SELINUS UNIVERSITY
OF SCIENCES AND LITERATURE

Assessing the Impact of Emerging Technologies on Online Business Models, Consumer Behaviour, and Supply Chain Management

By Abdul-Salam Sibidoo Mubashiru

A DISSERTATION

Presented to the Department of
Management Information Systems
program at Selinus University

Faculty of Computer Science
in fulfillment of the requirements
for the degree of Doctor of Philosophy
in Management Information Systems

2025

DECLARATION

I, Abdulsalam Sibidoo Mubashiru, attest that I am the sole author of this thesis and that its contents are only the results of reading and the research I have done. No part of it has been presented for another degree in this university or elsewhere.

Student ID: UNISE3101IT

ABSTRACT

This study examines the influence of emerging technologies, Artificial Intelligence (AI), Internet of Things (IoT), Virtual Reality (VR), blockchain, and big data, on consumer behaviour, business logistics, and supply chain management. Using quantitative analysis, the research assesses consumer familiarity with these technologies, their adoption rates in e-commerce and supply chains, and their measurable impact on operational efficiency and purchasing decisions.

The findings reveal that consumers are most familiar with AI, followed by IoT and VR, while blockchain and big data remain less understood. Despite this, AI and big data are the most widely adopted technologies in business operations, significantly enhancing strategic decision-making and customer insights. Regression analyses demonstrate that consumer exposure to AI recommendations and user-friendly websites strongly predicts online shopping behavior. In supply chain management, AI, IoT, and big data collectively explain significant proportion of operational efficiency improvements.

The study concludes that businesses must prioritize AI and data-driven tools to enhance customer experience and operational agility, while policymakers should support digital literacy and ethical frameworks for sustainable adoption. Some recommendations for future research include exploring sector-specific challenges and the long-term effects of technology integration. This research contributes empirical evidence to the discourse on digital transformation, offering useful information for practitioners and scholars alike.

KEY WORDS

Artificial intelligence

Big data analytics

Consumer behaviour

E-commerce

Emerging technologies

Supply chain management

ACKNOWLEDGEMENT

First and foremost, I thank my supervisor, Professor Salvatore Fava, for his invaluable advice, support, and guidance during my PhD journey. I thank all the participants who provided the data for this study. Thank you, Hibatu Mumuni for being by my side through thick and thin on this journey. Finally, to my Mom (Azara) for the encouragement, prayers and the mental support she has given me throughout this research.

DEDICATION

I sincerely dedicate this thesis to my family, whose support and encouragement inspired me to complete this study.

TABLE OF CONTENTS

LIST OF FIGURES

Figure **Page**

LIST OF TABLES

Table **Page**

LIST OF SOME ACRONYMS

AI - Artificial Intelligence

IoT - Internet of Things

IT - Information Technology

ML - Machine Learning

RFID - Radio-Frequency Identification

RPA - Robotic Process Automation

CPFR - Collaborative planning, forecasting, and replenishment ()

Fintech - Financial Technology

VR - Virtual Reality

CHAPTER ONE

INTRODUCTION AND AIM OF STUDY

1.1 Background of the Study

This section presents an introductory background to the study. It discusses some emerging technologies, online business models, consumer behaviour and supply chain management.

1.1.1 Emerging Technologies

The rapid emergence and evolution of new technologies have greatly impacted various aspects of society and business. These innovations are characterized by their progressive nature and can help companies achieve competitive advantage (Álvarez-Aros & Bernal-Torres, 2021). They often lead to the creation of new ways of working and delivering enhanced efficiency (Nagy et al., 2018). The rise of various new technologies such as artificial intelligence (AI), blockchain, and the Internet of Things (IoT) is expected to have a significant impact on the future of technology (Singh et al., 2020).

AI is a broad category of technologies that can be used to create machines that can mimic the intelligence of humans. Its ability to analyze and process large amounts of data allows businesses to gain new insights (Ma & Sun, 2020). AI-driven forecasting can help predict the demand for goods and services, as well as improve the efficiency of supply chains. Virtual assistants and chatbots that are powered by AI can also provide users with real-time information and support, helping them feel more comfortable and satisfied.

Originally developed for the cryptocurrency Bitcoin, blockchain technology has since found applications in various sectors. It can be used to improve the transparency of supply chains by allowing users to record transactions across a wide network of

computers. For instance, in the logistics industry, blockchain can help companies track the journey of their products from origin to destination (Saberi et al., 2018). It enables smart contracts, which are automated and can be used to enforce contractual terms without requiring intermediaries. They can also reduce transaction costs and improve efficiency (Zheng et al., 2019).

IoT refers to the network of devices and software that can connect and exchange information with one another over the Internet. These innovations are transforming sectors by allowing them to monitor and manage their environments and processes (Kashani et al., 2021). The IoT can help improve the efficiency of supply chain management by allowing companies to monitor and manage their inventory. Consumers can also benefit from the enhanced functionality of products, such as smart home appliances and health monitors (Wu et al., 2018).

The rise of digital activities has led to the accumulation of vast amounts of data, which can be analyzed using big data analytics. This process helps businesses identify hidden insights and make informed decisions. In addition to analyzing data for marketing and sales, big data analytics can also be used for product development and operations. Big data analytics can help companies identify and target their customers based on their preferences and provide them with personalized products and services. In supply chain management, it can help them improve efficiency and manage their logistics (Zhao et al., 2020).

With cloud computing, businesses can store and access their data and applications over the Internet, which eliminates the need for onsite infrastructure. It also helps reduce information technology (IT) costs, improves accessibility, and enables collaboration. Online businesses can benefit from this technology as it speeds up the deployment of their services, increases customer experience, and handles massive

amounts of transactions (Zbakh et al., 2018). Cloud-based solutions can help improve the coordination and information sharing within a supply chain.

1.1.2 Online Business Models (E-commerce)

The rise of the internet has resulted in the evolution of various business models. These models allow companies to create value and interact with customers in new and innovative ways. E-commerce is considered to be the most prevalent type of business model online (Kedah, 2023). Companies such as Amazon and Alibaba have established themselves as leaders in this space, providing a wide variety of products and services to consumers. New technologies such as blockchain and AI are helping improve the efficiency of e-commerce transactions. Through the use of AI and IoT devices, companies can now offer customized recommendations based on their customer's data. They can also improve the efficiency of their inventory management by monitoring shipment status.

A subscription-based model has gained popularity in various industries, such as software, retail, and entertainment. These models allow customers to access a service or product for a set amount of money, which is typically recurring (Dempsey & Kelliher, 2018). Big data and AI are becoming more prevalent to analyze and improve the customer experience. They can also help companies develop new products and improve their offerings. Cloud computing is a suitable solution for these kinds of services as it can accommodate the necessary infrastructure. The freemium model is commonly used in the app and software industry, where users can access a service for free, but they are then charged for the additional features (Trabucchi et al., 2017). This method is carried out through the use of big data analytics, which helps the company identify and target the users with the most effective offers.

On-demand services, such as those provided by companies such as Airbnb, Uber, and Lyft, connect consumers with providers of various goods and services in real-time. These platforms use advanced algorithms and data processing to ensure that they can meet the demand for their services efficiently. IoT devices, like GPS-enabled smartphones, can also help monitor the availability of services and deliver the best possible experience. In addition to improving the user experience, big data analytics and AI can help these platforms predict demand trends and optimize their pricing (Simchi-Levi et al., 2018).

Without requiring sellers to hold inventory, marketplaces such as Etsy, Upwork, and eBay allow buyers and sellers to conduct transactions. To improve the security and trust of these marketplaces, blockchain technology is being used to create transparent transaction records (Turgay & Erdoğan, 2023). AI is being used to improve the efficiency of these platforms by developing recommendations and detecting fraud.

Crowdfunding platforms such as GoFundMe, Indiegogo, and Kickstarter allow individuals and companies to raise money for their ideas and projects. These models foster entrepreneurship and innovation by harnessing the collective strength of their supporters. New technologies like blockchain allow for secure and transparent distribution and tracking of funds. Social media and marketing tools, such as AI-powered platforms, help campaigners reach a wider audience.

The rise of digital advertising has made it an integral part of online businesses' strategies. Companies such as Facebook and Google use AI to target ads based on a user's preferences and behaviour. Big data analytics can help them improve the efficiency of their ad spend. In addition, blockchain technology is being used to address various issues of fraud and transparency in the industry.

YouTube, for example, allows content providers such as podcasters, YouTubers, and bloggers to earn money through various forms of advertising and subscriptions. These platforms also support their content by providing tools that allow them to monetize their content. Big data analytics and artificial intelligence are vital for improving the quality of content and driving engagement.

1.1.3 Consumer Behaviour

The rise of new technologies has greatly impacted how people interact with businesses and make decisions regarding their purchases. Understanding how these changes are affecting the way consumers view value and engage with brands is very important for businesses. One of the most important factors that businesses are now able to consider is the expectations of their consumers. Through the use of machine learning (ML) and AI, they can analyze and deliver personalized services and products. Through the use of personalization, businesses can improve the customer experience by delivering customized recommendations and advertisements on various platforms. This approach can help boost sales and improve the customer's loyalty (Tyrväinen et al., 2020).

Today, consumers are more focused on instant gratification and convenience than ever before. The rise in on-demand services such as Uber and DoorDash has set new standards for accessibility and speed. The Internet of Things (IoT) can help simplify tasks and enhance the experience of consumers (Ingaldi & Ulewicz, 2019). Consumers expect fast and seamless service in e-commerce, which has become more competitive due to features such as same-day delivery and easy returns (Ingaldi & Ulewicz, 2019). To meet these demands, businesses must adopt technology to streamline their processes.

The rise of the internet has democratized the information age, allowing people to make educated decisions. Before making a purchase, people typically research

products, read reviews, and look up recommendations from online forums and social media. Big data analytics can help businesses understand this behaviour and improve their online presence. Having the necessary product information and attentive customer service are some of the factors that businesses need to consider to gain the trust of their customers. The rise of smartphones and social media has led to the development of social commerce and mobile commerce. People increasingly prefer to shop on their mobile devices, which means that apps and websites must be optimized for them. Social media platforms such as Facebook, TikTok, and Instagram have become integral to the purchase process, with features such as in-app checkout and shoppable posts. Social media influencer marketing is also an integral part of any company's strategy, as consumers rely on recommendations from their peers. Companies must adapt their methods to engage with their audience and take advantage of social media for commerce.

The rise of the sharing economy and subscription services has led to a shift in how consumers access and experience products and services (Lieberman, 2021). This preference is especially apparent among younger individuals. Some of the companies that have emerged that cater to this type of consumer are Zipcar, Netflix, and Spotify. According to Kumar et al (2020), experiences such as dining out and travel are becoming more valued than their physical possessions. To appeal to this demographic, businesses should focus on providing memorable services and implementing rental or subscription models.

Due to the increasing number of people looking for products that are made from sustainable materials, the demand for ethical and environmentally friendly products has increased. This has resulted in more transparency in the supply chain and the certification of companies (Buell & Kalkanci, 2019). Through blockchain technology,

consumers can verify the authenticity of products and the origins of their supply chains. Companies must therefore prioritize ethical and sustainable practices to attract and retain such customers.

Due to the increasing number of people interacting with businesses online, security and digital trust have become more important. Consumers' behaviour can be affected by concerns about the privacy and security of their personal information. To prevent unauthorized access and use of their data, organizations must implement effective measures and be transparent about how they collect and use their data. Blockchain and AI technologies can help enhance the security of transactions.

The rise of technology has led to an increased focus on the importance of well-being and health, especially after the COVID-19 pandemic. Wearable devices, telehealth apps, and other services allow people to monitor their conditions and receive medical assistance remotely (Mosconi et al., 2019). This trend also affects the purchase behaviour of certain health-related products. To cater to the needs of more health-conscious consumers, wellness businesses must take advantage of technology.

1.1.4 Supply Chain Management

The concept of supply chain management refers to the process of planning and managing all aspects of a company's supply chain. It involves working with various departments and organizations to improve its efficiency (Rogers et al., 2020). New technologies are helping organizations transform their supply chain management by increasing visibility and facilitating collaboration.

The rise of advanced technologies such as blockchain and the IoT has revolutionized the way we view and act on the supply chain. With the help of IoT devices, such as RFID tags and sensors, we can now track the movement of our products

as they go through the supply chain, ensuring that they arrive at their intended destination promptly. This eliminates potential errors and helps prevent disruptions.

Through blockchain technology, transactions can be recorded and analyzed in a secure and immutable manner. This type of ledger can help in the management of the supply chain by creating a tamper-proof record of every step in the process. It can also help prevent fraud and ensure that the products are authentic (Saberi et al., 2018).

