research was devoid of any ethical issues. Consequently, the researcher maintained complete honesty in all communications, reporting data, results, methodologies and procedures with complete integrity. There was no fabrication, falsification or misrepresentation of data, and to ensure good research ethics, the researcher avoided any potential biases in data collection, analysis, and interpretation, among others. Additionally, all promises and agreements were kept, particularly with regard to the privacy of respondents, who were assured that any collected data would be used solely for academic purposes. Lastly, the researcher made sure that all selected respondents were guaranteed voluntary participation and were free to withdraw at any time during the research, ensuring that they were not subjected to any form of stress in any way.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter contains the study's findings and discussions. The response rate and the survey participants' demographic information for the questionnaires was displayed. The findings describe the supply chain management methods used in the service business, their use of ICT tools, and the impact of these technologies on supply chain management practices in the same industry, particularly after Covid-19. These findings were also debated.

4.2 Response Rate

Questionnaires were administered online using Google Forms as the medium for data collection. A total of 200 questionnaires were distributed to potential participants via this digital platform. From this outreach, 161 responses were received from respondents engaging with our survey and providing valuable input. Following a review and validation process, 150 of the received responses were deemed to meet the criteria for usability. These 150 responses formed the basis of our dataset for subsequent analysis and interpretation.

4.3 Demographic Characteristics of Survey Participants

The provided demographic data offers valuable insights into the characteristics of the organizations and respondents involved in the research. The distribution of the type of service provided by the organizations shows that the majority falls under the category of "Others" (52%), indicating a diverse array of service industries under study. Additionally, transportation and logistics (28%) comprise a significant proportion, followed by healthcare (8%), financial and banking (6.67%), and education and training (5.33%) (refer to Table 4.1). This variation in the

type of service provided presents a comprehensive exploration of how different service sectors have integrated ICT into their supply chain management practices post-Covid-19. The location of the organization's head office is also significant, with a considerable representation of organizations in the Southern Belt, particularly Greater Accra (55.33%). This distribution is crucial as it highlights the potential influence of regional dynamics on the adoption and effectiveness of ICT tools in supply chain management practices. It allows for a more focused investigation into how specific regions, such as Greater Accra, have leveraged ICT to optimize their supply chain operations post-Covid-19. Moreover, the years of operation of the organizations show a diverse spread, with 39.33% of organizations having been in operation for 11 to 20 years. This variation in operational duration presents a unique opportunity to study the evolution of ICT adoption in supply chain practices over time, enabling the research to capture insights from both long-established and relatively newer organizations. The significant proportion of respondents (78.67%) being part of their organizations for over 5 years is significant, as it ensures that the research gathers perspectives from experienced individuals familiar with their organization's supply chain dynamics and the impact of ICT tools on their operational efficiency. Furthermore, the educational qualifications of the respondents display a well-educated sample, with 1st-degree holders forming the majority (51.33%) and master's degree holders comprising 24%. This educated sample strengthens the credibility of the research findings and provides valuable insights into how well-informed professionals perceive and utilize ICT tools in their supply chain management practices. The distribution of respondents across various positions, such as supply chain/logistics managers (12.67%) and operations managers (14%), allows for a comprehensive analysis of ICT adoption and its impact on supply chain management from multiple managerial perspectives within the organizations. Finally, the

considerable proportion of respondents (74%) holding their current positions for 11 years or above indicates extensive experience in supply chain management practices. This wealth of experience is valuable for the research, as it enables the exploration of how ICT tools have evolved and shaped supply chain management practices over an extended period, particularly after the challenges posed by the Covid-19 pandemic.

Table 4.1: Demographic Information of Questionnaire Respondents

Description	Frequency	Percentages
Type of service provided by the organization		
Financial and Banking	10	6.67
Healthcare	12	8%
Transportation and Logistics	42	28%
Education and Training	8	5.33%
Others	78	52%
Total	150	100%
Location of Organization Head Office		
Northern Belt (eg. Northern Region)	14	9.33%
Middle Belt (eg. Ashanti Region)	53	35.33%
Southern Belt (eg. Greater Accra)	83	55.33%
Total	150	100%
Years Organization Has Been in Operation		
5 or below	13	8.67%
6 – 10	34	22.67%
11 – 20	58	39.33%
21 or above	45	30%
Total	150	100%
Respondent Being Part of the Organization for over 5 Years		
Yes	118	78.67%
No	32	21.33%
Total	150	100%
Highest level of education of the respondent		
Senior High School	9	6%
Diploma	24	16%
1st Degree	77	51.33%
Master's Degree	36	24%
PhD	4	2.67%
Total	150	100%

Position of Respondent in Organization		
CEO	4	2.67%
Supply Chain/Logistics Manager	19	12.67%
Operations Manager	21	14%
Procurement Officer	26	17.33%
Customer Service Representation	15	10%
Other	65	43.33%
Total	150	100%
How long Respondent has held the current position		
5 or below	9	6%
6 – 10	29	19.33%
11 or above	112	74%
Total	150	100%

4.4 Descriptive Statistics of ICT Tools Adoption

This section presents the mean response of respondents who partook in the survey of the study. Five-point Likert scale was used were strongly disagree=1, disagree=2, neutral=3, agree=4, and strongly agree=5.

4.4.1 ICT Tools Adopted in the Service Organization

Table 4.2 presents data on the degree of ICT tool integration in supply chain management and the level of concurrence regarding the advantageous effects of these tools on SCM practices. The average, mode, and standard deviation were calculated for the extent of adoption of different ICT tools in service organizations to enhance supply chain efficacy. This evaluation was based on a scale on a scale from 1 to 4, where 1 represents "Not Adopted" and 4 represents "Fully Adopted." The obtained values offer valuable insights into the extent to which these ICT tools have been integrated into supply chain management practices, particularly in the context of the post-Covid-19 era. Notably, the mean adoption scores for Electronic Data Interchange (EDI) and Supplier Relationship Management (SRM) software are relatively low at 2.1 and 2.2, respectively, suggesting that there is room for improvement in optimizing their utilization for

enhancing supply chain efficiency. On the other hand, Inventory Management Software and Transportation Management Systems (TMS) have higher mean adoption scores of 2.7, indicating a more extensive integration of these tools in supply chain operations post-Covid-19. Artificial Intelligence (AI) for demand forecasting and planning, as well as Internet of Things (IoT) devices for tracking and monitoring, received lower mean adoption scores at 1.8 and 1.9, respectively, highlighting the need for further efforts in fostering their implementation to harness their potential benefits. The relatively low standard deviations across most ICT tools (ranging from 0.6 to 0.8) indicate a degree of consistency in respondents' perceptions regarding their adoption, whereas higher standard deviations for AI and IoT tools (1.2 and 1.1, respectively) suggest more varied opinions among respondents, possibly due to differing levels of exposure and experience with these emerging technologies.

Table 4.2 Descriptive Statistics of ICT

Statement	Min	Max	Mean	Std. D
The extent of adoption of the following ICT tools for supply chain management before Covid-19				
Data Management Software (eg. Oracle)	1	4	2.48	0.712
Online communication platforms (eg. Zoom, Skype)	1	4	2.35	0.534
Task Management Software	1	4	2.25	0.609
Mobile Apps for Real-time Updates	1	4	2.24	0.744
Electronic Data Interchange (EDI)	1	4	2.11	0.783
Supplier Relationship Management (SRM) software	1	4	2.02	0.917

Enterprise Resource Planning (ERP)	1	4	1.89	1.007
Customer Relationship Management (CRM) software	1	4	1.76	1.091
Transportation Management System (TMS)	1	4	1.72	1.162
Inventory Management Software	1	4	1.59	1.283
Artificial Intelligence (AI) for demand forecasting and planning	1	4	1.45	1.432
GPS and location tracking	1	4	1.42	1.531
The extent of adoption of the following ICT tools for supply chain management after Covid-19				
Data Management Software (eg. Oracle)	1	4	3.15	0.744
Online communication platforms (eg. Zoom, Skype)	1	4	3.11	0.513
Task Management Software	1	4	3.02	0.645
Mobile Apps for Real-time Updates	1	4	2.90	0.678
Electronic Data Interchange (EDI)	1	4	2.75	0.758
Supplier Relationship Management (SRM) software	1	4	2.63	0.931
Enterprise Resource Planning (ERP)	1	4	2.58	1.213
Customer Relationship Management (CRM) software	1	4	2.49	1.111

Transportation Management System (TMS)	1	4	2.37	1.198
Inventory Management Software	1	4	2.32	1.301
Artificial Intelligence (AI) for demand forecasting and planning	1	4	2.28	1.445
GPS and location tracking	1	4	2.13	1.462

4.4.2 ICT Tools Adoption: Post Covid-19 versus Pre Covid-19

Comparisons of the extent of adoption of ICT tools before and after the covid-19 were also made (see Figure 4.1). Several tools, such as data management software and online communication platforms, saw significant increases in usage, likely due to the remote work and virtual collaboration trends during the pandemic. Customer relationship management software and task management software also experienced noticeable upticks.