Big data analytics can help supply chain managers improve their efficiency and make informed decisions. It can also help them identify areas of their operations where they can improve. Through ML and AI, supply chain managers can improve their efficiency and manage their inventory. With the help of predictive analysis, companies can anticipate changes in the market and adjust their strategies to ensure timely delivery and reduce waste.

A robotic process automation system (RPA) can help automate certain repetitive tasks, such as order processing and shipment tracking. It can free up employees to focus on more important activities while reducing human error. As more drones and autonomous vehicles are being used for deliveries and transportation, the use of RPA can also be beneficial for companies (Biswal et al., 2020). Various technological advancements can result in lower transportation costs, faster delivery times, and better access to remote regions. For instance, Amazon is currently testing the use of drones in its last-mile logistics operations.

The rapid emergence and evolution of new technologies have created a conducive environment for collaborative and integrated engagement among partners within the supply chain. Cloud-based platforms allow collaborators to securely exchange and share information, empowering them to make informed decisions and improve their efficiency (Dhandapani & Ramachandran, 2021).

Collaborative planning, forecasting, and replenishment (CPFR) is a process that involves sharing information and plans to improve the efficiency of a supply chain. With the help of cloud-based tools, such as analytics, CPFR can also reduce uncertainties and improve the alignment of demand and supply.

Big data and blockchain technologies are helping companies improve their supply chain management practices and ensure that their goods are ethically and sustainably produced. These innovations can help them monitor the origin and journey of their raw materials and ensure that they meet sustainability standards. New technologies are helping companies create a circular economy by supporting the reuse, recycling, and re-manufacturing of products. Through IoT, devices can monitor the lifecycle of products and help companies recover their value from used goods.

Various risks can affect the operations of a supply chain, such as pandemics, natural calamities, and geopolitical conflicts. Technological innovations can help improve the resilience of a supply chain by identifying potential threats and vulnerabilities (Keswani et al., 2022). Through digital twins, companies can analyze historical data and develop effective contingency plans. This technology allows them to simulate various scenarios and assess the effects of potential disruptions. It enhances their ability to respond to unforeseen events. Cybersecurity is becoming an important factor in the management of the supply chain due to digitalization. Various security measures, such as blockchain-based transactions and AI threat detection, can be used to protect the data of the organization.

1.2 Statement of the Research Problem

The rapid emergence and evolution of new technologies are transforming the way businesses operate. They are posing new challenges and opportunities for supply chain management and consumer behaviour. Understanding how these innovations affect consumers and the supply chain is very important. Nevertheless, there is an inadequate comprehensive understanding of the effects of new technologies on various business operations and sectors. This is despite the wide body of literature on these innovations. There are still gaps in the understanding of how various technologies affect different facets of a company's operations and business sectors. (Akbari & Hopkins, 2022; Alazab et al., 2021; Ameen, Hosany & Tarhini, 2021; Aryal et al., 2020; Attaran, 2020; Hoffman et al., 2022; Lee et al., 2019; Li, 2020; Purohit et al., 2022; Raji et al., 2024; Ranta et al., 2021; Rosário & Dias, 2023; Yang et al., 2021). This study aims to fill these gaps by examining the adoption and integration of emerging technologies, their influence on consumer behaviour, and their effects on supply chain management and operational efficiency.

The rise of technologies such as blockchain, AI, and IoT are transforming how businesses operate. Existing research has mainly focused on the implementation of these technologies in specific sectors, such as e-commerce and supply chains. It does not provide a comprehensive view of their widespread adoption (Hoffman et al., 2022; Lee et al., 2019; Li, 2020; Ranta et al., 2021; Rosário & Dias, 2023;). In their editorial, Hoffman et al. (2022) discussed the various frameworks that can be used to think about the impact of new technology on the marketing industry. In their review, Rasario and Dias (2023) examined the benefits and challenges of data-driven marketing. They also explored the multiple factors that influence the development and implementation of this strategy.

Ranta et al. (2021) conducted a case study examining the business models of four Northern European companies that have adopted circular economy strategies. They found that innovations in these models were catalysed by the use of analysis and data integration technologies.

Li (2020) utilized a literature review to create a comprehensive business model framework that analyzed the empirical data from the creative industries. According to him, digital technologies have led to various changes in the way business models are structured. According to him, the emergence of new business models is not new in the context of the online business ecosystem. This study aims to analyze the various technologies that are used by online businesses and their integration into their operations. It will also provide a detailed view of the multiple factors that influence the adoption of these technologies.

The rise of technological advancements has resulted in a rapid evolution of consumer behaviour. According to studies, certain innovations, such as chatbots, virtual reality, and mobile payment methods, can significantly influence a person's purchasing decisions (Ameen et al., 2021; Raji et al., 2024; Purohit et al., 2022). However, there is currently a lack of understanding about how these technologies influence the buying habits, brand loyalty, and decision-making processes of consumers. This study aims to provide a comprehensive analysis of the effects of these innovations on shopping habits and online shopping trends.

The rapid emergence and evolution of new technologies have dramatically changed the way supply chain management is done. They are expected to have a significant impact on various aspects of the supply chain, such as inventory management and transportation logistics. Despite the widespread research into their potential, there are still gaps in understanding their practical applications (Alazab et al.,

2021; Attaran, 2020; Aryal et al., 2020; Akbari & Hopkins, 2022; Yang et al., 2021). It is imperative to evaluate how technological advancements enhance supply chain visibility, transparency, agility, and resilience, addressing challenges such as inventory optimization, last-mile delivery, and demand forecasting accuracy.

1.3 Research Questions

- What types of emerging technologies are being utilized across different sectors of the online business ecosystem and to what extent?
- What is the impact of emerging technologies on consumer behaviour, preferences, and expectations in the context of online shopping?
- What are the changes in consumer decision-making processes, shopping habits, and brand loyalty patterns associated with technological innovations?
- What is the impact of emerging technologies on supply chain management practices?

1.4 Research Aims and Objectives

1.4.1 Research Aims

The main aim of this study is to examine the effect of emerging technologies on online business modes, consumer behaviour and supply chain management.

1.4.2 Research Objectives

- To identify the types of emerging technologies being utilized across different sectors of the online business ecosystem.
- To investigate how the adoption of emerging technologies is influencing consumer behaviour, preferences, and expectations in the context of online shopping.

- To examine changes in consumer decision-making processes, shopping habits, and brand loyalty patterns resulting from technological innovations.
- To assess the impact of emerging technologies on supply chain management practices.

1.5 Innovativeness of the Study

The study takes a unique approach by incorporating different perspectives from supply chain management, technology adoption, and consumer behaviour. By doing so, it allows for a more in-depth understanding of how emerging technologies affect each other.

Unlike other studies that focus on a particular technology or industry, this research looks into the adoption of new technologies in various sectors of the online business ecosystem. For instance, it examines the rise of e-commerce platforms and logistics networks, as well as the impact of customer service channels.

This study aims to bridge the gap between the theoretical and practical applications of emerging technologies by providing actionable recommendations and insights for businesses that want to improve their competitive positioning and operations.

This study aims to provide a comprehensive analysis of the current impacts and future developments of new technologies. It also explores trends and potential changes that will affect their integration and adoption. Through its forward-looking approach, researchers and businesses can anticipate the future changes that will affect them.

1.6 Organization of the Study

This dissertation is made up of five chapters. The first chapter presents an introduction to the study. It provides an extensive background to the study. It also states the research problem as well as the research objectives and questions and the innovativeness of the study. The second chapter of the study reviews and synthesizes contemporary literature relevant to the research objectives. Chapter Three is dedicated to a review of the research methodology and methods. It discusses the philosophical underpinnings of the study as well as the research approach, study design and the methods used in the study. Chapter Four presents the contents and results of the data analyses. An extensive discussion of the results of data analysis, presented in Chapter Four, is carried out in Chapter Five. Chapter Six summarizes the study and presents the key findings, conclusions and recommendations of the study. It includes a reference list of the sources cited in the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter conducts a comprehensive review of contemporary literature relevant to the assessment of the impact of emerging technologies on online business models, consumer behaviour, and supply chain management. The current section provides an overview of the study by briefly introducing the main themes of the study: emerging technologies, online business models, consumer behaviour, and supply chain management. The section also explains the purpose and importance of the literature review in addressing the research objectives.

2.1.1 Overview of the Study

The rapid emergence and evolution of new technologies have created a vast number of new opportunities for online businesses. This study explores the effects of these innovations on online business models, consumer behaviour and supply chain management.

The term emerging technologies refers to a wide range of innovations that are transforming how businesses operate. Some of these include artificial intelligence, machine learning, blockchain, and virtual reality. They are helping companies improve efficiency and create new capabilities. The rise of digital business models has disrupted traditional industries. These innovations, such as subscription services and direct-to-consumer sales, are helping companies reach a wider audience and improve their efficiency.

The way consumers shop is being changed by technology. With the ability to create personalized shopping experiences and ensure transactions are secure, technology is disrupting the traditional way of doing business. This has prompted businesses to

rethink their approach to brand loyalty and customer care. The integration of new technologies is transforming the way supply chain management is done. These include the use of blockchain and IoT. These innovations can help improve the efficiency and resilience of a supply chain by allowing it to more effectively forecast and manage its inventory.

2.1.2 Purpose of the Literature Review

The goal of this chapter is to provide a comprehensive review of the various factors that influence the development and implementation of online business models. It also aims to identify the gaps in the current knowledge regarding the impact of new technologies on these models. It aims to create a theoretical framework that can be used to analyze and interpret the findings of a study. This framework will help guide the reader through the process of analyzing and interpreting the findings. It also aims to identify the key emerging technologies that are being used in the online business ecosystem and to understand their potential impact on consumers and supply chain management.

Again, it seeks to understand the influence that emerging technologies have on the consumer behaviour of online shoppers. It analyzes past studies to gain a deeper understanding of how these changes affect different aspects of shopping habits, brand loyalty, and decision-making processes. It aims to provide actionable insights that can help companies improve their customer service.

The review examines the changes taking place in the business models of the digital age. It assesses how these changes are affecting the operations of companies, including the evolution of e-commerce platforms and subscription services. Gaining a deeper understanding of these changes is vital for identifying the obstacles and opportunities that companies face. The review aims to examine the impact of new technologies on

the management of supply chains. It considers the various aspects of supply chain management, such as demand forecasting and inventory control. Through a comprehensive analysis of the literature, the review identifies how these innovations are helping improve the efficiency of the supply chain. The literature review is meant to identify gaps in current knowledge. This is achieved by highlighting areas where there are inadequate or inconclusive studies. This contributes to the academic community's understanding of the subject and provides new insights.

2.2 Emerging Technologies in Online Business Ecosystem

This section reviews some definitions and scope of emerging technologies. It reviews the types of emerging technologies and conducts a sectoral analysis by discussing how these technologies are being utilized across different sectors such as retail, logistics, finance, and healthcare.

2.2.1 Definitions and Overview of Emerging Technologies

2.2.1.1 Definition of Emerging Technologies

The emergence of new technologies is a broad concept that refers to innovations that are either in their early stages of development or are already being implemented. These are often referred to as novel, rapid, and transformative innovations that can significantly change the way businesses operate. They can also introduce new capabilities and enhance existing ones (Allioui & Mourdi, 2023; Novocin & Weber, 2022).

The field of emerging technologies is characterized by a wide variety of innovations that can have a significant impact on various sectors. These include technological advancements that are in their early stages of development and can provide broad clinical applications (Anklam et al., 2022). Some of the major

innovations that have been identified include artificial intelligence, quantum computing, and the development of autonomous systems. Other innovations include drug discovery and education (Luo et al., 2023; Reding & Eaton, 2020). Not only do they shape the future of global security and warfare, but they also play a vital role in the development of a sustainable world. These include the development of new technologies that are used in the production and delivery of various types of entertainment and sports (Rautela et al., 2023).

2.2.1.2 Characteristics of Emerging Technologies

Emerging technologies are characterized by their innovativeness. They offer novel approaches and solutions that challenge conventional methods. These are usually the result of technological development and scientific research. On the other hand, disruptiveness is when these technologies can disrupt established business models and markets.

The rapid evolution of new technologies can lead to the establishment of new industries and the obsolescence of old ones. This is because innovations and discoveries are made constantly. Learning and adaptation are required to keep up with the changes. Many emerging technologies are capable of quickly scaling up and affecting global markets and large populations. Their scalability can be enhanced by networks and digital platforms. Emerging technologies often feature interdisciplinary capabilities, which means they often combine the work of different disciplines such as engineering, biology, materials science, and computer science. Uncertainties surround the full potential and outcomes of emerging technologies. Numerous risks and obstacles can prevent the development and implementation of these innovations. They can also greatly affect how businesses operate, as well as how consumers interact with services and goods.