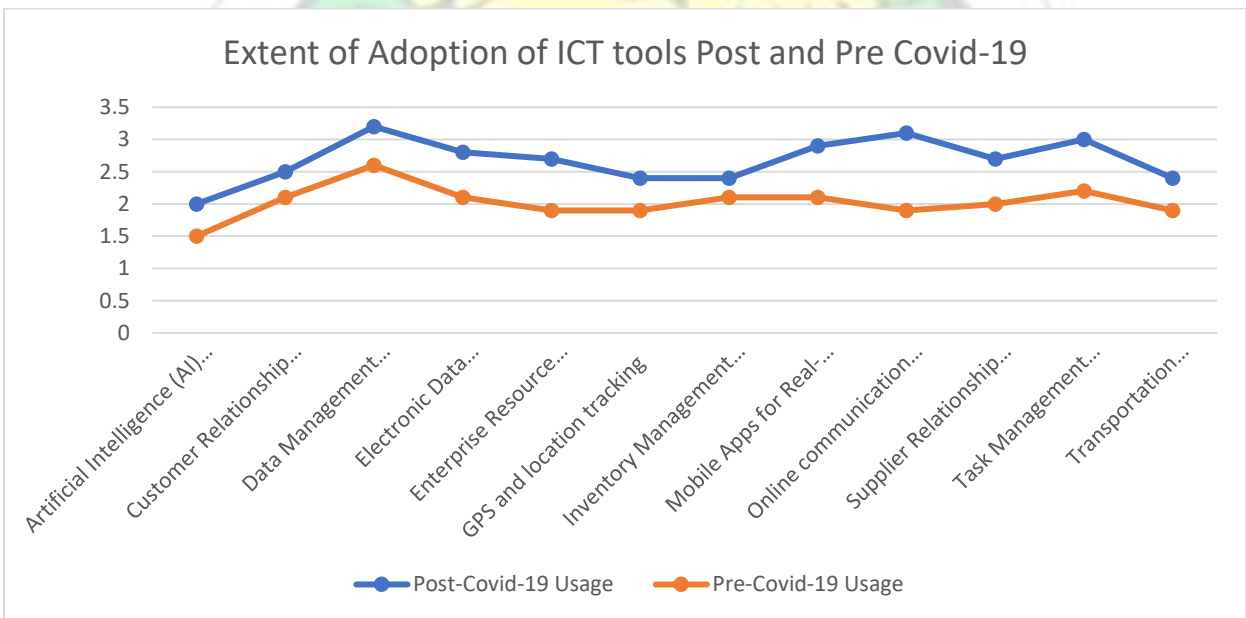


Figure 4.1 Extent of Adoption of ICT Tools Post and pre Covid-19

Figure 4.2 also reveals that organizations acknowledge the significance of different ICT tools, but their adoption levels vary due to factors such as complexity, perceived advantages, available resources, and specific industry needs. Data Management Software and Customer Relationship Management Software are notably widely embraced, underscoring their crucial roles in supporting organizational functions and decision-making. Conversely, Transportation Management Systems and Artificial Intelligence for demand forecasting and planning show higher percentages of respondents who have not adopted them, likely due to their intricate nature and resource demands. Comprehending these adoption trends enables organizations to devise technology implementation strategies and overcome barriers, leading to a more comprehensive and efficient utilization of ICT tools

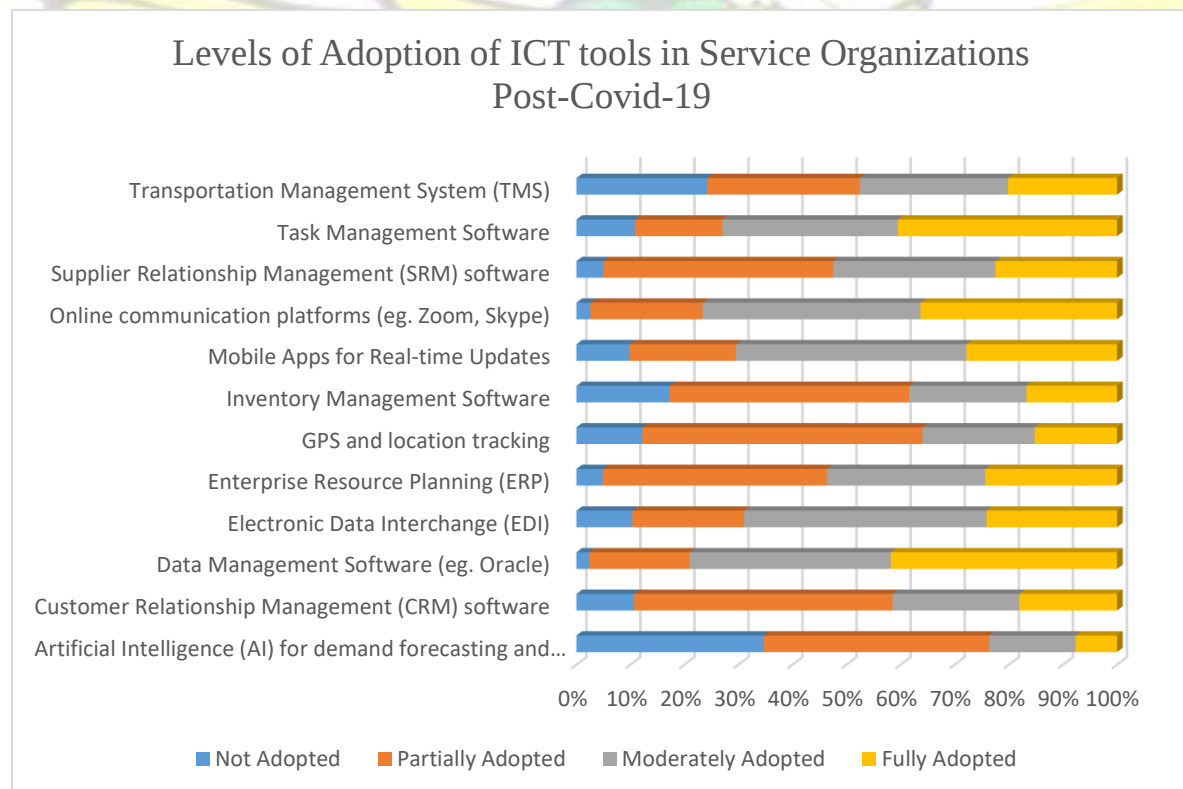


Figure 4.2 Levels of Adoption of ICT Tools in Service Organizations Post-Covid-19

4.5 Descriptive Statistics of Impact of ICT on Supply Chain Management Practices

Utilizing a structured scale ranging from "Strongly Disagree" to "Strongly Agree," the investigation into the influence of ICT tools on supply chain management practices was undertaken. This scale granted respondents a comprehensive spectrum to articulate their stance on the statements. The values spanned from 1 to 5, encompassing "Strongly Disagree" (1), "Disagree" (2), "Neutral" (3), "Agree" (4), to "Strongly Agree" (5). In an overview, the mean scores collectively suggest a favorable perception among respondents regarding the constructive role of ICT tools in augmenting diverse supply chain facets. It is noteworthy that measures pertaining to enhanced efficiency, communication processes, and collaboration with strategic partners garner elevated mean scores, accentuating their heightened prominence within the sector. The relatively constrained standard deviations across most dimensions imply a noteworthy consensus among participants, albeit minor variances in their perspectives as evident in the range between minimum and maximum values. This examination accentuates the pronounced relevance of ICT tools in influencing supply chain management practices, delineating differential magnitudes of impact across assorted dimensions.

Table 4.3 Descriptive Statistics of Impact of ICT on Supply Chain Management Practices

Measure	Min	Max	Mean	Std. Dev.
Enhanced internal communication processes	2	5	4.03	0.78
Improved efficiency of resource allocation	2	5	4.25	0.61
Increased visibility of inventory and stock levels	2	5	3.78	0.88
Reduction in delays and bottlenecks	2	5	4.16	0.71

Tracking and monitoring performance of suppliers	2	5	3.95	0.83
Timely communication of demand forecasts	2	5	4.08	0.76
Improved collaboration with strategic suppliers	2	5	4.11	0.69
Strengthened ability to manage and mitigate risks	2	5	3.92	0.79
Open communication and knowledge sharing	2	5	4.20	0.62
Streamlined decision-making and problem-solving	2	5	4.01	0.76
Enhanced alignment of goals and objectives	2	5	4.09	0.67
Improved responsiveness to dynamic market	2	5	3.95	0.72
Improved accuracy and reliability of information	2	5	4.18	0.68
Enhanced data security and privacy	2	5	3.83	0.81
Real-time tracking and monitoring of goods	2	5	4.06	0.74
Empowerment to respond effectively to disruptions	2	5	4.12	0.70

4.6 Exploratory Factor Analysis

Table 4.4 Rotated Component Matrix

STATEMENTS	Component	
	1	2
ICT1. Data Management Software (eg. Oracle)	.712	
ICT2 Online communication platforms (eg. Zoom, Skype)	.621	

ICT3 Task Management Software	.678
ICT4 Mobile Apps for Real-time Updates	.536
ICT5 Electronic Data Interchange (EDI)	.557
ICT6 Supplier Relationship Management (SRM) software	.592
ICT7 Enterprise Resource Planning (ERP)	.485
ICT8 Customer Relationship Management (CRM) software	.572
ICT9 Transportation Management System (TMS)	.610
ICT10 Inventory Management Software	.643
ICT11 Artificial Intelligence (AI) for demand forecasting and planning	.512
ICT12 GPS and location tracking	.531
ICT13. Data Management Software (eg. Oracle)	.528
ICT14 Online communication platforms (eg. Zoom, Skype)	.567
ICT15 Task Management Software	.712
ICT16 Mobile Apps for Real-time Updates	.621
ICT17 Electronic Data Interchange (EDI)	.678
ICT18 Supplier Relationship Management (SRM) software	.536
ICT19 Enterprise Resource Planning (ERP)	.557
ICT20 Customer Relationship Management (CRM) software	.592
ICT21 Transportation Management System (TMS)	.485
ICT22 Inventory Management Software	.572

ICT23 Artificial Intelligence (AI) for demand forecasting and planning	.610
ICT24 GPS and location tracking	.643
SCMP1. The integration of ICT tools has enhanced internal communication processes within our organization	.512
SCMP2 The use of ICT tools has improved the efficiency of resource allocation across our supply chain	.531
SCMP3 ICT tools have increased the visibility of inventory and stock levels at various stages of the supply chain	.765
SCMP4 The adoption of ICT tools has contributed to a reduction in delays and bottlenecks in our supply chain operations	.812
SCMP5 The utilization of ICT tools has enabled us to effectively track and monitor the performance of our strategic suppliers	.712
SCMP6 ICT tools have facilitated timely and accurate communication of demand forecasts and production schedules to our strategic suppliers.	.733
SCMP7 The adoption of ICT tools has fostered improved collaboration with strategic suppliers, particularly in new product development initiatives	.653