2.2.1.3 Examples of Emerging Technologies

Machine learning and AI are helping transform various sectors by allowing machines to perform tasks and make decisions that require the expertise of humans. They are being widely used in areas such as autonomous vehicles and predictive analytics.

The decentralized nature of blockchain technology enables transactions to be recorded transparently and immutable. It is transforming various sectors, such as healthcare and finance. The Internet of Things is a framework that enables the exchange of data between various physical devices. It is being used to enhance the efficiency of healthcare monitoring and smart homes. Virtual and augmented reality combine to create an entirely new experience through the utilization of data superimposed onto the physical world. They are utilized in retail, education, and gaming. Big data analytics process involve analyzing and processing vast amounts of information to find patterns, insights, and other characteristics. It can be used in areas such as finance, marketing, and healthcare. The cloud computing model allows companies to access computing resources over the internet. This enables them to enhance efficiency and lower their expenses. The 5G technology represents the evolution of mobile networks. It promises faster speeds, improved latency, and universal connectivity. It holds the potential to spark advancements in areas such as smart cities and the Internet of Things. The increasing number of advancements in automation and robotics are helping improve the efficiency and safety of various sectors, such as manufacturing and logistics.

2.2.1.4 Utilization of Emerging Technologies Across Different Sectors

The rapid emergence and evolution of new technologies have transformed various sectors, such as healthcare, retail, and logistics. These innovations are helping

organizations improve their operational efficiency and create new business opportunities.

Artificial Intelligence and Machine Learning have revolutionized the way consumers shop for goods and services in the retail industry. Through the use of these technologies, retailers can now provide individualized recommendations and marketing strategies based on their customer data (Davenport & Ronanki, 2018). Online retailers have started to integrate virtual assistants and chatbots into their platforms, which have assisted consumers in making purchases and getting instant support (Luo et al., 2019). The adoption of augmented reality and virtual reality has also been considered a significant advancement. This allows people to try different products and experiences through virtual reality. Virtual reality enables interactive demonstrations and store tours, which are novel ways for customers to interact with brands (Javornik, 2016).

The rise of the Internet of Things has revolutionized retail, allowing stores to monitor their inventory levels and provide staff with timely updates on replenishment. Moreover, devices equipped with the IoT can collect customer data and provide retailers with valuable insight into their purchasing habits (Luo et al., 2019). Through Big Data Analytics, retailers can gain deeper insight into their customers' behaviour and improve their forecasting. They can also use blockchain technology to ensure the transparency of their supply chains. This can help prevent fraud and improve consumer trust (Kshetri, 2018).

Dokku et al (2023) analyzed the use of AI in the retail industry. It focused on the management of inventory, order processing, and shipping. The researchers analyzed 145 samples from different establishments in the city of Vijayawada. The researchers collected data from both primary and secondary sources. They then utilized a factor analysis to evaluate the study's findings. According to the researchers, most of India's

retailers are aware of the use of AI in their operations. They also noted that some establishments handle inventory, shipping, and order processing using the technology. Nevertheless, the researchers focused on the impact of AI on the retail industry in India's Andhra Pradesh state, specifically in the city of Vijayawada. However, since the sample size of the city's establishments may not represent India's entire retail sector, the study's overall conclusions may be affected. The factors that influence the study's findings may not be apparent in the data collected or analyzed. For instance, the assumptions used in the analysis might not have taken into account the underlying data. The researchers focused on the utilization of AI in certain retail functions, such as inventory management and order processing. However, their findings might overlook other aspects of its implementation within the sector.

Shekhawat (2022) the use of the Internet of Things and artificial intelligence in the retail sector to improve decision-making capabilities and operational efficiency. She examined current implementations of AIoT in retail stores and the different ways in which it can be used to achieve operational excellence. This study explores the use of electronic shelf labels (ESLs) in the retail industry and how they are helping to improve the efficiency of stores. It also shows how the industry is investing in the use of IoT and AI technologies to improve the decision-making process and operational effectiveness. The study shows how the combination of the Internet of Things and AI can transform the way retailers operate. It provides a powerful digital platform that enables them to access and analyze vast amounts of data. It also highlights how the current implementations of AIoT in retail stores can help improve the efficiency of their operations. According to the study, the use of electronic Shelf Labels has revolutionized the pricing strategies of retailers. It shows how AIoT applications, such as those featured in ESLs, can help enhance the efficiency and effectiveness of retail

environments. Nevertheless, But the study does not provide retailers with a comprehensive analysis of the various obstacles that they might encounter when implementing such technologies. Although the study provides an overview of the various aspects of AIoT and the use of electronic shelf labels, it does not provide retailers with a comprehensive analysis of the various obstacles they might encounter when implementing such technologies. Instead, it focuses on the technical requirements that retailers should consider when it comes to implementing the technology.

The use of advanced technologies in logistics can help improve the efficiency and sustainability of the industry. Some of the key factors that have been identified as potential drivers of the development of these technologies include the introduction of electric vehicles, artificial intelligence, blockchain, and virtual reality (Chauhan, 2022; Nand et al., 2023; Gupta & Singh, 2024). The use of advanced technologies in logistics can help improve the efficiency and sustainability of the industry. Some of the key factors that have been identified as potential drivers of the development of these technologies include the introduction of electric vehicles, artificial intelligence, blockchain, and virtual reality (Comi & Russo, 2022).

ML and AI are being widely used in the logistics industry to improve the efficiency of the transportation process. They can help reduce the cost of transportation and improve the delivery time. In addition, through predictive maintenance, which uses machine learning models, equipment failures can be predicted before they happen, decreasing downtime and improving maintenance costs (Savelsbergh & Van Woensel, 2016). The rise of the IoT has revolutionized the way goods are tracked and monitored in real time. Its ability to provide actionable data enables enhanced visibility into the distribution chain (Gubbi et al., 2013). Fleet management systems that utilize the IoT can optimize their routes and schedules, ultimately lowering operating costs. Through

blockchain technology, which secures transactions, the logistics industry can now benefit from increased transparency and traceability. Automated tools, such as drones and self-driving cars, are also being tested to improve the efficiency of the supply chain (Christopher, 2016; Goodchild & Toy, 2018).

Chauhan (2022) focused on the planning and allocation of resources in freight logistics systems using the use of new transportation technologies, such as drones and electric cars. He proposes integrating these into existing networks to reduce congestion and greenhouse gas emissions. The paper aimed to analyze the various challenges that affect the transportation system and identify areas where the use of electric vehicles and drones can be effective. In addition to reviewing the literature, the paper also uses data analysis and simulation studies to examine the effects of these technologies on the logistics industry. The researcher proposed various methods that can be used to improve the efficiency of the transportation system. These include the use of optimization techniques and mathematical modelling. According to Chauhan, freight transportation is a vital part of the US economy and contributes over 50% of the country's total transportation sector (Chauhan, 2022).

The use of electric vehicles and drones has been identified as an effective way to reduce the greenhouse gas emissions associated with the freight transportation industry (Chauhan, 2022). In addition, they can help improve the efficiency of the logistics industry by reducing the time it takes to deliver goods. According to Chauhan (2022), the integration of electric vehicles and drones can help improve the efficiency of freight movements, reduce environmental impact, and boost the performance of the overall system in real-time scenarios. They note that the use of advanced transportation technologies can help address the challenges faced by the logistics industry.

The financial sector has started adopting ML and AI in various areas, such as automated trading and fraud detection (Ngai et al., 2011). These tools can help identify anomalous patterns in the market and execute complex transactions with high precision and speed (Dixon et al., 2020). The rise of blockchain technology has created new opportunities for the financial sector, as it allows companies to offer secure and decentralized digital currencies (Nakamoto, 2008). Its smart contracts can also automate the enforcement of contracts, which reduces the need for intermediaries. Big Data analytics can help identify potential risks and improve the efficiency of the operations of the financial industry (Davenport, 2014). The ability to store and analyze massive amounts of data through cloud computing allows financial firms to swiftly adapt to changes in the market (Zhang, 2023).

The transformation of the financial industry has been driven by the integration of various innovations. Fintech, which denotes the link between financial services and IT, has emerged as a crucial factor in advancing financial innovation (Zhang, 2023). Some of the most prominent innovations in the financial industry include blockchain technology, which is designed to ensure that transactions are conducted securely and transparently. AI and other digital platforms are also being used to enhance the efficiency of financial services (Gopal et al., 2023). The rapid emergence and evolution of new technologies such as the IoT and virtual reality (VR) has created a new landscape for financial services. These innovations are expected to enhance the efficiency and security of the financial services industry. However, they can also expose the industry to various risks.

Zhang (2023) covered the history of various financial technologies, including digital currency, peer-to-peer lending, blockchain technology, and robo-advice. He evaluates their advantages and disadvantages and compares them to traditional

operations. The paper uses various methods to analyze and discuss the implications of financial technologies on the traditional finance industry. It also explores the problems that these innovations present.

Gopal et al (2023) examined the latest empirical data to gain a deeper understanding of the value that financial technology (fintech) offers investors. They also looked into the security risks that banks face as a result of this innovation. They assessed the integration of various cutting-edge technologies, such as AI, ML, IoT, Blockchain, VR, 5G, and Smartphone Applications. The study also considered various technological advancements that are expected to transform the way financial services are delivered. These include the development of new platforms and applications, such as credit underwriting and fraud detection, the establishment of virtual assistants and chatbots, and the use of blockchain technology. The researchers noted that the integration of AI and Machine Learning in the banking and fintech industry has greatly advanced the sector. They identified various technological trends that are driving the transformation of the way financial services are delivered. Some of these include the development of new platforms and applications, such as fraud detection, the establishment of virtual assistants and chatbots, and the use of blockchain technology. According to Gopal et al (2023), the use of cloud computing is increasing in the financial industry to store and manage vast amounts of data, which helps improve efficiency and safety for both businesses and consumers. To prevent unauthorized access and fraud, many financial firms are now investing in cybersecurity measures such as authentication technologies.

The rapid emergence and evolution of various new technologies such as AI, robotics, IoT, blockchain, drones, and virtual reality are helping transform the way healthcare is delivered. These innovations are also helping lower the cost of treatment

and improve the quality of care. The use of these technologies in various areas such as medication administration, surgical procedures, and pandemic response is expected to increase. The integration of blockchain, AI, and IoT-enabled wearable devices is expected to transform the way healthcare is done (Esteva et al., 2019). Despite the challenges that these technologies face, such as the lack of interoperability and cost-effective sensors, they are still expected to contribute to the development of personalized healthcare systems (Corbett et al., 2023; Junaid et al., 2022). The applications of these technologies in various fields, such as pandemic response, vaccine development, and healthcare delivery, have shown promising results (Corbett et al., 2023; Junaid et al., 2022).

Corbett et al (2023) explored the evolution of technology within the healthcare industry. It looks into the key aspects of this change and examines its potential to transform the way healthcare is delivered. The researchers also talk about how it can affect patient monitoring, disease management, and access to services. They used various methods to analyze the technological advancements within the healthcare industry. They explored some key aspects of this change and examined its potential to transform the way healthcare is delivered. They also talked about how it can affect patient monitoring, disease management, and access to services. The study mainly emphasized the potential advantages of technology in the healthcare sector, but they overlooked its drawbacks and challenges.

Junaid et al (2022) examined the use of various emerging technologies, such as AI, IoT, Blockchain, and Smart Sensors, in healthcare management systems. They looked into the available studies and key enabling factors, as well as successful implementations. The study also assessed the various critical issues that affect the development and implementation of IoT-based wearable sensor systems, Blockchain,

and AI in the healthcare management system industry. Junaid et al (2022) noted that the integration of these technologies has led to the establishment of personalized healthcare programs. They noted that the rapid emergence and evolution of AI and IoT-based technologies have led to the transformation of the traditional healthcare management system. However, despite the progress, the implementation of these innovations has been hindered by various factors. Some of these include the lack of accurate and cost-effective medical sensors, interoperability issues, and the unstandardized nature of the IoT system. The paper mainly focuses on the advantages and applications of new technologies in the healthcare industry. It does not go into detail about the implementation of these innovations. Instead, it highlights the issues that can prevent the smooth interoperability of data and the cost-effective use of smart medical devices. The paper's survey approach might limit the scope of the study's analysis to examine specific use cases or the implementation of Blockchain, AI, and IoT in healthcare settings.

The rapid emergence and evolution of new technologies in various sectors such as healthcare, retail, finance, and logistics has created new opportunities for both new and existing businesses. These innovations are helping them improve their operational effectiveness and enable them to transform how they operate. Their impact on how consumers interact with goods and services is expected to continue to grow.

2.3 Impact on Online Business Models

The rapid emergence and evolution of new technologies such as blockchain, artificial intelligence, and real-time data analytics have revolutionized the way online businesses operate (Demaci, 2022). These innovations have allowed them to create new e-business models that are designed to transform the way consumers and society interact. Some of these include the creation of marketplaces that provide short-term

loans and the development of mobile-enabled transportation solutions. The rise of social media has revolutionized the way marketing works. It allows brands to connect with their users and build effective online identities. AI-powered companies can then drive innovation and create significant changes in the way organizations operate.

Demaci (2022) investigated how emerging technologies, such as AI, blockchain, and robots, can affect traditional business models, consumer habits, and labour force dynamics. It explored the possibility of these innovations disrupting existing markets and creating new business opportunities. The study utilized a qualitative method and included case studies and a literature review. It noted that to successfully implement new technologies, one must take into account the concerns of their customers and workers while also nurturing innovation and growth. The study emphasizes how important it is to learn about and cater to the needs of consumers before investing in customer-centric technologies. It also emphasized how important it is for companies to invest in workforce training to equip their personnel with the necessary skills to succeed in new roles. It is also important that companies thoroughly assess and adjust to how emerging technologies are affecting their business models, workforce, and customers. Although the study focused on qualitative methods, such as case studies, it may not apply to everyone. Demaci (2022) only featured case studies from a certain industry, which could prevent its findings from applying to other sectors. Also, the study did not provide any comprehensive analysis of the various barriers and challenges that companies face when it comes to adopting new technologies.

Simões et al (2021) conducted a case study to study the effects of digitalization on the business models of small and medium-sized enterprises in Portugal. They utilized a case research approach to investigate how new technologies are affecting these business models, and this allows for the study of both the "why" and "how." The researchers

conducted a case study that involved semi-structured interviews, which were carried out over two days. They utilized a video call platform to carry out the interviews. The objective of the study was to gather information about two Portuguese companies' business models. The case study was carried out to produce new concepts and contribute to the development of future research regarding the impact of digitalization on business models. According to Simoes et al (2021), Industry 4.0 will create complicated systems that will require specialized management tools. They noted that businesses will start modifying their business models in response to internal changes or external competition. The researchers noted that the shift toward an open innovation strategy and a network-centric approach will allow businesses to navigate through more competitive markets. They also emphasized the importance of having a workforce that is involved in the process of transformation. The researchers remarked that due to the limited sample size and the nature of the case study, they were not able to carry out statistical analyses. Instead, they focused on the analytic method of conducting the study. The study analyzed how digitalization affects the business models of two Portuguese companies. Though the study focused on the various aspects of digitalization, it did not explore the full implications of this field on the business models of companies. Simões et al (2021) did not provide a comprehensive analysis of the multiple strategies that businesses can use to navigate through the changes brought about by Industry 4.0.

Bazarova and Botavina (2022) examined foreign and Russian literature on the topic of digitalization's effect on new business models. The researchers then synthesized the collected data to come up with a conclusion. They created a flowchart to represent the various elements of the study and their findings. They focused on how digital transformation can affect businesses, particularly in Germany and Russia's e-

commerce sectors. The study categorized e-commerce implementations according to their features and functions. The study noted that the rapid emergence and evolution of new business models, such as e-commerce and outsourcing, have been greatly influenced by digitalization. They state that this has a significant effect on how companies interact with their customers and how they operate. According to Bazarova and Botavina (2022), digital transformation has affected businesses in Germany and Russia. It highlights how important technology is when it comes to shaping market trends and influencing consumer behaviour. Overall, the study highlights how digitalization has greatly affected the dynamics of business. Companies must adopt technological innovations to stay competitive. Since the study only focused on these two countries' markets, their findings may not be generalized to other global contexts. Also, the study did not explore the practical challenges that companies face when implementing different e-commerce techniques. Instead, the researchers used standard scientific methods such as comparisons and analysis. They also failed to explore the potential changes that could affect the future development of new business models.

Averina et al. (2021) presented a framework for developing a comprehensive understanding of a company's digital transformation to stay competitive. They identified three main strategic directions that will help transform the business model. These include technological excellence, client satisfaction, and proximity to customers. The framework emphasized the importance of having a game plan to guide the transformation of the company's current business model. It also covers areas such as marketing opportunities, self-service capabilities, and analytics. The researchers suggested using various concepts such as customer interactions and service blueprints to help businesses develop their digital model. They also suggested automating processes and establishing a culture that encourages employees to use automation tools.

They noted that redesigning every aspect of a company's operations is important to ensure that it can meet the needs of its customers. They suggested using concepts such as service blueprints, physical evidence of interactions, and division boundaries to help businesses implement digital transformation. In addition, Averina et al. (2021) suggested automating certain processes and introducing a culture focused on automation tools to help employees improve their efficiency. However, they did not thoroughly discuss the various financial and resource requirements that businesses face when it comes to implementing digital transformation. Although the framework suggested various steps that businesses can take to start implementing digital transformation, it did not provide a comprehensive guide on how to manage the transition period. The study also did not provide enough details on how to mitigate the risks that could arise due to the implementation of new technology.

2.4 Influence of Emerging Technologies on Consumer Behaviour

The rise of digital technologies such as blockchain, AI, robots, and digital platforms has greatly impacted the behaviour of consumers in different sectors. The surge in digital technologies has stimulated changes in how consumers shop for, consume, and make purchases, according to Ovodenko et al (2020). The home furnishing industry has started adopting an omnichannel strategy, wherein customers prefer to receive individualized attention and benefit from both online and offline channels (Rangaswamy et al., 2022). The use of non-thermal and thermal technologies in food production has led to improvements in the consumer perception and sensory characteristics of products. These innovations have also influenced the acceptance of certain food products by consumers (dos Santos Rocha et al., 2022). The rise of digital technologies has greatly impacted the purchasing habits and expectations of consumers.

It has also highlighted the need for companies to adopt a strategic approach to meet the changing needs of their customers (Demaci, 2022).

Ovodenko et al (2020) conducted a literature review to examine the changes that occurred in consumer behaviour during the digital age. They focused on the impact of such technologies on buying habits and interactions. The researchers also analyzed how distribution systems have changed due to the changes, especially in the context of SMEs. The researchers noted that the rise of digital technologies has drastically changed how consumers shop for and purchase goods. It has also led to the emergence and evolution of an omni-channel retailing system and the changes in distribution channels. These findings support the view that the transformation of consumer behaviour has affected the way businesses operate, aligning with global and national trends (Ovodenko et al., 2020). Ovodenko et al (2020) reveal that the level of digitization in the external communications of small and medium-sized enterprises (SMEs) can be influenced by various factors. They emphasised that it is important for them to adopt and adapt to digital advancements to maintain their competitive advantage. In addition to improving their product distribution, digitization also helps them interact with their consumers. The researchers primarily relied on a literature review to support their findings, which limited the amount of data that could be collected. Despite the importance of digitization in the operations of small and medium enterprises, the focus of the study did not fully capture the various nuances of the industry. Although the study discussed the various factors that can influence the level of digitization in the external communications of SMEs, it did not extensively explore the potential risks and challenges that can be associated with the process. This lack of information can be beneficial for businesses planning on or already implementing digital transformation.

Rangaswamy et al (2022) utilized a deductive methodology and quantitative approach to analyze the effects of digital technology on the buying behaviour of consumers in Singapore. Convenience sampling was used to gather data. The researchers collected various information about the consumers, such as their socio-demographics, purchasing intention, and behavioural characteristics. They employed a non-probability sampling method which ensured that the consumers got the same selection opportunities based on the time and availability of the questionnaire. The study was conducted on the public in Singapore, who had internet access. It was found that consumers prefer to use an omnichannel approach when it comes to buying furniture, which helps improve the competitive environment (Rangaswamy et al., 2022). The study also revealed that adopting an omnichannel strategy can help boost a retailer's competitive advantage and improve the experience of customers. Rangaswamy et al (2022) noted that this approach can help manage the retention and involvement of consumers. They noted that being engaged online can result in a shift in consumers' attitudes and behaviour. The study mainly relied on convenience sampling to gather data: this method can introduce bias since the participants were chosen based on their availability. The researchers relied on self-reported information collected through questionnaires. However, due to the participants' subjective interpretations of the questions, the data may be prone to inaccuracies. The study also did not explore the external factors that can affect the buying behaviour of consumers.

Rocha et al (2022) analyzed the effects of non-thermal and thermal technologies on the perception of food products by consumers. They also discussed the advantages of these new technologies in terms of their health and sensory attributes. Through a literature review, the researchers were able to discuss the effects of non-thermal and thermal technologies on the perception of food products by consumers. They identified

some of the most common non-thermal technologies that are used in the food industry, such as cold plasma, high-pressure processing, and ultrasound. The study analyzed the effects of these technologies on the perceptions of various sensory attributes, such as taste, aroma, texture, and colour. It also looked into how these innovations compare to pasteurization methods when it comes to consumer acceptance levels. According to Rocha et al (2022), non-thermal and thermal innovations have the potential to enhance the sensory attributes of food products by delivering improvements in their texture, colour, aroma, and flavour. Despite their potential to improve the quality of food, the researchers noted that there are still various barriers that prevent people from accepting these new technologies (Rocha et al., 2022). The researchers noted that technological advancements in the food processing industry can potentially have a positive impact on the perception of various sensory attributes by consumers. These changes should be accompanied by the implementation of appropriate process parameters and the development of strategies aimed at overcoming barriers to consumer acceptance. The study was conducted under a literature review framework, which limited its scope of analysis and prevented it from thoroughly examining the various factors that influence the development and implementation of new technologies in the food processing industry. In addition, it did not take into account the environmental impacts and regulatory requirements of the new technologies. Although the study acknowledged the limited information about the barriers that keep people from accepting new technologies, it did not extensively discuss the strategies and procedures that can help overcome these obstacles.

2.5 Influence of Emerging Technologies on Shopping Behaviour

The rise of e-commerce has greatly impacted the way consumers shop. Technological advancements have made it easier and more convenient to conduct

transactions online. According to studies, certain factors, such as hedonism and online promotions, can influence the intentions of e-shopaholics (Napitupulu & Hidayat, 2020). The technological advancements that have occurred in the e-commerce industry, it has led to the emergence of a digital economy (Xiong, 2022). These changes have made it easier and more convenient for consumers to conduct transactions online. Tandon et al (2018) assert that certain factors, such as website functionality and perceived risks, can influence the satisfaction of consumers when it comes to shopping online. These include the ease of ordering and the cash-on-delivery option. This demonstrates how the evolving technologies have affected the preferences and behaviours of consumers when it comes to shopping online.

Napitupulu and Hidayat (2020) conducted a study to analyze the effects of online shopping on the behaviour of women in Jakarta's golden triangle, which included Sudirman, Thamrin, and Kuningan. They found that women who work in these areas have higher e-shopaholic tendencies. The researchers used a sample of 101 women. They found that various factors, such as online shopping applications and hedonist habits, can influence the behaviour of women. They also noted that the increasing number of promotions and online shopping applications can lead to an increase in impulsive buying. According to Napitupulu and Hidayat (2020), the increasing number of promotions and online shopping applications can influence the behaviour of women. They also noted that the lack of product information and hedonist habits can influence the buying decisions of women. The study's conclusion: Online shopping should be made more user-friendly and help develop a rational consumer community (Napitupulu & Hidayat, 2020).

Xiong (2022) analyzed the consumer behaviour of people who shop online based on the changes brought about by the digital economy and artificial intelligence. He

revealed that all age groups are exposed to the concept of online shopping, and the frequency of shopping per month is highest among young individuals. The study also looked into China's online retail market, estimating that there were around 820 million people who bought products through the Internet by December 2021.

Tandon et al (2018) examined the various aspects of online shopping in India to determine its impact on customer satisfaction. They validated the ease of ordering and the payment method, as well as the perceived risk associated with the use of technology. According to the study's findings, the perceived risk associated with online shopping was associated with lower customer satisfaction. On the other hand, the drivers and website functionalities positively affected the satisfaction of consumers. The researchers highlight the importance of online retailers in developing economies by providing them with the necessary tools and resources to improve their customer experience. The study encourages online retailers to improve their customer experience and prevent non-customers from shopping for their products. It demonstrates the role of cash on delivery payment in facilitating a smoother and more accepting experience for consumers. This new dimension to the Unified Theory of Acceptance and Use of Technology establishes a new standard for research.