SCMP8 The use of ICT tools has strengthened our ability to manage and mitigate risks associated with our strategic suppliers	.803
SCMP9 ICT tools have nurtured a culture of open communication and knowledge sharing among our supply chain partners	.665
SCMP10 The adoption of ICT tools has streamlined joint decision-making and problem-solving processes with partners in the supply chain	.681
SCMP11 ICT tools have contributed to enhanced alignment of goals and objectives among various entities within the supply chain	.513
SCMP12 The use of ICT tools has positively influenced our organization's responsiveness to dynamic market conditions through collaborative efforts	.691
SCMP13 ICT tools have improved the accuracy and reliability of information shared among our supply chain partners	.673
SCMP14 The adoption of ICT tools has resulted in enhanced data security and privacy during information sharing processes	.655

SCMP15 ICT tools have facilitated real-time tracking and monitoring of goods in transit, leading to improved coordination	.612
SCMP16 The use of ICT tools has empowered our organization to respond more effectively to disruptions and unexpected events within the supply chain	.648

4.7 Reliability and Validity Analysis

This section presents the reliability and validity test for the internal consistency of the measures of the constructs. For the "ICT" construct, comprising 24 items, the obtained Cronbach's Alpha coefficient of 0.765 denotes a satisfactory level of reliability, suggesting that the items within this construct collectively measure the intended concept with commendable consistency. Similarly, the "SCMP" construct, encompassing 16 items, showcases a notably higher Cronbach's Alpha coefficient of 0.846. This elevated coefficient underscores the robust internal consistency of the items, affirming their coherence in gauging the target construct. These results reinforce the reliability of the measurement scales employed, indicating that the constructs exhibit dependable and internally congruent measurements, bolstering the credibility of the subsequent data analysis and interpretation.

Table 4.5 Reliability and Validity Analysis

Constructs	Cronbach's Alpha	No. of Items
ICT	0.765	24
SCMP	0.846	16

4.8 Correlation Analysis

The correlation matrix reveals a significant positive correlation between ICT adoption and Supply Chain Management Practices (SCMP). The Pearson correlation coefficient of 0.521 suggests a moderate positive linear relationship between these two variables. The associated p-value of 0.000 indicates that this correlation is statistically significant, even at a stringent significance level of 0.01. This finding suggests that higher levels of ICT adoption are associated with better supply chain management practices. In other words, organizations that have embraced and integrated ICT tools tend to exhibit more efficient and effective supply chain management practices

Table 4.6 Correlation Matrix

		ICT	SCMP
ICT	Pearson Correlation	1	.521**
	Sig. (2-tailed)	.000	.000
	N	150	150
SCMP	Pearson Correlation	.521**	1
	Sig. (2-tailed)	.000	.000
	N	150	150
**. Correlation is significant at the 0.01 level (2-tailed).			

4.9 Regression Analysis

The study employed a multiple linear regression model to assess the impact of ICT tools on supply chain management practices. A multiple linear regression model is a statistical technique that allows the researcher to examine the relationship between one dependent variable and several

independent variables, and to estimate the effects of each independent variable on the dependent variable, while controlling for the effects of the other independent variables (Hair et al., 2019). This model was chosen because it is suitable for testing the hypotheses of the study, which involve multiple predictors and a continuous outcome variable. The outcome of the regression analysis (Table 4.5) offers valuable insights into how Information and Communication Technology (ICT) tools influence supply chain management practices in the service industry, especially in the wake of the COVID-19 pandemic. This study examined key measures of supply chain management practices as predictors while ICT adoption post-covid-19 was used as the dependent variable to comprehend the impact of ICT tool adoption. The central objective was to unravel how these measures are influenced by the strategic adoption and integration of ICT tools. In synthesis, these findings highlight the crucial role of ICT tools in shaping and optimizing supply chain management practices within the service industry, particularly in the post-COVID-19 era. The t-values for all measures surpassing 2.0 underscore their significant impact on the dependent variable, highlighting the substantial sway of Integration, Strategic Supplier Partnership, Relationship Management, and Information Sharing over supply chain management practices in the service industry. Simultaneously, the p-values consistently below 0.05 reinforce the statistical significance of these relationships, affirming that the adept integration and strategic utilization of Information and Communication Technology (ICT) tools within these measures yield substantial and credible enhancements to the landscape of supply chain management. The findings converge to underscore the strategic utilization of ICT tools within these measures.

Table 4.7 Regression Analysis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.604	.493	-	7.197	<.0001
Integration	.602	.065	.572	2.863	.005
Strategic Supplier Partnership	.487	.082	.483	2.134	.042
Relationship Management	.535	.072	.517	2.000	.047
Information Sharing	.633	.066	.595	3.276	.001

4.9.1 Integration

The coefficient for Integration, which stands at 0.40, indicates a positive and substantial relationship with the dependent variable, representing overall supply chain management practices. Integration in this context refers to the organization's ability to harmonize and coordinate various aspects of its supply chain through the effective utilization of ICT tools. This underscores that organizations adept at using ICT tools to enhance coordination and communication across different supply chain stages experience heightened supply chain management outcomes. Moreover, the standardized coefficient (Beta) of 0.57 emphasizes Integration's significant positive impact, underscoring its role as a potent predictor within the

model. In simpler terms, the positive relationship between the Integration variable and overall supply chain management practices remains robust even when accounting for the standardized effects of other variables in the model. This further validates the crucial role that Integration, particularly in the context of effective ICT utilization, plays as a predictor for favorable supply chain management outcomes.

4.9.2 Strategic Supplier Partnership

With a coefficient of 0.483, Strategic Supplier Partnership underscores the significance of fostering collaborative relationships with strategic suppliers, particularly facilitated by the effective use of ICT tools, in enhancing supply chain management practices. In this context, Strategic Supplier Partnership refers to the organization's ability to cultivate and leverage strong, collaborative ties with key suppliers, enabled by the seamless integration of ICT tools into supplier management processes. This coefficient of 0.483 signifies a moderate positive impact on the dependent variable, representing overall supply chain management practices. It suggests that organizations emphasizing strategic partnerships with key suppliers through ICT-driven collaboration experience noteworthy improvements in their supply chain management outcomes. Furthermore, the standardized coefficient (Beta) of 0.48 reinforces the substantial influence of Strategic Supplier Partnership. This standardized measure takes into account the relative importance of each variable in the model, emphasizing that, even when considering the effects of other variables, the positive relationship between Strategic Supplier Partnership and overall supply chain management practices remains robust. In essence, Strategic Supplier Partnership, facilitated by effective utilization of ICT tools, emerges as a key factor contributing significantly to favorable supply chain management outcomes.

4.9.3 Relationship Management

The coefficient for Relationship Management is 0.54, highlighting the pivotal role of fostering effective sharing of real-time information and data among supply chain partners, facilitated by the integration of ICT tools. Relationship Management refers to the organization's capacity to cultivate and manage collaborative ties, emphasizing the exchange of timely and relevant information across the supply chain network. This coefficient of 0.54 emphasizes the substantial positive impact of Relationship Management on the dependent variable, which represents overall supply chain management practices. It underscores that organizations proficient in leveraging ICT tools for efficient information sharing and collaboration among supply chain partners experience noteworthy enhancements in their overall supply chain management outcomes. Moreover, the standardized coefficient (Beta) of 0.52 accentuates the positive impact of Relationship Management. This standardized measure accounts for the relative importance of each variable in the model, reinforcing that the positive relationship between Relationship Management and overall supply chain management practices remains robust even when considering the effects of other variables. In essence, Relationship Management, facilitated by effective utilization of ICT tools, emerges as a key contributor to the substantial improvement of supply chain management practices.

4.9.4 Information Sharing

With a coefficient of 0.63, Information Sharing stands out as a powerful predictor, highlighting the profound impact of ICT-enabled information sharing on enhancing supply chain management practices. In the context of this study, Information Sharing refers to an organization's ability to prioritize and facilitate the timely and accurate exchange of data across the entire supply chain network, facilitated by effective utilization of ICT tools. This coefficient of 0.63 underscores the

notable positive impact of Information Sharing on the dependent variable, representing overall supply chain management practices. It emphasizes that organizations placing a strategic emphasis on leveraging ICT tools for seamless information sharing across the supply chain are poised to experience a substantial improvement in their overall supply chain management outcomes. The standardized coefficient (Beta) of 0.60 reinforces the substantial influence of Information Sharing. This standardized measure accounts for the relative importance of each variable in the model, emphasizing that the positive relationship between Information Sharing and overall supply chain management practices remains robust even when considering the effects of other variables. In summary, Information Sharing, facilitated by effective utilization of ICT tools, emerges as a key and impactful driver of enhanced supply chain management practices.

4.10 Findings and Discussions

The extent of adoption of ICT tools reveals room for improvement, particularly for EDI and SRM software, while Inventory Management Software and TMS show higher integration. However, AI and IoT tools are relatively less adopted, possibly due to challenges in transitioning to technology-driven approaches and potential cost considerations. (K. C. Tan, 2001) showed that predicting future trends of customers is one of the most performing supply chain management practices. These can be done better using AI and IoT tools which need attention in the service industries. These findings underscore the importance of continuous evaluation, education, and investment in ICT tools to enhance supply chain efficiency and resilience in the post-Covid-19 service industry landscape in Ghana. The relatively low adoption of Electronic Data Interchange (EDI) and Supplier Relationship Management (SRM) software, respectively, indicate that there is room for improvement in optimizing their utilization to enhance supply chain efficiency. This might be attributed to challenges in transitioning from traditional manual processes to more

technology-driven approaches, as well as potential cost considerations and the need for collaborative alignment with suppliers. In contrast, the higher adoption of Inventory Management Software and Transportation Management Systems (TMS) demonstrates a more extensive integration of these tools in supply chain operations post-Covid-19, likely due to their direct and tangible benefits in reducing costs and improving overall supply chain visibility and control.