2.6 Impact of Emerging Technologies on Supply Chain Management Practices

The rapid emergence and evolution of technologies such as the Internet of Things, Artificial Intelligence, and Blockchain are transforming the way supply chain management is done. They are providing organizations with unprecedented visibility into their operations and are helping them manage their risk (Olutimehin et al., 2024; Rickardo & Gladson, 2023; Tripathi et al., 2023). These technologies are helping organizations improve their operational efficiency and transparency, as well as increase their customer satisfaction. They can also help them identify and secure transactions

(Rickardo & Gladson, 2023). The rapid emergence and evolution of new technologies such as drones, 3D printing, and autonomous vehicles are disrupting the logistics industry. These innovations are increasing the agility and responsiveness of supply chains, but they are also raising concerns about their social and economic impacts (Frias et al., 2023). According to various studies conducted by different researchers, the rapid emergence and evolution of new technologies can provide numerous opportunities to improve the resilience and agility of the supply chain Olutimehin et al., 2024; Tripathi et al., 2023; Frias et al., 2023). However, they can also expose them to various challenges such as data privacy and interoperability.

Olutimehin et al (2024) comprehensively reviewed the literature and best practices in the logistics industry to examine how technology can transform the way risk management is done. They considered the innovations like the Internet of Things, predictive analytics, and blockchain. They provided insight into how these technologies can transform the way logistics industry transactions are conducted. It also examined how they can help predict potential disruptions and identify potential issues before they happen. According to Olutimehin et al (2024), the use of technologies such as predictive analytics, blockchain, and the Internet of Things, along with other innovations, can significantly change the way logistics organizations manage their risk. These innovations can help them improve their efficiency and responsiveness to unexpected events. They note that the use of technologies like blockchain, IoT sensors, predictive analytics, and AI algorithms can significantly change the way supply chain risk management is done. However, they noted that various challenges prevent organizations from fully utilizing these innovations. These include the need for expertise, privacy concerns, and interoperability issues. However, the study did not provide sufficient evidence to support its claims about the effectiveness of these

innovations. It also overlooked the various challenges that these technologies can face. Furthermore, it failed to explore the incompatibilities of different innovations, such as AI, IoT, blockchain, and predictive analytics, in the context of supply-chain risk management. This could have resulted in a more balanced analysis.

Through a literature review, Rickardo and Gladson (2023) explored the effects of blockchain and artificial intelligence on the management of the supply chain. They found that these technologies could help improve the efficiency of the process by reducing costs and enhancing customer satisfaction. The study presented case studies that highlighted the potential advantages of integrating blockchain and artificial intelligence into supply chain operations. They found that such technologies could help improve efficiency, transparency and sustainability. The researchers used various methods to analyze the data collected from multiple sources. The study determined that disruptive technologies, namely blockchain and artificial intelligence, have a significant impact on the management of supply chains. According to Rickardo and Gladson (2023), these innovations can help improve the efficiency of supply chain operations by allowing them to collect and analyze real-time data. According to the researchers, blockchain technology can help companies create and maintain secure transaction records. It can also help improve the transparency and traceability of their supply chains. By integrating these innovations, organizations can lower their operational costs, identify and resolve supply chain problems, and enhance their customer satisfaction. Rickardo and Gladson (2023) how the integration of blockchain and AI can result in improvements in transparency, efficiency, and sustainability within logistics operations.

Although the study discussed the various factors that companies should consider when it comes to implementing blockchain and artificial intelligence in their supply

chains, it did not provide specific strategies or guidance that can help them overcome these obstacles. For instance, it did not cover the necessary skills and technical requirements for the implementation of these innovations. Furthermore, the study failed to address the various risks that organizations might encounter when integrating such innovations into their existing supply chains. These include regulatory issues and data security concerns.

Tripathi et al (2023) discussed the importance of utilizing emergent technologies to manage supply chain disruption and risk. They analyzed the literature on the subject and looked into the role of artificial intelligence, blockchain technology, and the Internet of Things in mitigating these risks. Two brief analyses were presented by the researchers. One of these focuses on blockchain's role in real-world supply chain scenarios. The other study analyzed AI's influence in various supply chain stages using data gathered from industry practitioners and experts. The researchers then obtained industry insights and opinions to gain a deeper understanding of the potential of blockchain technology in managing supply chain risk. The researchers utilized various methods to analyze the effects of emerging technologies on the resilience of supply chains. These included case studies, theoretical analysis, interviews, and literature review. The study identified the importance of utilizing the latest digital technologies, such as the IoT, Big Data Analytics, Blockchain Technology, and AI, to manage supply chain risk. Tripathi et al (2023) noted that integrating these technologies can help improve the efficiency and effectiveness of supply chains by allowing them to achieve better visibility and control over their operations. In addition, through a secondary study, the researchers revealed that blockchain technology can play a vital role in managing supply chains in real-life scenarios. They also discussed the potential of AI in various aspects of the supply chain, leveraging insights gathered from practitioners

and experts. The findings support the notion of its application in the management of disruptions and risk mitigation. The study focused on theoretical discussions about the potential of emerging technologies in the management of disruptions and supply chain risk. Although it highlighted the advantages of adopting such technologies, such as AI, IoT, BDA, and 5G, it did not thoroughly explore the implementation challenges that companies may face. Instead, the study presented brief analyses of the effects of AI and blockchain on various aspects of the supply chain, leveraging expert opinions and case studies. This limited the generalizability of its findings to varying industry configurations and supply chain scenarios.

CHAPTER THREE

DATA AND METHODOLOGY

3.1 Introduction

This chapter introduces and discusses the research methodology used in the study to analyze the impacts of emerging technologies on various aspects of supply chain management, consumer behaviour, and online business models. It provides a comprehensive overview of the philosophical underpinnings of the research, the research approach and design, methods, data collection and analysis tools, as well as samples and sampling techniques utilized in the study. The chapter ensures that the

study is carried out in a systematic manner and that the results are reliable and trustworthy.

3.2 Aspect of Research

Researchers utilize scientific methods to identify solutions to issues that have been previously thought of. The goal of the study is to uncover the truth behind the problem. This type of research is often referred to as a science that focuses on the way scientific studies are carried out. This research aims to analyze the various approaches that researchers typically utilize when it comes to their studies. Besides knowing how to construct tests and indexes, researchers also need to know which techniques are helpful and which are not. Before starting a study, it is important that researchers thoroughly understand the assumptions that underlie various techniques and the parameters that they will use to determine if they will be effective in a particular problem.

Having a well-defined methodology is also important to ensure that the study will be carried out according to the exact requirements of the topic. The two main types of research questions are those that deal with the interrelationships and the nature of things. Before starting a study, it is important that researchers thoroughly understand the assumptions that underlie various techniques and the parameters that they will use to determine if they will be effective in a particular problem. Once the issue has been identified, the researchers can start working on the bottom line. Before tackling a particular problem, one must first consider the pros and cons of different approaches. The scientific investigation phase, which is the first step, involves identifying a research question. This can be accomplished by gathering information about the subject, followed by an analysis of its details.

When it comes to identifying a research question, one must first discuss the issue with coworkers or people who are knowledgeable about the subject. This is the best way to improve one's understanding of the topic. A university student may ask for advice from a mentor, who may already be familiar with a wide variety of research topics. These types of guides can help researchers focus on the details and develop a strategy for addressing the problem. In most cases, an issue within a government or corporate organization can be identified by the administrative agencies. This allows researchers to talk about the factors that contributed to the problem and how it can be solved. In this case, the subject is expected to be studied to analyze how emerging technology can affect various aspects of supply chain management and online business models.

3.3 Research Philosophy

The philosophy of research is as essential as any other aspect of its approach. Three sub-fields of philosophy are involved in this field: epistemology, axiology, and ontology. These allow researchers to select the most effective viewpoint when tackling certain topics. The philosophy of research provides a basis for the design and methods of a study. It also helps researchers determine the most effective viewpoint for their studies. Academic inquiry aims to provide a philosophical framework for addressing questions related to the origin, development, and value of knowledge. The philosophy of research is a set of ideas that explains how knowledge should be processed and obtained. Through various methods, such as surveys, interviews, and statistical analysis, researchers can answer the question of how knowledge should be acquired and applied. The research philosophy section of a dissertation serves as a vital part of the intellectual life of a researcher.

The main focus of philosophy is on the nature of knowledge and reality, as well as world values. It aims to arrive at a conclusion through a critical analysis based on logical reasoning. There are three primary schools of thought that can be used to investigate these topics. Through in-depth studies, researchers can gain a deeper understanding of certain topics. They then use their findings to address inquiries related to philosophy's basic principles. Research philosophy aims to describe how one views the research being conducted (Crossan, 2003).

The philosophy of research is a vital part of any scientific investigation, as it determines the scope and quality of the data that will be studied. It is composed of three components: epistemology, technique, and ontology. The researcher's perspective and the social science phenomena under study should also be taken into account to make the choice. According to the authors, more radical techniques may be inappropriate for scientific studies due to their philosophical implications, which makes intermediary philosophy the ideal method for merging philosophy and research. Modern research methods often combine qualitative and quantitative approaches. Before starting a study, it is important to thoroughly understand the disadvantages and advantages of different approaches. In interpretivism philosophy, the focus is on the activities of people instead of relying on the facts to form rules. This study utilizes interpretivism as the method of research. This alternative philosophy was developed after social scientists began criticizing positivism. It aims to provide a deeper understanding of how people see the world through their perspectives.

Researchers consider interpretivism to be more than a theory. It is a philosophy that states that people are separate from physical events because they make sense. According to Chia (2017), studying social environments is too difficult. Through interpretive research, researchers can gain a deeper understanding of the world. This

philosophy can be used to analyze how emerging technologies can affect various aspects of business, such as supply chain management and consumer behaviour.

3.4 Research Approach and Design

Deductive and inductive procedures are commonly used in research. The former is based on the concept of the Saunders onion, while the latter involves experimentation with different theories and general hypotheses. An inductive method is used to conclude a topic, and it involves using specific instances to examine the observed phenomena. This method is very dependent on empirical observation. When it comes to choosing a research method, the decision should be made based on the practicality of the task and the goals of the study. Deductive methods usually start by reviewing existing literature, then formulating a hypothesis based on the collected information (Goswami, 2010). Unlike deductive researchers, inductive practitioners start with the big picture.

The inductive method states that knowledge can be acquired through secure observations, which can provide a basis for understanding reality. This concept also points out that there is a correlation between the experiences of people and sensory objects. The conclusion of the argument aims to expand knowledge by taking into account other aspects of the world. The number of observations that support the general statement grows. These findings can then be verified by examining specific examples that back up the assertions.

Deductive reasoning starts with an observation, while inductive reasoning goes from there (Goswami, 2010). In inductive reasoning, assumptions are used to form a conclusion (Goswami, 2010). This method is very useful in making a study that is in line with the use of the appropriate techniques and methods. For instance, if the study is about the effects of new technologies on the supply chain management and online business models, then using both deductive and inductive techniques would be ideal.

The design of a study begins with the selection of a subject and a technique. This step is influenced by various factors, such as the social environment, the standards of evidence, and the expectations of the researcher and the community. Many research techniques use varying theoretical and practical approaches. A quantitative study is conducted to investigate a specific problem by gathering information and coming up with a statistical analysis that can be used to extrapolate a theory (Polit & Beck, 2010).

Unlike other forms of research, qualitative methods are designed to examine a social or human issue from different perspectives. They are conducted in a natural environment and involve the use of a variety of observations and questions. The selection of the best research technique depends on the study's goal, the available funding, the expertise of the researcher, the intended audience, and the other factors that affect the project. Although both qualitative and quantitative methods can be used in a single research study, the difference between these two approaches is in the way they collect data and perform analysis (Choy, 2014).

A qualitative research study is conducted on individuals to collect, interpret, and analyze information based on their words and actions. This type of research differs from quantitative research. It focuses more on concepts and meanings, and it does not rely on numbers and measurements. As such, a qualitative researcher will usually conduct many interviews and focus groups. Generally, qualitative research is known to provide detailed and accurate information. Due to its nature, quantitative research can be used to identify causal connections between various factors in the population. However, it is important to consider the various factors that affect the decision-making process when it comes to conducting this type of research. For instance, the type of data that is collected, the scope of the study, and the accessibility of resources are all taken into

account. It is important to keep in mind that the two ideologies are not polar antagonists. They can be combined in a mixed-method approach (Grady et al., 2013).