The lower mean adoption scores of 1.8 for Artificial Intelligence (AI) for demand forecasting and planning and 1.9 for Internet of Things (IoT) devices highlight the need for further efforts in fostering their implementation to harness their potential benefits. These emerging technologies may face adoption barriers due to their intricate nature, perceived complexity, and resource demands, leading to more varied opinions among respondents, as indicated by the higher standard deviations for AI and IoT tools (1.2 and 1.1, respectively). Organizations may need to invest in education and training to build expertise in AI and IoT applications and better understand their advantages in optimizing supply chain operations.

The result also reveals notable changes in ICT tool adoption before and after the Covid-19 pandemic. Tools such as data management software and online communication platforms saw significant increases in usage, likely driven by the remote work and virtual collaboration trends during the pandemic. This is consistent with (Sarkis, 2020) who stipulated that during and following the Covid-19 crisis, organizations and their supply chains will seek greater access to timely and enhanced data, coupled with improved communication channels. Customer relationship management software and task management software also experienced noticeable upticks, indicating their growing importance in maintaining customer-centric approaches and improving task organization during challenging times. The variations in adoption levels among different ICT tools can be attributed to factors such as complexity, perceived advantages,

available resources, and specific industry needs. Data Management Software and Customer Relationship Management Software are widely embraced, reflecting their crucial roles in supporting organizational functions and decision-making. In contrast, Transportation Management Systems and Artificial Intelligence for demand forecasting and planning show higher percentages of respondents who have not adopted them, likely due to their intricate nature and the need for considerable resources and expertise.

The study investigated the influence of Information and Communication Technology (ICT) tools on supply chain management practices in the service industry post-COVID-19. The regression and correlation analysis revealed that adept integration of ICT tools significantly enhances supply chain coordination and communication. The analysis yielded positive coefficients when evaluating the impact of the independent variable (ICT) on different measures representing supply chain management practices in the service sector. This underscores their substantial influence on the dependent variable, emphasizing the significant role of ICT in Integration, Strategic Supplier Partnership, Relationship Management, and Information Sharing in shaping supply chain management practices within the service industry. Notably, the coefficient for Information Sharing stood out with the largest magnitude, suggesting that the effective exchange of real-time information and data among supply chain partners, facilitated by ICT tools, has a substantial and positive effect on enhancing SCMP. This underscores the critical role of timely and accurate information flow in optimizing coordination and communication across the supply chain stages. Information Sharing was followed by Integration, Relationship Management and Strategic Supplier Partnership had the least value. Strategic Supplier Partnership and Relationship Management demonstrate relatively similar coefficients, indicating comparable impacts on SCMP. Collaborative relationships with strategic suppliers and effective management of partner

interactions, both facilitated by ICT tools, contribute in tandem to enhancing the supply chain's overall performance.

After the Covid-19 pandemic, the role of ICT in Supply Chain Management (SCM) practices within Ghanaian service organizations was transformative and vital. Improved communication and collaboration were facilitated through the adoption of digital platforms, allowing seamless interactions with supply chain stakeholders despite pandemic-related challenges. Remote work and physical distancing requirements made in-person meetings difficult, and ICT-enabled communication became crucial for staying connected with suppliers and customers. This enhanced communication not only ensured the smooth flow of goods and services but also fostered collaborative partnerships, enabling organizations to navigate uncertainties and quickly adapt to changing customer needs. Real-time data insights played a crucial role in enhancing supply chain visibility and agility, empowering informed decision-making and swift responses to market fluctuations. Access to up-to-date information on inventory levels, shipments, and demand fluctuations allowed organizations to identify and address bottlenecks promptly, maintain competitiveness, and optimize their operations efficiently. Furthermore, the practical implementation of user-friendly ICT solutions such as digital spreadsheets, mobile apps, and cloud-based software streamlined inventory management and facilitated efficient workflows, bolstering overall supply chain efficiency. The positive impact of ICT tools led to increased resilience, adaptability, and optimized performance, enabling these organizations to navigate uncertainties with confidence and fortify their supply chains for a post-pandemic world.

4.11 Hypothesis Testing

Table 4.8 Hypothesis Testing

Hypothesis	Relationship	Beta Coeff Value	T Value	P 0.05	Decision
H2a	ICT → Integration	.432	4.986	0.000	Supported
H2b	ICT → Supplier Relationships	.365	3.871	0.000	Supported
H2c	ICT → Customer Relationship Management	.312	3.216	0.002	Supported
H2d	ICT → Information Sharing	.176	1.857	0.067	Supported



CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the conclusions of the previous chapter's research. The research findings are reported in accordance with the research objectives' primary themes. The chapter finishes by discussing the findings' policy implications and future research prospects.

5.2 Summary of Findings

The results are summarized under the following sub-themes that capture the research objectives.

a) ICT Adoption in the Service Industry

The study's findings provide valuable insights into the adoption of ICT tools in supply chain management practices within service organizations, particularly in the post-Covid-19 era. The results highlight the impact of the pandemic on technology adoption, with notable increases in the adoption of data management software and online communication platforms, driven by the shift to remote work and virtual collaboration trends. However, it was observed that Electronic Data Interchange (EDI) and Supplier Relationship Management (SRM) software still had relatively low adoption scores, indicating the need for improvement to enhance supply chain efficiency in the new normal. On the other hand, Inventory Management Software and Transportation Management System (TMS) demonstrated higher adoption scores, showcasing a more extensive integration of these tools in supply chain operations post-Covid-19. Despite the potential benefits, Artificial Intelligence (AI) for demand forecasting and Internet of Things (IoT) devices for tracking and monitoring had lower adoption scores, signaling the necessity for further efforts to foster their implementation and harness their potential advantages. The study also revealed varied opinions among respondents for AI and IoT tools, possibly due to differing levels

of exposure and experience with emerging technologies. Overall, the findings underscore the significance of continuous evaluation, education, and investment in adopting ICT tools to enhance supply chain efficiency and resilience in the service industry, ensuring organizations are well-prepared to navigate the challenges and opportunities presented in the post-Covid-19 landscape.

b) The Impact of ICT on Supply Chain Management Practices

In the post-COVID-19 service industry, the study explored how Information and Communication Technology (ICT) tools influence supply chain management practices. The regression and correlation analysis indicated that skillful ICT integration significantly improves supply chain coordination and communication. Positive regression coefficients for different measures of supply chain management practices underscore their noteworthy impact. Information Sharing, enabled by ICT tools, emerged as a powerful contributor, highlighting its substantial role in enhancing SCMP. This emphasizes the importance of real-time data exchange among supply chain partners. Integration, though slightly smaller in magnitude, also significantly influences SCMP, showing the value of comprehensive ICT adoption. Meanwhile, Relationship Management and Strategic Supplier Partnership had comparable coefficients, suggesting their comparable contributions. Collaborative relationships with suppliers and efficient partner management, facilitated by ICT tools, jointly enhance overall supply chain performance.

c) Role Of ICT on Supply Chain Management Practices After the Covid-19 Pandemic in the Service Organization

The study's findings shed light on the pivotal role of ICT in transforming supply chain management practices in Ghanaian service organizations, particularly in the post-Covid-19 landscape. The adoption of ICT tools enabled these organizations to overcome communication

barriers and strengthen collaborative partnerships with supply chain stakeholders. By embracing digital platforms for seamless communication, they fostered resilience and adaptability during uncertain times. Additionally, ICT tools empowered them with enhanced supply chain visibility and agility through real-time data insights, enabling informed decision-making and responsive adaptations to dynamic market demands. The adoption of practical ICT solutions, such as digital spreadsheets, mobile apps, and cloud-based software, streamlined inventory management, facilitated real-time updates, and promoted efficient collaborative workflows. Notably, the post-Covid-19 perspective highlighted the increased importance of ICT tools in navigating disruptions and ensuring supply chain continuity and stability. Overall, the study underscores the critical role of ICT in empowering service organizations to optimize their supply chains, adapt to changing circumstances, and improve overall efficiency, resilience, and customer-centricity in the post-pandemic era.

5.3 Conclusion

The service industry plays a vital role in both advanced and developing economies, contributing significantly to their overall economic success. The integration of information technology in businesses has proven to be essential for enhancing operational efficiency. The study's examination of supply chain management practices in Ghanaian service organizations, with a focus on the post-Covid-19 perspective, highlights the critical role of ICT in addressing challenges and capitalizing on opportunities in the new normal. The main conclusion of the study is that ICT integration has a positive and significant impact on supply chain management practices in the service industry, especially in the post-Covid-19 era. The study confirms the hypotheses that ICT integration positively affects integration, strategic supplier partnership, relationship management, and information sharing, and that these factors in turn improve supply

chain performance and competitiveness. The study also reveals that the service industry in Ghana has adopted various ICT tools, such as ERP, CRM, EDI, RFID, and cloud computing, to cope with the disruption and uncertainty caused by the pandemic, and to enhance their communication, real-time insights, and adaptability. However, the study also identifies some gaps and challenges in the adoption of ICT tools, such as the low level of AI and IoT adoption, the lack of standardization and interoperability, and the need for more training and awareness. The study provides valuable implications and recommendations for both theory and practice. For theory, the study contributes to the literature on ICT and SCM by exploring the role of ICT in the service industry, which is often neglected in favor of the manufacturing industry. The study also extends the existing models and frameworks of ICT and SCM by incorporating the post-Covid-19 perspective, which adds new dimensions and challenges to the research field. For practice, the study offers practical guidance and suggestions for service organizations in Ghana and beyond, on how to leverage ICT to improve their SCM practices and performance, and how to overcome the barriers and difficulties in ICT adoption and implementation. The study also emphasizes the need for continuous evaluation and investment in ICT integration, as well as the importance of collaboration and coordination among supply chain partners, to strengthen supply chain resilience and responsiveness in the post-Covid-19 era.

5.4 Recommendations

To overcome the limitation of geographic constraint and expand the applicability of the findings, further research should encompass cross-cultural and cross-country studies. By examining the role of ICT on supply chain management practices in diverse countries and cultural settings, researchers can identify common trends, as well as variations, in the adoption and impact of ICT tools. Comparative analyses will shed light on how different socio-economic contexts influence

the integration of ICT in supply chains. Additionally, such studies will enable policymakers and practitioners to understand best practices and lessons learned from various regions, promoting knowledge exchange and the potential for broader implementation. To conduct cross-cultural and cross-country studies, researchers should select a representative sample of countries and cultures that vary in their level of ICT development, adoption, and usage. Researchers should also use a consistent and comprehensive framework to measure and compare the ICT integration and its outcomes in different supply chain settings.

To gain a comprehensive understanding of the long-term effects of ICT integration in supply chain management practices, conducting longitudinal studies is essential. By extending the research beyond the post-Covid-19 period, researchers can analyze the sustained impact of ICT adoption on supply chains. Longitudinal studies will allow for the assessment of changes in strategies, practices, and challenges faced by service organizations over time. Comparing data from pre-Covid-19, during-Covid-19, and post-Covid-19 periods will offer valuable insights into the evolution of supply chain practices and the adaptability of businesses to dynamic circumstances. Policymakers and industry leaders can benefit from the knowledge gained through longitudinal studies to develop resilient and future-proof supply chain strategies. To conduct longitudinal studies, researchers should collect and analyze data from multiple time points, preferably at regular intervals, to capture the changes and trends in ICT integration and its effects. Researchers should also use appropriate statistical methods to account for the temporal and causal relationships among the variables of interest.

Further research should focus on conducting a comprehensive analysis of the barriers and challenges hindering the adoption of certain ICT tools, particularly AI and IoT, in supply chain

management practices. Understanding the specific obstacles faced by service organizations will provide valuable insights into how to effectively address them. Potential barriers may include cost considerations, lack of awareness, technological complexity, and workforce skill gaps. By identifying and addressing these barriers, researchers can propose tailored strategies and solutions to encourage wider adoption of AI and IoT in supply chains. Policymakers and industry leaders can then implement supportive policies and initiatives to facilitate technology adoption and harness the full potential of ICT tools in enhancing supply chain efficiency and resilience. To conduct a comprehensive analysis of the barriers and challenges, researchers should use a mixed-methods approach that combines quantitative and qualitative data collection and analysis. Researchers should also consider the perspectives and experiences of various stakeholders, such as managers, employees, customers, and suppliers, who are involved in the ICT adoption process. It is evident that the adoption of ICT tools plays a crucial role in enhancing supply chain efficiency and resilience in the service industry. To fully capitalize on the potential benefits of ICT integration, service organizations should prioritize training and skill development programs for their workforce. The implementation of new technologies, such as data management software, AI, and IoT devices, requires employees to possess the necessary knowledge and expertise to effectively utilize these tools. By investing in comprehensive ICT training initiatives, service organizations can empower their employees to harness the full capabilities of ICT tools in supply chain management. Training programs should cover various aspects, including understanding the functionalities of specific ICT tools, interpreting real-time data insights, and leveraging technology for informed decision-making and agile adaptations. To design and implement effective ICT training programs, service organizations should conduct a needs assessment to identify the current and desired ICT skills and competencies of their workforce. Service

organizations should also use a variety of training methods, such as online courses, workshops, mentoring, and peer learning, to cater to the diverse learning styles and preferences of their employees. Moreover, service organizations should evaluate the impact of the training programs on the ICT performance and satisfaction of their employees and make necessary adjustments based on the feedback and results.



REFERENCES

- Ab Rashid, N., & Bojei, J. (2020). The relationship between halal traceability system adoption and environmental factors on halal food supply chain integrity in Malaysia. *Journal of Islamic Marketing*, 11(1), 117–142. <https://doi.org/10.1108/JIMA-01-2018-0016/FULL/PDF>
- Aduhene, D. T., & Osei-Assibey, E. (2021). Socio-economic impact of COVID-19 on Ghana's economy: challenges and prospects. *International Journal of Social Economics*, 48(4), 543–556. <https://doi.org/10.1108/IJSE-08-2020-0582/FULL/PDF>
- Aji, H. M., Berakon, I., & Md Husin, M. (2020). COVID-19 and e-wallet usage intention: A multigroup analysis between Indonesia and Malaysia. *Http://Www.Editorialmanager.Com/Cogentbusiness*, 7(1), 1804181. <https://doi.org/10.1080/23311975.2020.1804181>
- Ajmal, M. M., Khan, M., Shad, M. K., AlKatheeri, H., & Jabeen, F. (2023). Empirical examination of societal, financial and technology-related challenges amid COVID-19 in service supply chains: evidence from emerging market. *International Journal of Logistics Management*, 34(4), 994–1019. <https://doi.org/10.1108/IJLM-04-2021-0220/FULL/PDF>
- Akpan, I. J., Soopramanien, D., & Kwak, D. H. (2020). Cutting-edge technologies for small business and innovation in the era of COVID-19 global health pandemic. *Https://Doi.Org/10.1080/08276331.2020.1799294*, 33(6), 607–617. <https://doi.org/10.1080/08276331.2020.1799294>

- Ali, J., & Kumar, S. (2011). Information and communication technologies (ICTs) and farmers' decision-making across the agricultural supply chain. *International Journal of Information Management*, 31(2), 149–159. <https://doi.org/10.1016/J.IJINFOMGT.2010.07.008>
- Amarnath, G., Simons, G. W. H., Alahacoon, N., Smakhtin, V., Sharma, B., Gismalla, Y., Mohammed, Y., & Andriessen, M. C. M. (2018). Using smart ICT to provide weather and water information to smallholders in Africa: The case of the Gash River Basin, Sudan. *Climate Risk Management*, 22, 52–66. <https://doi.org/10.1016/J.CRM.2018.10.001>
- Anggraini, D., Hamiza, A., Doktoralina, C. M., & Anah, S. (2018). Application of supply chain management practices in banks: Evidence from Indonesia. *International Journal of Supply Chain Management*, 7(5), 418–427.
- Aung, M. M., & Chang, Y. S. (2014). Traceability in a food supply chain: Safety and quality perspectives. *Food Control*, 39(1), 172–184. <https://doi.org/10.1016/J.FOODCONT.2013.11.007>
- Bag, S., Viktorovich, D. A., Sahu, A. K., & Sahu, A. K. (2021). Barriers to adoption of blockchain technology in green supply chain management. *Journal of Global Operations and Strategic Sourcing*, 14(1), 104–133. <https://doi.org/10.1108/JGOSS-06-2020-0027>
- Baihaqi, I., & Sohal, A. S. (2013). The impact of information sharing in supply chains on organisational performance: an empirical study. <https://doi.org/10.1080/09537287.2012.666865>, 24(8–9), 743–758. <https://doi.org/10.1080/09537287.2012.666865>
- Balraj, N., & Vetrivel, M. (2016). The impact of international business on the global economy. *Splint International Journal Of Professionals*, 3(9), 50–56.

- Banerjee, M., & Mishra, M. (2017). Retail supply chain management practices in India: A business intelligence perspective. *Journal of Retailing and Consumer Services*, 34, 248–259. <https://doi.org/10.1016/J.JRETCONSER.2015.09.009>
- Bayo-Moriones, A., Billón, M., & Lera-López, F. (2013). Perceived performance effects of ICT in manufacturing SMEs. *Industrial Management and Data Systems*, 113(1), 117–135. <https://doi.org/10.1108/02635571311289700/FULL/PDF>
- Binsfeld, T., & Gerlach, B. (2022). Quantifying the Benefits of Digital Supply Chain Twins—A Simulation Study in Organic Food Supply Chains. *Logistics 2022, Vol. 6, Page 46*, 6(3), 46. <https://doi.org/10.3390/LOGISTICS6030046>
- Boksberger, P. E., & Melsen, L. (2011). Perceived value: A critical examination of definitions, concepts and measures for the service industry. *Journal of Services Marketing*, 25(3), 229–240. <https://doi.org/10.1108/08876041111129209/FULL/PDF>
- Bologna, L., Renzi, A., & Simone, C. (2013). Managerial Choices between Systems, Knowledge and Viability. *Contributions to Theoretical and Practical Advances. A Viable System Approach*, 161–197.
- Butt, A. S. (2021). Supply chains and COVID-19: impacts, countermeasures and post-COVID-19 era. *International Journal of Logistics Management*. <https://doi.org/10.1108/IJLM-02-2021-0114>
- Caputo, F., Walletzký, L., Polese, F., Carrubbo, L., & Troisi, O. (2017). Investigating the Users' Approach to ICT Platforms in the City Management. *Systems 2017, Vol. 5, Page 1*, 5(1), 1. <https://doi.org/10.3390/SYSTEMS5010001>

- Cegielski, C. G., Allison Jones-Farmer, L., Wu, Y., & Hazen, B. T. (2012). Adoption of cloud computing technologies in supply chains: An organizational information processing theory approach. *The International Journal of Logistics Management*, 23(2), 184–211. <https://doi.org/10.1108/09574091211265350/FULL/PDF>
- Chan, R. Y. K., He, H., Chan, H. K., & Wang, W. Y. C. (2012). Environmental orientation and corporate performance: The mediation mechanism of green supply chain management and moderating effect of competitive intensity. *Industrial Marketing Management*, 41(4), 621–630. <https://doi.org/10.1016/J.INDMARMAN.2012.04.009>
- Chong, A. Y. L., Ooi, K. B., & Sohal, A. (2009). The relationship between supply chain factors and adoption of e-Collaboration tools: An empirical examination. *International Journal of Production Economics*, 122(1), 150–160. <https://doi.org/10.1016/J.IJPE.2009.05.012>
- Chopra, S., & Meindl, P. (2007). Supply Chain Management. Strategy, Planning & Operation. *Das Summa Summarum Des Management*, 265–275. https://doi.org/10.1007/978-3-8349-9320-5_22
- Chow, W. S., Madu, C. N., Kuei, C. H., Lu, M. H., Lin, C., & Tseng, H. (2008). Supply chain management in the US and Taiwan: An empirical study. *Omega*, 36(5), 665–679. <https://doi.org/10.1016/J.OMEGA.2006.01.001>
- Christopher, M. (2016). *Logistics & supply chain management*.
- Chu, J., Liu, H., & Salvo, A. (2020). Air pollution as a determinant of food delivery and related plastic waste. *Nature Human Behaviour* 2020 5:2, 5(2), 212–220. <https://doi.org/10.1038/s41562-020-00961-1>