The fundamental foundation of qualitative research is measurement. This method can be used to describe various quantitative phenomena. On the other hand, qualitative research is focused on qualitative phenomena that have a direct or significant influence on the quality or kind of an individual's actions. To understand why people do what they do, it is important to conduct studies on these types of phenomena. Through qualitative research, we can identify the factors that influence individuals' actions and behaviours. This method can also help us understand how people tend to like or dislike a certain product. Researchers used this approach to examine the various perspectives of their subjects. The results of the study are then used to develop a strategy to improve the effectiveness of marketing and sales. In-depth interviews, focus groups, and projective interviewing are some of the techniques that are commonly utilized in this process. When gathering primary data, a researcher usually conducts an experiment. This procedure involves examining certain quantitative measures to check the validity of their hypothesis (Grady et al., 2013).

Data collected from sources such as hospitals, clinics, and individuals is reliable. However, since quantitative information does not provide an in-depth view of how disasters affect people, it is not always feasible to plan for their response. Improving the humanitarian response by understanding the causes of a problem and the number of affected individuals can be done through the use of quantitative information. A community can then be asked to prioritize the needs of the affected people. However, this does not go far enough as it does not explain how they are affected by their local culture and values. Although there is a wide overlap between qualitative and quantitative data, the exact methods used to gather these types of information are

different. This is why it is important that the two data types are compatible in order to provide a comprehensive view of a disaster's impact on a community. When it comes to gathering accurate data, it is important to ask the right questions at the right time and place.

This study utilizes a mixed-method approach to analyze the effects of new technologies on various aspects of the supply chain and consumer behaviour. It was designed to provide a comprehensive analysis of these changes through a combination of qualitative and quantitative methods. The research design allows for the capture of both nuanced and measurable insights. The quantitative part of this study involves analyzing the data collected from various sources, such as supply chain professionals, consumers, and online businesses. This type of data is then analyzed using statistical methods to identify correlations and patterns.

The qualitative component of this study explores the perspectives and experiences of the individuals who are involved in the development and implementation of new technologies. Through survey questionnaires, the researchers were able to gather information about the various stakeholder groups and attitudes toward the use and integration of new innovations.

3.5 Population and Sampling

3.5.1 Population

This study aims to identify the key groups that influence the development and implementation of new technologies in the e-commerce space. These include consumers who shop online, businesses that operate in the space, and supply chain professionals who are responsible for managing the integration of new technologies.

3.5.2 Sampling Technique

The study utilizes convenient sampling methods and a purposive sampling technique to select its participants. Only those who are actively engaged in online businesses, supply chain management, or shopping are included in the study. This ensures that the respondents have the necessary access to the information. For the consumer survey, the sample size is 200 individuals, while the others are from 30 supply chain professionals and 50 online businesses.

3.6 Data Collection Tools

The process of gathering research data begins with developing a study topic and a strategy. Secondary and primary information should also be considered when it comes to choosing the appropriate data collection method. On the other hand, secondary information was gathered and analyzed by another person. When it comes to conducting a study, the researcher has to choose which method to use. The main difference between the two is that primary data was gathered from scratch, while secondary information was gathered from different sources. Due to the increasing number of inquiries, the use of postal questionnaires has been gaining popularity. This type of data collection is commonly used by various organizations and commercial sectors. A postal questionnaire asks the individuals to provide their feedback and return the information. A questionnaire is composed of multiple forms that are printed with a set of questions. It is usually designed to be filled out by the individuals who are participating in the study.

Each respondent must provide answers to all of the questions on their own. In commercial and economic surveys, the distribution of questionnaires is a vital component of the procedure. A pilot study is often recommended to test the effectiveness of this method. As a trial run, the pilot survey can help experts identify

the weaknesses and strengths of the questionnaires, as well as the various steps involved in conducting the survey. One can learn from past mistakes and make improvements by carefully phrasing the questions. Words should be chosen carefully since they can affect the answers. Also, avoid using terms that have grey areas in them. Refrain from prejudice when formulating questions. One can improve their wording and formulation skills by repetition. Since the data collected and analyzed by another individual is already available, secondary data is useful when conducting a survey. Researchers need to find various sources to gather this type of information. Unpublished or previously gathered secondary data are usually acceptable sources (Grady et al., 2013).

The primary and secondary data collection methods will be utilized in the study to analyze how emerging technologies can affect the supply chain, consumer behaviour, and online business models. When choosing the appropriate tools, factors such as the availability of resources, the researcher's ideological beliefs, and the study's objectives should be taken into account (Pandey & Pandey, 2021). Although there are various types of data collection tools, they often converge in most cases. This is why it is important to choose the right approach when carrying out a research project.

Through surveys, researchers can collect valuable information about their subjects. These surveys are conducted with the help of a wide range of people, and they can be used to gather data on a variety of subjects. The respondents can be chosen depending on their demographics, sexual orientation, age, socioeconomic class, and gender. The questions that appear first in most surveys are usually focused on the subjects' demographics and sexual orientation. However, researchers may also want to gather information about other factors such as the focus groups that they are planning on using. To ensure that the survey is conducted properly, the researchers must thoroughly investigate the subject. Each experiment focuses on changing one of the test

methods. The other components remain the same. In action research, the researchers try to find practical solutions to common problems.

When conducting research, scholars usually reach out to survey participants using online tools. The information collected through these surveys is then evaluated to help identify the findings. Cross-sectional surveys are commonly used for analytical or descriptive studies. They are very fast and can help researchers get the data they need in a hurry. When a particular topic is needed to be examined, researchers often utilize these types of surveys.

Companies are increasingly looking to survey their customers to improve their offerings. Although researchers have numerous tools and techniques, surveys are regarded as the most valid and reliable method for gathering information. Surveys are particularly effective at eliciting meaningful responses from consumers. With the help of credible research, these organizations can gain a deeper understanding of their customers. The researcher decided to conduct surveys to gather information about the impact of emerging technologies on various aspects of the supply chain and online business models. In addition, case study inferences were used to ensure that the research was carried out thoroughly.

The study utilized three survey tools to gather data from supply chain professionals, consumers, and online businesses. Each of the survey questions was tailored to specific research topics and objectives. The survey for consumers was conducted to capture their shopping habits and the impact of new technologies on their experience online. The survey was conducted to gather information about the integration and use of new technologies in online businesses. It also analyzed the challenges and benefits that these technologies present to the operations of supply chain

management. The surveys featured open and closed-ended questions, which allowed for both qualitative and quantitative evaluation.

3.7 Data Collection Procedures

The data collection process was carried out through online interviews and surveys, which were then sent out to various online platforms such as LinkedIn and social media. The online format helped increase the response rate and made it easier for participants to access. Virtual interviews were conducted with key stakeholder groups, allowing for more flexible schedules. Prior to participating, the individuals were informed of the study's objectives, their rights, and data confidentiality.

3.8 Data Analysis

The data was analyzed using both qualitative and quantitative methods. The following are the procedures used.

3.8.1 Quantitative Data Analysis

The data collected from the surveys were presented in terms of descriptive statistics. Correlation analysis was then used to identify the factors that influenced the supply chain efficiency and consumer behaviour. The goal of this study was to analyze the factors that influence the performance of online businesses and the efficiency of supply chain management. Through a combination of statistical tools, such as the SPSS software, and Python software, the researchers were able to perform a variety of statistical analyses.

3.8.2 Qualitative Data Analysis

Thematic analysis was performed to analyze the interview transcripts and open-ended responses. It involves identifying the various themes within the data and coming up with a deeper understanding of its participants' perspectives. The NVivo software

was also used to organize the data and produce reports that contain more detailed information. Triangulation helped enhance the conclusions' robustness.

3.9 Validity and Reliability

The goal of this study was to ensure that the results are reliable and consistent. To achieve this, the survey questions were pre-tested with only a small group of participants. To ensure that the questions are aligned with the research objectives, the literature review was conducted to ensure that the constructs are defined. Finally, the reliability of the survey data was checked using the Cronbach Alpha statistic.

3.10 Ethical Considerations

The study followed all ethical standards for academic research. All participants were informed about the study's purpose and procedures, and they were also allowed to withdraw at anytime without penalty. Data was gathered without requiring prior consent, and only the aggregated information was published. The research was approved by the relevant review board before it was conducted.

The data collected during the study were protected from manipulation due to strict ethical standards. The individuals who participated in the research never felt pressured to take part in it. This includes methods that are designed to gain an individual's confidence. The participants agreed to participate in the study by signing a permission form that clearly states their agreement to be involved and their rights to access and withdraw from the study. Their consent was regarded as an expression of their agreement with the researcher. Confidentiality and anonymity are important factors that are considered when it comes to conducting a study.

The individuals participating in the study were protected from any harm by maintaining their confidentiality and anonymity. This is done through the use of the terms "participation confidentiality" and "participation anonymity." In addition, the

researchers should disclose any conflicts of interest that they may have prior to being approved for the study. Before an individual can participate in a scientific study, they must have an explicit agreement. This agreement should be put in place to prevent unethical activities. Researchers should also consider the privacy implications of their data when conducting studies. The records of the survey takers and interviewees should be kept for five years. In addition, the researchers must ensure that the individuals are given the necessary warnings so that their data is protected from unauthorized access and use. Prior consent must also be obtained from the individuals before the survey can be conducted. All the information collected will be kept confidential.

3.11 Chapter Summary

The chapter provides an overview of the methodology and philosophical underpinnings of the study as well as various steps involved in the study, such as the research approach and design, sample and sampling techniques, data collection, and analysis methods. It also discusses the various ethical considerations and procedures employed in the study. The mixed approach allowed the researchers to gain an in-depth understanding of the various factors that affect the supply chain, online business models, and consumer behaviour relative to emerging technologies.

CHAPTER FOUR
CONTENTS AND RESULTS

4. 1 Introduction

This chapter presents some relevant analyses of the data collected through the questionnaire survey. The primary objective of this study, as stated in Chapter One, is to explore the impacts of emerging technologies on online business models, consumer behavior, and supply chain management. To address this objective, a mixed-methods approach was adopted, combining qualitative and quantitative data collection tools. The questionnaire survey, which was designed to capture these impacts, forms the basis of the analysis in this chapter.

The questionnaire was distributed to three key stakeholder groups: consumers, online business owners/managers, and supply chain professionals. Each group of respondents provided a different perspective on the integration and impacts of emerging technologies. The questionnaire collected data on demographics, awareness and adoption of technologies, consumer opinions and expectations, and impact on operational practices. The data collected were primarily closed ended questions for ease

of analysis, but open ended questions were included to give context and depth to the findings. The aim of this survey design was to ensure that the impact of emerging technologies would be analyzed from every angle, and allow for comparisons across different stakeholders.

This chapter presents descriptive and inferential analyses of the obtained data. Some of the results of analyses are presented in the form of tables and graphs to ensure ease of understanding and interpretation. The descriptive statistics help to explore key demographics of each respondent groups and understand the frequency of different responses in different questions. The statistical analysis helped to identify correlations and differences between responses of different groups, while the inferential statistics provided a statistical evidence for inferences or conclusions. The next chapter will discuss the key findings with existing literature to connect the findings with relevant theories and concepts. It will also summarize the main findings and conclusions of the study. Finally, it will discuss the limitations of this study identify research gaps for further research.

4.2 Data Preparation

Before conducting the data analysis, the raw data collected from the questionnaire survey underwent a series of data preparation steps to ensure accuracy, consistency, and suitability for statistical and thematic analysis. This section details the processes used for data cleaning, variable coding, and categorization, as well as the handling of any missing values and the creation of composite variables.

4.2.1 Data Cleaning

The primary data received from the online survey was reviewed for any potential inaccuracies, missing entries, or inconsistencies. Firstly, the data was checked for missing values. The responses with missing values were analyzed for any systematic

patterns. While a limited number of responses were found to have missing values, any cases with significant missing information were excluded from further analysis. Secondly, the dataset was checked for any outliers. In certain cases where there were outlier responses on the Likert scale questions or time based responses, these were addressed by reviewing the validity of the response and then removed or otherwise.

4.2.2 Coding and Categorization

The questionnaire included both closed-ended and open-ended questions. First, the numerical data from the closed-ended questions were directly entered into the WPS Spreadsheets for ease of access and statistical calculations. Then, the open-ended responses were read carefully to gain an overview of the different themes. A coding scheme was developed based on the recurrence of key themes, ideas and concepts from the dataset. These codes were applied to each of the responses and then grouped into main themes for analysis.

4.2.3 Variable Types

The questionnaire data consisted of many variable types. The nominal variables included categorical data such as “Gender”, “Education Level”, “Business Type”, “Industry Focus”, and “Occupation”. These variables were used for descriptive analysis, frequency distributions and to identify patterns within the data. The ordinal variables included Likert scale ratings for familiarity with technology and levels of agreement with various statements. The variables were treated as ordinal where appropriate and the average scores were used for analysis. The interval/ratio variables included demographic data such as “Years in Operation”.

Descriptive statistics such as the mean and standard deviation were used to analyse these variables. Some composite variables were developed by combining information on several different variables into a single score. They included Technology

Engagement, Technology Implementation, and Emerging Technology. Technology Engagement was used to categorize the types of consumers that were using specific types of technology. It was an average score of their familiarity score and also the number of technologies they had encountered while purchasing online. The second composite variable was technology implementation. Technology Implementation was developed to highlight the online businesses that had implemented the greatest number of technologies. It was an overall score based on the total number of technologies being used by the online businesses.

4.3 Descriptive Statistics

This section provides a descriptive overview of the data collected from the questionnaire survey. It presents key demographic characteristics of the respondent groups, explores awareness and adoption of emerging technologies, and summarizes the responses on Likert scales and open-ended questions. The purpose of this section is to summarize the data before moving on to more in-depth analysis in subsequent sections.

4.3.1 Demographic Characteristics of Participants

The survey collected data from a total of 300 respondents, including 200 consumers, 50 online business owners/managers, and 50 supply chain professionals. The demographic characteristics of the respondents are presented in the following sections.

4.3.2 Demographics Characteristics of Consumers

The age distribution of the consumers is shown in Figure 4.1, which indicates that most of the consumer respondents are within the 35-44 age bracket. This could possibly

be explained by the fact that, generally, this age bracket could be the most active working class.

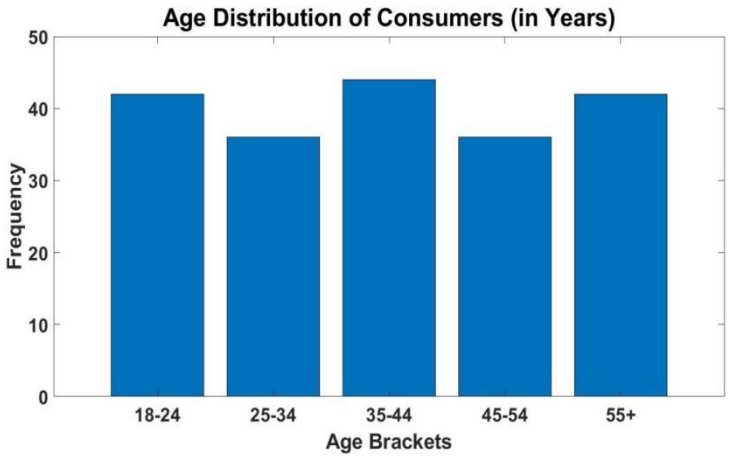

Fig.4. 1: Age distribution of consumer respondents

The consumers within the age brackets of 25-34 and 45-54 are the relatively less represented groups in this study. The gender distribution of the consumers is shown in Figure 4.2, a donut chart.

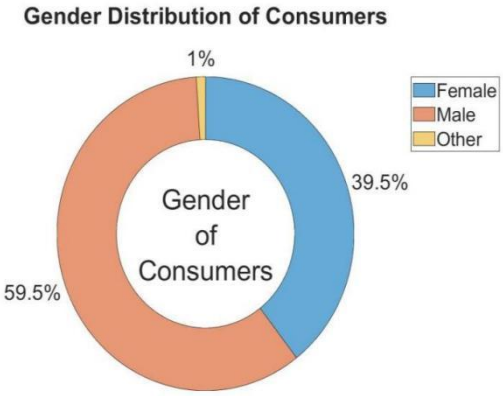

Fig.4. 2: Gender distribution of consumer respondents

It could be seen from Figure 4.2 that more than half of the consumers are males. The male consumers represent approximately 60% of the consumers in this study.

With respect to the consumers' level of education, the majority of them have a Bachelor's degree. This is followed by consumers with a Master's degree as shown in Figure 4.3. Only a few of the consumer have Doctorate degrees and other qualifications.

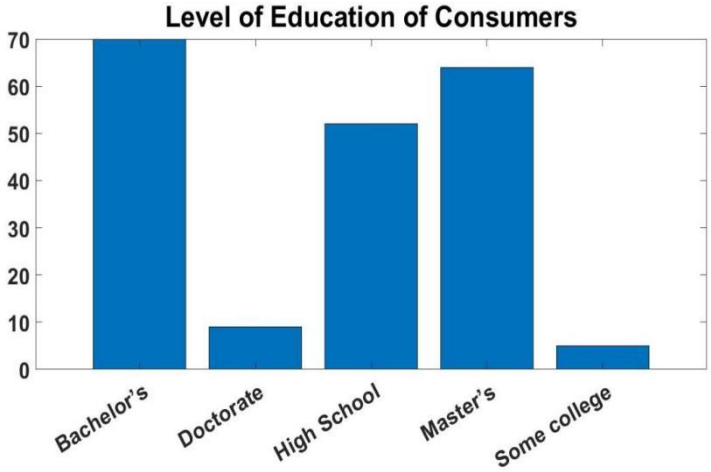

Fig.4. 3: Level of Education of Consumer Respondents

The respondent were also asked of how often they shopped online. The information obtained is displayed in Figure 4.4.

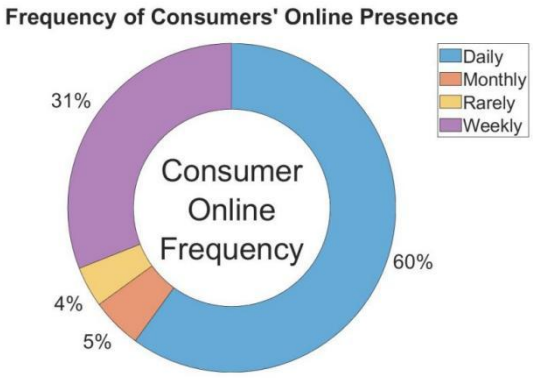

Fig.4. 4: Consumers' online shopping frequency

As displayed in Figure 4.4, more than half, 60%, of the consumers shopped online daily as compared to 5% and 4% who shopped online monthly or rarely.

4.3.3 Demographic Characteristics of Online Business Respondents

The online business respondents were of different types as shown in the donut chart in Figure 4.5. Most (34%) of the online businesses were retailers. About half the number of the retail businesses (16%) were service based.

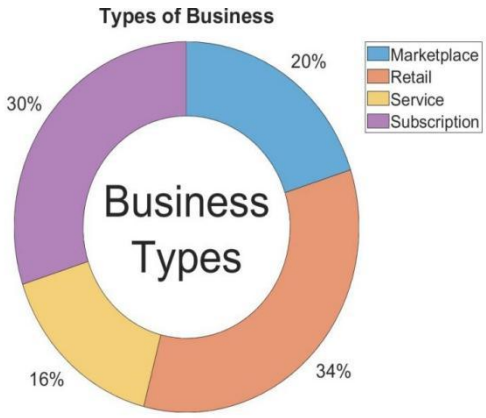

Fig.4. 5: Types of online businesses

Table 4.1 displays the number of years in operation of the online businesses.

Table4. 1: Years in Operation of Online Businesses

Business Type	Mean	Standard Deviation
Marketplace	8.2	2.5298
Retail	8.1765	4.9274
Service	6.625	3.6621
Subscription	6.2667	303.8816

On average, the Marketplace businesses recorded the highest number of years in operation while Subscription businesses had the lowest number of years in operation.

In Figure 4.6, a donut chart of the number of employees in online businesses is shown. It could be seen from the chart that more than half (52%) of the online businesses had 11-50 number of employees.

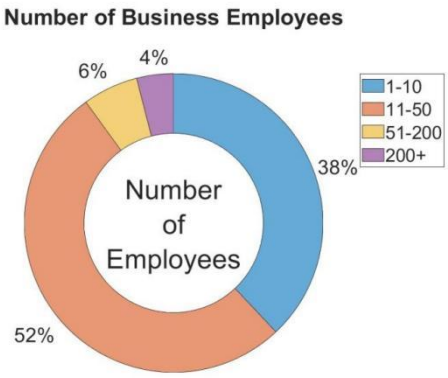

Fig.4. 6: Number of employees in online businesses

Also, 10% of the online businesses had 1-10 and 11-50 number of employees, altogether. Figure 4.7 is a bar chart showing the annual revenues of the online business respondents. Whereas 25 out of the 50 online business respondents earn annual revenue of US$100,000-500,000, less than 5 earn annual revenue of over US$1,000,000.

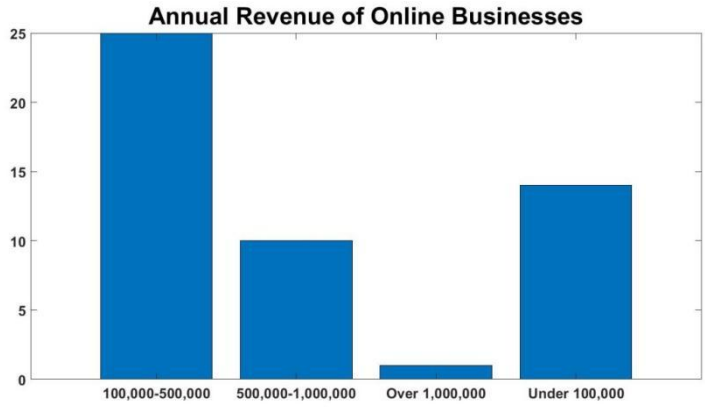

Fig.4. 7: Annual revenue of online business

4.3.4 Demographic Characteristics of Supply Chain professional Respondents

As shown in Figure 4.8, the supply chain management professionals included analysts, directors, executives and managers. The donut chart in Figure 4.8 indicates that half (50%) of the supply chain management professionals were Managers, who formed the largest supply chain management professionals in this study.

Fig.4. 8: Job titles of supply chain management professionals.

The Executives constituted the small group, representing 10% of the supply chain management professionals. The years of experience of the supply chain management professionals are presented in Table 4.2.

Table4. 2: Years of Experience of Supply Chain Management Professionals

Revenue Bracket	Mean	Standard Deviation
Analyst	6.2308	3.5626
Director	10.143	4.1404
Executive	5.8	3.2711
Manager	10.52	5.1811

The statistics presented in Table 4.2 indicate that the Managers have more years of experience, represented by a mean experience of 10.52 years, than any other supply chain management professional group in this study. The Executive group of the supply chain management professionals have the smallest level of experience, represented by 5.8 years.

Also, the study grouped the supply chain management professionals into different industries. Figure 4.9 shows a donut chart of the industry focus of the supply chain management professionals.

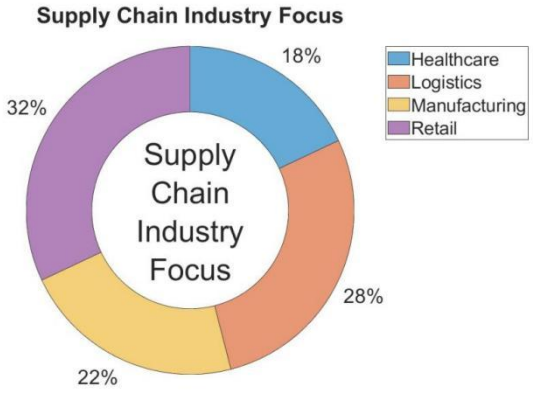

Fig.4. 9: Industry focus of the supply chain management professionals.

It could be seen from Figure 4.9 that the supply chain management professionals are fairly distributed according to industry focus. However, whereas supply chain management professional within the Retail industry constituted the largest group, represented by 32%, those in the Healthcare industry constituted the smallest group, represented by 18%

4.4 Emerging Technology Awareness, Familiarity and Implementation

4.4.1 Consumer Familiarity of Emerging Technologies

On a scale of 1 to 5, the consumers were asked to rate their familiarity with the emerging technologies of Artificial Intelligence (AI), Blockchain Technology, Internet of Things (IoT), Virtual Reality (VR) and Big Data Analytics. The corresponding descriptive statistics are presented in Table 4.3.

Table4. 3: Descriptive Statistics of Consumer Familiarity with Emerging Technologies

Technology	Mean Familiarity Score	Standard Deviation
AI	4.0650	0.7770
Blockchain	2.63	1.0671
IoT	3.0850	1.3442
Virtual Reality	3.0450	1.3461

Big Data Analytics	2.6350	0.9467

The statistics in Table 4.3 indicate that the consumers were more familiar with AI, followed by IoT and VR, as represented by mean familiarity scores of 400650, 3.0850, and 3.0450 respectively. However, they were less familiar with Blockchain Technology and Big Data Analytics, represented by mean familiarity scores of 2.6300 and 2.6350 respectively.

Additionally, 72% of consumers reported that they have encountered/interacted with at least one emerging technology while shopping online. The most common technologies encountered were AI (70%), IoT (45%), VR (39%). This further indicates that the consumers were familiar with AI, IoT, and Virtual Reality, but had lower familiarity with Blockchain Technology and Big Data Analytics.