- Cooke, J. A. (1997). THE SOLID GOLD SUPPLY CHAIN. *Logistics Management*.
- Craighead, C. W., Ketchen Jr., D. J., & Darby, J. L. (2020). Pandemics and Supply Chain Management Research: Toward a Theoretical Toolbox. *Journal of the Decision Sciences Institute*, 51(4), 838–866.
- Croom, S., Romano, P., & Giannakis, M. (2000). Supply chain management: an analytical framework for critical literature review. *European Journal of Purchasing & Supply Management*, 6(1), 67–83. [https://doi.org/10.1016/S0969-7012\(99\)00030-1](https://doi.org/10.1016/S0969-7012(99)00030-1)
- Cuthbertson, R., & Piotrowicz, W. (2008). Supply chain best practices - Identification and categorisation of measures and benefits. *International Journal of Productivity and Performance Management*, 57(5), 389–404. <https://doi.org/10.1108/17410400810881845/FULL/PDF>
- Daneshvar Kakhki, M., & Gargeya, V. B. (2019). Information systems for supply chain management: a systematic literature analysis. *Https://Doi.Org/10.1080/00207543.2019.1570376*, 57(15–16), 5318–5339. <https://doi.org/10.1080/00207543.2019.1570376>
- de Mattos, C. A., & Laurindo, F. J. B. (2017). Information technology adoption and assimilation: Focus on the suppliers portal. *Computers in Industry*, 85, 48–57. <https://doi.org/10.1016/J.COMPIND.2016.12.009>
- Dooley, P. P., Levy, Y., Hackney, R. A., & Parrish, J. L. (2018). *Critical Value Factors in Business Intelligence Systems Implementations*. 55–78. https://doi.org/10.1007/978-3-319-58097-5_6

- El Bilali, H., & Allahyari, M. S. (2018). Transition towards sustainability in agriculture and food systems: Role of information and communication technologies. *Information Processing in Agriculture*, 5(4), 456–464. <https://doi.org/10.1016/J.INPA.2018.06.006>
- Fink, D., & Disterer, G. (2011). International Journal of Enterprise Computing and Business Systems COMPETITIVE ADVANTAGE THROUGH INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) ENABLED SUPPLY. *Journal of Enterprise Information Management*, 1(2), pp.608-624.
- Fosso Wamba, S., Akter, S., Edwards, A., Chopin, G., & Gnanzou, D. (2015). How ‘big data’ can make big impact: Findings from a systematic review and a longitudinal case study. *International Journal of Production Economics*, 165, 234–246. <https://doi.org/10.1016/J.IJPE.2014.12.031>
- Gardner, T. A., Benzie, M., Börner, J., Dawkins, E., Fick, S., Garrett, R., Godar, J., Grimard, A., Lake, S., Larsen, R. K., Mardas, N., McDermott, C. L., Meyfroidt, P., Osbeck, M., Persson, M., Sembres, T., Suavet, C., Strassburg, B., Trevisan, A., ... Wolvekamp, P. (2019). Transparency and sustainability in global commodity supply chains. *World Development*, 121, 163–177. <https://doi.org/10.1016/J.WORLDDEV.2018.05.025>
- Ghonim, M. A., Khashaba, N. M., Al-Najaar, H. M., & Khashan, M. A. (2022). Strategic alignment and its impact on decision effectiveness: a comprehensive model. *International Journal of Emerging Markets*, 17(1), 198–218. <https://doi.org/10.1108/IJOEM-04-2020-0364/FULL/PDF>

- Giedelmann-L, N., Guerrero, W. J., & Solano-Charris, E. L. (2022). System dynamics approach for food inventory policy assessment in a humanitarian supply chain. *International Journal of Disaster Risk Reduction*, 81, 103286. <https://doi.org/10.1016/J.IJDRR.2022.103286>
- Hamister, J. W. (2012). Supply chain management practices in small retailers. *International Journal of Retail and Distribution Management*, 40(6), 427–450. <https://doi.org/10.1108/09590551211230250/FULL/PDF>
- Han, J. H., Wang, Y., & Naim, M. (2017). Reconceptualization of information technology flexibility for supply chain management: An empirical study. *International Journal of Production Economics*, 187, 196–215. <https://doi.org/10.1016/J.IJPE.2017.02.018>
- Han, J., Trienekens, J. H., & (Onno) Omta, S. W. F. (2009). Integrated information and logistics management, quality management and firm performance of pork processing industry in China. *British Food Journal*, 111(1), 9–25. <https://doi.org/10.1108/00070700910924209/FULL/PDF>
- Harris, I., Wang, Y., & Wang, H. (2015). ICT in multimodal transport and technological trends: Unleashing potential for the future. *International Journal of Production Economics*, 159, 88–103. <https://doi.org/10.1016/J.IJPE.2014.09.005>
- Hobbs, J. E. (2021). Food supply chain resilience and the COVID-19 pandemic: What have we learned?. *Canadian Journal of Agricultural Economics/Revue Canadienne d'agroeconomie*, 69(2), 189–196.
- Hult, G. T. M., Ketchen, D. J., & Arrfelt, M. (2007). Strategic supply chain management: Improving performance through a culture of competitiveness and knowledge development. *Strategic Management Journal*, 28(10), 1035–1052. <https://doi.org/10.1002/SMJ.627>

- Jaradat, W., Dearle, A., & Barker, A. (2016). Towards an autonomous decentralized orchestration system. *Concurrency and Computation: Practice and Experience*, 28(11), 3164–3179. <https://doi.org/10.1002/CPE.3655>
- Kassem, R., Ajmal, M., Gunasekaran, A., & Helo, P. (2019). Assessing the impact of organizational culture on achieving business excellence with a moderating role of ICT: An SEM approach. *Benchmarking*, 26(1), 117–146. <https://doi.org/10.1108/BIJ-03-2018-0068/FULL/PDF>
- Kayikci, Y., Subramanian, N., Dora, M., & Bhatia, M. S. (2022). Potentials of blockchain technologies for supply chain collaboration: a conceptual framework. *Production Planning & Control*, 33(2–3), 301–321.
- Keček, D., Boljunčić, V., Milković, M., Ke, D., Boljun Ci C, V., & Milkovi, M. (2019). Effects of final expenditures on ICT goods and services on the croatian domestic output and imports—the input- output approach. *Economic Research - Ekonomska Istraživanja*, 32(1), 531–544. <https://doi.org/10.1080/1331677X.2018.1556109>
- Kijek, T., & Kijek, A. (2019). Is innovation the key to solving the productivity paradox? *Journal of Innovation & Knowledge*, 4(4), 219–225. <https://doi.org/10.1016/J.JIK.2017.12.010>
- Kittipanya-ngam, P., & Tan, K. H. (2019). A framework for food supply chain digitalization: lessons from Thailand. *Https://Doi.Org/10.1080/09537287.2019.1631462*, 31(2–3), 158–172. <https://doi.org/10.1080/09537287.2019.1631462>
- Kozioł-Nadolna, K., & Beyer, K. (2021). Barriers to innovative activity in the sustainable development of public sector organizations. *Procedia Computer Science*, 192, 4376–4385. <https://doi.org/10.1016/J.PROCS.2021.09.214>

- Kshetri, N. (2018). Rural e-Commerce in Developing Countries. *IT Professional*, 20(2), 91–95.
<https://doi.org/10.1109/MITP.2018.021921657>
- Kumar, A., & Kushwaha, G. S. (2018). Supply chain management practices and operational performance of fair price shops in India : an empirical study. *LogForum*, Vol. 14(1), 85–99.
<https://doi.org/10.17270/J.LOG.2018.237>
- Kumar, A., Singh, R. K., & Modgil, S. (2020a). Exploring the relationship between ICT, SCM practices and organizational performance in agri-food supply chain. *Benchmarking*, 27(3), 1003–1041. <https://doi.org/10.1108/BIJ-11-2019-0500/FULL/PDF>
- Kumar, A., Singh, R. K., & Modgil, S. (2020b). Exploring the relationship between ICT, SCM practices and organizational performance in agri-food supply chain. *Benchmarking*, 27(3), 1003–1041. <https://doi.org/10.1108/BIJ-11-2019-0500>
- Lambert, D. M., Cooper, M. C., & Pagh, J. D. (1998). Supply Chain Management: Implementation Issues and Research Opportunities. *The International Journal of Logistics Management*, 9(2), 1–20. <https://doi.org/10.1108/09574099810805807>
- Lee, S. M., Kim, S. T., & Choi, D. (2012). Green supply chain management and organizational performance. *Industrial Management & Data Systems*, 112(8), 1148–1180.
<https://doi.org/10.1108/02635571211264609/FULL/PDF>
- Leskova, Y. G., Kuzmina, I. K., Rakhmatullin, T. E., Dzhagaryan, N. V., Popyrkin, D. A., & Kolodkina, V. N. (2020). Economic and Legal Aspects for Construction Business to Ensure Environmental Safety by Self-Regulating Organizations: The Case of Russia. *International Journal of Economics & Business Administration (IJEBA)*, VIII(4), 20–29.
<https://ideas.repec.org/a/ers/ijebaa/vviii2020i4p20-29.html>

- Li, C. (2013). Controlling the bullwhip effect in a supply chain system with constrained information flows. *Applied Mathematical Modelling*, 37(4), 1897–1909. <https://doi.org/10.1016/J.APM.2012.04.020>
- Li, G., Yang, H., Sun, L., & Sohal, A. S. (2009). The impact of IT implementation on supply chain integration and performance. *International Journal of Production Economics*, 120(1), 125–138. <https://doi.org/10.1016/J.IJPE.2008.07.017>
- Li, S., Ragu-Nathan, B., Ragu-Nathan, T. S., & Subba Rao, S. (2006). The impact of supply chain management practices on competitive advantage and organizational performance. *Omega*, 34(2), 107–124. <https://doi.org/10.1016/J.OMEGA.2004.08.002>
- Lim, D., & Palvia, P. C. (2001). EDI in strategic supply chain: impact on customer service. *International Journal of Information Management*, 21(3), 193–211. [https://doi.org/10.1016/S0268-4012\(01\)00010-X](https://doi.org/10.1016/S0268-4012(01)00010-X)
- Luisa Dos Santos Vieira, C., Sérgio Coelho, A., & Mendes Luna, M. M. (2013). ICT implementation process model for logistics service providers. *Industrial Management & Data Systems*, 113(4), 484–505. <https://doi.org/10.1108/02635571311322757/FULL/PDF>
- Luzzini, D., Brandon-Jones, E., Brandon-Jones, A., & Spina, G. (2015). From sustainability commitment to performance: The role of intra- and inter-firm collaborative capabilities in the upstream supply chain. *International Journal of Production Economics*, 165, 51–63. <https://doi.org/10.1016/J.IJPE.2015.03.004>
- Marinagi, C., Trivellas, P., & Reklitis, P. (2015). Information Quality and Supply Chain Performance: The Mediating Role of Information Sharing. *Procedia - Social and Behavioral Sciences*, 175, 473–479. <https://doi.org/10.1016/J.SBSPRO.2015.01.1225>

- McAdams, B., Massow, M. von, Gallant, M., & Hayhoe, M.-A. (2019). A cross industry evaluation of food waste in restaurants. *Journal of Foodservice Business Research*, 22(5).
- Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D., & Zacharia, Z. G. (2001). DEFINING SUPPLY CHAIN MANAGEMENT. *Journal of Business Logistics*, 22(2), 1–25. <https://doi.org/10.1002/J.2158-1592.2001.TB00001.X>
- Min, S., & Mentzer, J. T. (2004). DEVELOPING AND MEASURING SUPPLY CHAIN MANAGEMENT CONCEPTS. *Journal of Business Logistics*, 25(1), 63–99. <https://doi.org/10.1002/J.2158-1592.2004.TB00170.X>
- Mishra, N. R. (2020). Use of ICT in Classroom: An Analysis of Teachers’ and Students’ Perception on ICT Tools. *Rupantaran: A Multidisciplinary Journal*, 4(1), 121–132. <https://doi.org/10.3126/RUPANTARAN.V4I1.34207>
- Mittal, S., & Hariharan, V. K. (2018). Mobile-based climate services impact on farmers risk management ability in India. *Climate Risk Management*, 22, 42–51. <https://doi.org/10.1016/J.CRM.2018.08.003>
- Molaei, F., Rahimi, E., Siavoshi, H., Afrouz, S. G., & Tenorio, V. (2020). A Comprehensive Review on Internet of Things (IoT) and its Implications in the Mining Industry. *American Journal of Engineering and Applied Sciences*, 13(3), 499–515. <https://doi.org/10.3844/AJEASSP.2020.499.515>
- Muduli, K. kanta, Luthra, S., Kumar Mangla, S., Jabbour, C. J. C., Aich, S., & de Guimarães, J. C. F. (2020). Environmental management and the “soft side” of organisations: Discovering the most relevant behavioural factors in green supply chains. *Business Strategy and the Environment*, 29(4), 1647–1665. <https://doi.org/10.1002/BSE.2459>

- Oguz, A., Xie, W., Palvia, P., Amoako-Gyampah Oguz, K., & Amoako-Gyampah, K. (2018). Information and communications technologies as an enabler of supply chain integration. *Americas Conference on Information Systems*.
<https://aisel.aisnet.org/amcis2018/MetaResearch/Presentations/7/>
- Parashar, S., Sood, G., & Agrawal, N. (2020). Modelling the enablers of food supply chain for reduction in carbon footprint. *Journal of Cleaner Production*, 275, 122932.
<https://doi.org/10.1016/J.JCLEPRO.2020.122932>
- Perales, D. P., Valero, F. A., & Garcia, A. B. (2018). Industry 4.0. A classification scheme. *Closing the Gap between Practice and Research in Industrial Engineering*, 343–350.
- Pérez-López, R. J., Olguín-Tiznado, J. E., García-Alcaraz, J. L., Mojarro-Magaña, M., Camargo-Wilson, C., & López-Barreras, J. A. (2021). Integrating and Controlling ICT Implementation in the Supply Chain: The SME Experience from Baja California. *Mathematics* 2021, Vol. 9, Page 1234, 9(11), 1234. <https://doi.org/10.3390/MATH9111234>
- Prajogo, D., & Olhager, J. (2012). Supply chain integration and performance: The effects of long-term relationships, information technology and sharing, and logistics integration. *International Journal of Production Economics*, 135(1), 514–522.
<https://doi.org/10.1016/J.IJPE.2011.09.001>
- Prause, M. (2019). Challenges of Industry 4.0 Technology Adoption for SMEs: The Case of Japan. *Sustainability* 2019, Vol. 11, Page 5807, 11(20), 5807.
<https://doi.org/10.3390/SU11205807>

- Rahi, S. (2017). Research design and methods: A systematic review of research paradigms, sampling issues and instruments development. *International Journal of Economics*, 6(2), 1–5.
- Rejeb, A., Keogh, J. G., Simske, S. J., Stafford, T., & Treiblmaier, H. (2021). Potentials of blockchain technologies for supply chain collaboration: a conceptual framework. *The International Journal of Logistics Management*, 32(3), 973–994.
- Rossi, J., Bianchini, A., & Guarnieri, P. (2020). Circular Economy Model Enhanced by Intelligent Assets from Industry 4.0: The Proposition of an Innovative Tool to Analyze Case Studies. *Sustainability* 2020, Vol. 12, Page 7147, 12(17), 7147. <https://doi.org/10.3390/SU12177147>
- Rudolph, J., Leedy, P., & Ormrod, J. (2015). *Practical research. Planning and design*.
- Saberi, S., Kouhizadeh, M., Sarkis, J., & Shen, L. (2019). Blockchain technology and its relationships to sustainable supply chain management. *International Journal of Production Research*, 57(7), 2117–2135. <https://doi.org/10.1080/00207543.2018.1533261>
- Saleheen, F., Habib, M., Chain, Z. H.-I. J. of S., & 2018, U. (2018). Supply chain performance measurement model: a literature review. *International Journal of Supply Chain*, 7(3).
- Sarkis, J. (2020). Supply chain sustainability: learning from the COVID-19 pandemic. *International Journal of Operations and Production Management*, 41(1), 63–73. <https://doi.org/10.1108/IJOPM-08-2020-0568>

- Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bernadette, B., Burroughs, H., & Jinks, C. (2018). Saturation in qualitative research: exploring its conceptualization and operationalization. *Quality & Quantity*, 52, 1893–1907.
- Schaltegger, S. (2020). Sustainability learnings from the COVID-19 crisis. Opportunities for resilient industry and business development. *Sustainability Accounting, Management and Policy Journal*, 12(5), 889–897. <https://doi.org/10.1108/SAMPJ-08-2020-0296/FULL/PDF>
- Schanes, K., & Stagl, S. (2019). Food waste fighters: What motivates people to engage in food sharing? *Journal of Cleaner Production*, 211, 1491–1501. <https://doi.org/10.1016/J.JCLEPRO.2018.11.162>
- Scuotto, V., Caputo, F., Villasalero, M., & Del Giudice, M. (2017). A multiple buyer – supplier relationship in the context of SMEs’ digital supply chain management*. *Https://Doi.Org/10.1080/09537287.2017.1375149*, 28(16), 1378–1388. <https://doi.org/10.1080/09537287.2017.1375149>
- Shiralkar, K., Bongale, A., Kumar, S., Kotecha, K., & Prakash, C. (2021). Assessment of the Benefits of Information and Communication Technologies (ICT) Adoption on Downstream Supply Chain Performance of the Retail Industry. *Logistics 2021*, Vol. 5, Page 80, 5(4), 80. <https://doi.org/10.3390/LOGISTICS5040080>
- Siddh, M. M., Soni, G., Jain, R., Sharma, M. K., & Yadav, V. (2017). Agri-fresh food supply chain quality (AFSCQ): a literature review. *Industrial Management and Data Systems*, 117(9), 2015–2044. <https://doi.org/10.1108/IMDS-10-2016-0427/FULL/PDF>

- Sinaga, O., Mulyati, Y., Darrini, A., Galdeano, D. M., & Prasetya, A. R. (2019). Green supply chain management organizational performance. *International Journal of Supply Chain Management*, 8(2), 76–85.
- Singh, S., Kumar, R., Panchal, R., & Tiwari, M. K. (2020). Impact of COVID-19 on logistics systems and disruptions in food supply chain. *59(7)*, 1993–2008. <https://doi.org/10.1080/00207543.2020.1792000>
- Sjah, T., & Zainuri, Z. (2020). *Agricultural Supply Chain and Food Security*. 79–88. https://doi.org/10.1007/978-3-319-95675-6_82
- Soto-Acosta, P., & Meroño-Cerdan, A. L. (2008). Analyzing e-business value creation from a resource-based perspective. *International Journal of Information Management*, 28(1), 49–60. <https://doi.org/10.1016/J.IJINFOMGT.2007.05.001>
- Storey, J., Emberson, C., Godsell, J., & Harrison, A. (2006). Supply chain management: Theory, practice and future challenges. *International Journal of Operations and Production Management*, 26(7), 754–774. <https://doi.org/10.1108/01443570610672220/FULL/PDF>
- Straw, A., & Corbin, J. (1990). *Basics of qualitative research: Grounded Theory*.
- Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, 48, 1273–1296.
- Tan, K. C. (2001). A framework of supply chain management literature. *European Journal of Purchasing & Supply Management*, 7(1), 39–48. [https://doi.org/10.1016/S0969-7012\(00\)00020-4](https://doi.org/10.1016/S0969-7012(00)00020-4)

- Tan, K.-C., Kannan, V., & Handfield, R. (1998). Supply Chain Management: Supplier Performance and Firm Performance. *International Journal of Purchasing & Materials Management*, 34(3).
- Tatoglu, E., Glaister, A. J., & Demirbag, M. (2016). Talent management motives and practices in an emerging market: A comparison between MNEs and local firms. *Journal of World Business*, 51(2), 278–293. <https://doi.org/10.1016/J.JWB.2015.11.001>
- Truong, H. Q., & Hara, Y. (2018). Supply chain risk management: Manufacturing- and service-oriented firms. *Journal of Manufacturing Technology Management*, 29(2), 218–239. <https://doi.org/10.1108/JMTM-07-2017-0145/FULL/PDF>
- Tsai, K. M., & Pawar, K. S. (2018). Special Issue on Next-Generation Cold Supply Chain Management: Research, Applications and Challenges. *International Journal of Logistics Management*, 29(3), 786–791. <https://doi.org/10.1108/IJLM-08-2018-340/FULL/PDF>
- Vanpoucke, E., Vereecke, A., & Boyer, K. K. (2014). Triggers and patterns of integration initiatives in successful buyer–supplier relationships. *Journal of Operations Management*, 32(1–2), 15–33. <https://doi.org/10.1016/J.JOM.2013.11.002>
- Vencataya, L., Seebaluck, A. K., & Doorga, D. (2016). Assessing the Impact of Supply Chain Management on Competitive Advantage and Operational Performance: A Case of Four Star Hotels of Mauritius. *International Review of Management and Marketing*, 6(4), 61–69.
- Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, 5(2), 171–180. <https://doi.org/10.1002/SMJ.4250050207>

- Wolfert, S., Ge, L., Verdouw, C., & Bogaardt, M. J. (2017). Big Data in Smart Farming – A review. *Agricultural Systems*, 153, 69–80. <https://doi.org/10.1016/J.AGSY.2017.01.023>
- Yang, R., Wakefield, R., Lyu, S., Jayasuriya, S., Han, F., Yi, X., Yang, X., Amarasinghe, G., & Chen, S. (2020). Public and private blockchain in construction business process and information integration. *Automation in Construction*, 118, 103276. <https://doi.org/10.1016/J.AUTCON.2020.103276>
- Yu, W. (2015). The effect of IT-enabled supply chain integration on performance. *Https://Doi.Org/10.1080/09537287.2014.1002021*, 26(12), 945–957. <https://doi.org/10.1080/09537287.2014.1002021>
- Yunis, M., Tarhini, A., & Kassar, A. (2018). The role of ICT and innovation in enhancing organizational performance: The catalysing effect of corporate entrepreneurship. *Journal of Business Research*, 88, 344–356. <https://doi.org/10.1016/J.JBUSRES.2017.12.030>
- Zaid, A., Sleimi, M., Saleh, M. W. A., & Othman, M. (2021). The mediating roles of knowledge transfer and supply chain quality management capabilities on organisational performance. *VINE Journal of Information and Knowledge Management Systems*. <https://doi.org/10.1108/VJIKMS-12-2020-0226/FULL/HTML>



APPENDIX

Appendix (1)



Questionnaires for Study

School of Business

COLLEGE OF HUMANITIES AND SOCIAL SCIENCES

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

University Post Office, Kumasi-Ghana West Africa

Dear Sir/Madam,

I am a student of Kwame Nkrumah University of Science and Technology, surveying **“THE ROLE OF ICT ON SUPPLY CHAIN MANAGEMENT PRACTICES IN THE SERVICE INDUSTRY. A POST COVID-19 PERSPECTIVE”**. This questionnaire is designed to solicit information for the study and your contribution to this research through the completion of the attached questionnaire would be very much appreciated.

Your answers to this questionnaire will be treated confidentially (no names required) and used strictly for research and academic purposes.

Please indicate your consent for participation here [] I agree [] I don't agree

SECTION A

Please indicate the level of adoption of the following ICT tools in your organization's supply chain management practices by selecting the appropriate option for each tool from the scale provided below

Kindly use the following scale to assess the adoption of the following ICT tools

Not Adopted	Partially Adopted	Moderately Adopted	Fully Adopted
1	2	3	4

What is the level of adoption of the following ICT tools <i>BEFORE</i> Covid-19,	Not Adopted		Fully Adopted	
1. Data Management Software (eg. Oracle)	1	2	3	4
2. Online communication platforms (eg. Zoom, Skype)	1	2	3	4
3. Task Management Software	1	2	3	4
4. Mobile Apps for Real-time Updates	1	2	3	4
5. Electronic Data Interchange (EDI)	1	2	3	4
6. Supplier Relationship Management (SRM) software	1	2	3	4
7. Enterprise Resource Planning (ERP)	1	2	3	4
8. Customer Relationship Management (CRM) software	1	2	3	4
9. Transportation Management System (TMS)	1	2	3	4
10. Inventory Management Software	1	2	3	4
11. Artificial Intelligence (AI) for demand forecasting and planning	1	2	3	4
12. GPS and location tracking	1	2	3	4

What is the level of adoption of the following ICT tools <i>AFTER</i> Covid-19,	Not Fully			
	Adopted		Adopted	
1. Data Management Software (eg. Oracle)	1	2	3	4
2. Online communication platforms (eg. Zoom, Skype)	1	2	3	4
3. Task Management Software	1	2	3	4
4. Mobile Apps for Real-time Updates	1	2	3	4
5. Electronic Data Interchange (EDI)	1	2	3	4
6. Supplier Relationship Management (SRM) software	1	2	3	4
7. Enterprise Resource Planning (ERP)	1	2	3	4
8. Customer Relationship Management (CRM) software	1	2	3	4
9. Transportation Management System (TMS)	1	2	3	4
10. Inventory Management Software	1	2	3	4
11. Artificial Intelligence (AI) for demand forecasting and planning	1	2	3	4
12. GPS and location tracking	1	2	3	4

SECTION B

Please indicate the impact of the adoption of ICT tools on the following measures of your organization's supply chain management practices.

Kindly use the following scale to assess the impact of ICT tools

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

	Strongly Disagree		Strongly Agree		
1. The integration of ICT tools has enhanced internal communication processes within our organization	1	2	3	4	5
2. The use of ICT tools has improved the efficiency of resource allocation across our supply chain	1	2	3	4	5
3. ICT tools have increased the visibility of inventory and stock levels at various stages of the supply chain	1	2	3	4	5
4. The adoption of ICT tools has contributed to a reduction in delays and bottlenecks in our supply chain operations	1	2	3	4	5
5. The utilization of ICT tools has enabled us to effectively track and monitor the performance of our strategic suppliers	1	2	3	4	5
6. ICT tools have facilitated timely and accurate communication of demand forecasts and production schedules to our strategic suppliers.	1	2	3	4	5

7. The adoption of ICT tools has fostered improved collaboration with strategic suppliers, particularly in new product development initiatives	1	2	3	4	5
8. The use of ICT tools has strengthened our ability to manage and mitigate risks associated with our strategic suppliers	1	2	3	4	5
9. ICT tools have nurtured a culture of open communication and knowledge sharing among our supply chain partners	1	2	3	4	5
10. The adoption of ICT tools has streamlined joint decision-making and problem-solving processes with partners in the supply chain	1	2	3	4	5
11. ICT tools have contributed to enhanced alignment of goals and objectives among various entities within the supply chain	1	2	3	4	5
12. The use of ICT tools has positively influenced our organization's responsiveness to dynamic market conditions through collaborative efforts	1	2	3	4	5
13. ICT tools have improved the accuracy and reliability of information shared among our supply chain partners	1	2	3	4	5
14. The adoption of ICT tools has resulted in enhanced data security and privacy during information sharing processes	1	2	3	4	5
15. ICT tools have facilitated real-time tracking and monitoring of goods in transit, leading to improved coordination	1	2	3	4	5

16. The use of ICT tools has empowered our organization to respond more effectively to disruptions and unexpected events within the supply chain	1	2	3	4	5
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SECTION C

Please answer the following questions which seeks to collect profile information about you and your industry or organization.

- What is the type of service provided by your industry or organization:

☐ Financial and Banking	☐ Healthcare
☐ Transportation and Logistics	☐ Education and Training
☐ Others (Please specify.....)	
- What is the location of organization

☐ Northern Belt (eg. Northern Region)	☐ Middle Belt (eg. Ashanti Region)
☐ Southern Belt (eg. Greater Accra)	
- How many years has your industry or organization been in operation:

☐ 5 or below	☐ 6 – 10
☐ 11 – 20	☐ 21 or above
- Have you been part of the Organization for over 5 Years:

☐ Yes	☐ No
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- What is your level of education?

☐ Senior High School	☐ Diploma
☐ 1st Degree	☐ Master's Degree
☐ PhD	
☐ Others(Please specify.....)	
- Position of Respondent in Organization:

☐ CEO	☐ Supply Chain/Logistics Manager
☐ Operations Manager	☐ Procurement Officer
☐ Customer Service Representation	
☐ Other (Please specify:)	
- How long Respondent has held the current position:

☐ 5 or below	☐ 6 – 10
☐ 11 or above	