4.4.2 Technology Adoption/Use in Online Businesses and Supply Chains

Table 4.4 displays some descriptive statistics on the use of emerging technologies by online businesses and supply chain management professionals.

Table4. 4: Technology Usage by Online Businesses and Supply Chain Professionals

Technology	Online Business (n = 50)	Supply Chain Professionals (n = 50)
AI	35	30
Blockchain Technology	15	20
IoT	28	38
Virtual Reality	20	25
Big Data Analytics	30	30

It could be seen from Table 4.4 that AI and Big Data Analytics were the most used emerging technologies by both online business and supply chain management professionals. Blockchain Technology and VR were the least used emerging technologies by online businesses and supply chain management professionals. More

specifically, AI is the most commonly used emerging technology by both supply chain management professionals and online businesses, with IOT a close second. Blockchain Technology was the least used emerging technology by both groups.

4.5 Impact of Emerging Technologies

4.5.1 Impact of Emerging Technologies on Consumer Shopping Behaviour

To understand the impact of emerging technologies on the shopping behaviour of consumers, they were asked to rate some statements based on their preferences and online shopping styles. Table 4.5 displays the mean agreement scores of the consumers' ratings and the standard deviations. It can be seen from Table 4.5 that AI-powered recommendations is the top driver of consumers' online purchases, as this has a mean agreement score of 3.7350 with a standard deviation of 0.8710. Next is user-friendly websites. The mean agreement score of 3.2300 with a standard deviation of 0.8665 indicates that consumers tend to make more purchases on user-friendly websites However, the least driver of consumers' online purchases is a brand's transparency about the origin of their products and environmental consciousness.

Table4. 5: Mean Agreement Scores of Consumers

Statement	Mean Agreement Score (1-5)
AI-powered recommendations have influenced my purchases online	3.7350(0.8710)
I prefer to shop from online businesses that have user-friendly websites	3.2300(0.8665)
I value brands that are transparent about the origin of their products	2.2600(0.8462)
I value a cash-on-delivery option when purchasing online	3.0650(1.4216)

I am more likely to buy from brands that I have interacted with on social media	3.0300(0.9154)
I am more likely to buy from online brands that are environmentally conscious	2.9650(1.3183)

The importance of having a variety of payment options was also rated as 4.5 and same-day delivery as 3.8. In all, these indicate that consumers prefer user AI-powered recommendations, friendly websites, and brand presence on social media, but may not always be influenced by cash-on-delivery option and brands that are environmentally conscious.

The most important element of a positive shopping experience were good customer service, fast delivery and clear communication. Also, the most important factors that would make consumers loyal to a brand were good quality products, good customer service and ethical business practices. Figure 4.10 shows boxplots of emerging technologies and consumer shopping behaviour.

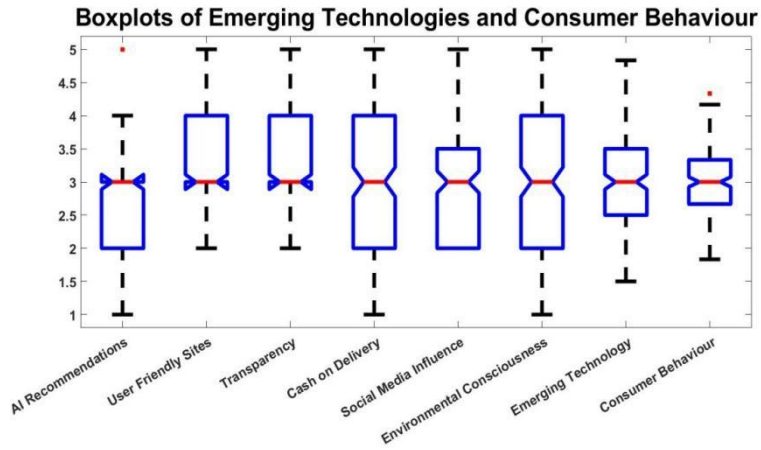

Fig.4. 10: Boxplots of emerging technologies and consumer shopping behaviour

The boxplot for AI recommendations is left skewed, but the boxplots for User Friendly Websites and Transparency are right skewed. The boxplots for AI recommendations and Consumer behaviour have outliers. In all, the boxplots appear to have their median lines around 3.

4.5.1.1 Correlation Analysis

A simple correlation analysis was conducted to measure the relationship between Emerging Technology and Consumer Behaviour. The results of the correlations analysis are displayed in Figure 4.11 and Table 5.

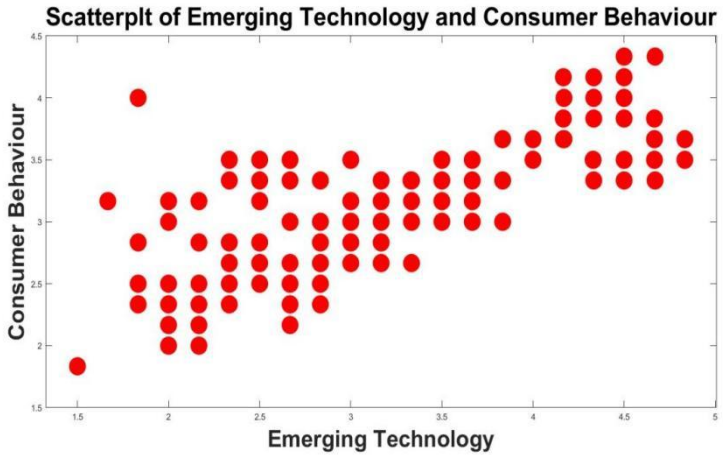

Fig.4. 11: Scatter plot of relationship between emerging technology and consumer behaviour.

Figure 4.11 appears to indicate a positive relationship between Emerging Technology and Consumer Behaviour. This suggests that as consumers become more familiar with emerging technology, their online shopping behaviour improves, and vice versa.

Table4. 6: Pearson's Correlation Coefficient

Response Variable	Predictor Variable	Correlation Coefficient	P-value
Consumer behaviour	Emerging technology	0.7522	0.0000

The Pearson's correlation coefficient between Emerging Technology and Consumer Behaviour is 0.7522, indicating a strong positive relationship between Emerging Technology and Consumer Behaviour. This supports the positive graphical relationship between the two variables depicted in Figure 4.11.

4.5.1.2 Linear Regression Analysis

A linear regression analysis was conducted to model the impact of Emerging technology on Consumer Behaviour. The results of the analysis are presented in Table 4.7.

Table4. 7: Results of Simple Linear Regression Analysis

Variable	Estimate	SE	tStats	P-value
Intercept	-0.33775	0.21758	-1.5523	0.12219
Emerging Technology	1.1314	0.070426	16.065	0.00001

R-squared = 0.566 ; Adjusted R-Squared = 0.564; P-value = 1e-37

As shown in Table 4.7, Emerging Technology has a coefficient of 1.1314, with a standard error of 0.070426 and a p-value of 0.00001. The p-value indicates that Emerging Technology is a significant predictor of Consumer Behaviour. The coefficient indicate that on average, a unit increase in consumers' familiarity with emerging technologies is associated with 1.1314 increase in their online shopping behaviour. The linear regression model has a p-value of 1e-37, indicating that it is significant. The model also has an approximated R-squared value of 0.57, indicating that, generally, emerging technologies explain more than half (57%) of the variability in consumers' online shopping behaviour.

A further multiple linear regression analysis was conducted to model the relationship between specific emerging technologies and online shopping behaviour of consumers. The results are displayed in Table 4.8.

Table4. 8: Results of Multiple Linear Regression Analysis

Variable	Estimate	SE	tStat	P-value
(Intercept)	0.54833	0.16528	3.3175	0.0010854
AI_Recommendations	0.68966	0.043761	15.76	1.64E-36
User_Friendly_Websites	0.057818	0.033714	1.7149	0.017963
Transparency	0.036625	0.033732	1.0858	0.27894
Cash_on_Delivery	0.038436	0.01888	2.0358	0.083134

Social_Media_Influence	0.024115	0.033253	-0.72519	0.04692
Environmentally_Conscious	0.10663	0.024414	4.3675	2.05E-05

R-squared = 0.801, Adjusted R-Squared = 0.794, P-value = 8.43e-65

As shown in Table 4.8, AI_Recommendations, User_Friendly_Websites, and Social_Media_Influence are significant predictors of consumers' online shopping behaviour. These predictors have p-values less than 0.05. Transparency about product origin, Cash_on_Delivery option, and Environmentally_consciousness are not significant predictors of consumers' online shopping behaviour, as they have p-values greater than 0.05.

The AI_Recommendations has a coefficient of 0.68966, indicating that, on average, a unit increase in consumers' encounter with AI recommendations is associated an average 0.68966 increase in their online purchases. Similarly, the Use_Friendly_Websites variable has a coefficient of 0.057818, indicating that a unit increase in consumers' encounter with user-friendly websites, on average, leads to 0.057818 increase in consumers' preference to shop online. Also, the Social_Media_Influence variable has a coefficient of 0.024115, indicating that, a unit increase in consumers' level of interaction with a brand social media is associated with an average increase of 0.024115 in their likelihood to shop online from the brand. Although, the Environmentally_Conscious variable was not related to consumers' shopping behaviour in the results of the exploratory data analysis, it is associated with an average increase of 0.10663 in consumers' likelihood to buy from brands that are environmentally conscious.

4.5.2 Impact of Emerging Technologies on Online Business Models

Like the consumer respondents, the online business respondents were asked to rate some statements relating to how emerging technologies have impacted them. Table 4.9 summary the responses of the online business respondents.

Table4. 9: Mean Agreement Scores of Business

Statement	Mean Agreement Scor (1-5)
AI has helped us make more strategic decisions	3.5000 (0.8391)
Blockchain technology has improved our online security and customer trust	2.5000(0.7354)
We use big data analytics to better understand our customers	3.7200(0.6713)
IoT technology has improved our supply chain	3.5600(0.8609)

The use of big data analytics to understand customers has the highest mean agreement score, followed by the use of IoT by online businesses to improve their supply chain management. The use of blockchain technology by online businesses to improve online sceurity and customer trust has the lowest mean agreement score. These indicate that emerging technologies in the form of big data analytics and and IoT have impacted online business models more that AI and blockchain technology have.

Some boxplots of emerging technology and online business operations have been presented in Figure 4.12.

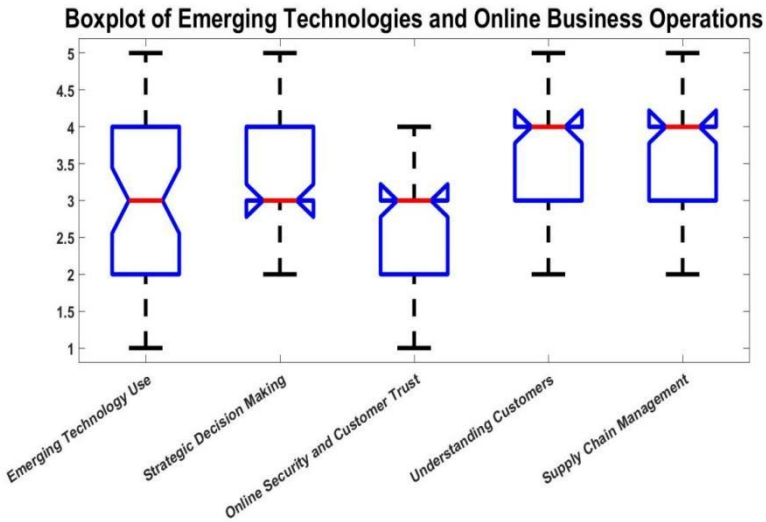

Fig.4. 12: Boxplots of emerging technologies and online business operations

As displayed in Figure 4.12, the use of IoT by online businesses to improve their supply chain management is left skewed. Similarly, the use of big data analytics by online businesses to better understand their customer is left skewed. The positions of the median lines of the boxplots of the use of IoT and big data analytics by online business models indicate that there is no difference between them. Although, the boxplot for the use of blockchain technology by online business models is also left skewed, its median line is lower than those of the IoT and Big Data Analytics. This indicate that there is a difference in the impact of blockchain technology, IoT and big data analytics on online business models. Also, the boxplot for the use of AI by online business is right skewed, but has a median line which is at the same position as the boxplot of Blockchain Technology and lower than those of IoT and Big Data Analytics. These indicate that the impact of AI and blockchain technology use by online business models appear to be same, but both lower than the impact of IoT and big data technology use by online businesses.

4.5.2.1 Correlation Analysis

A simple correlation analysis was conducted to ascertain the relationship between the composite variables, Emerging Technologies and Online Business Operations. The scatter plot in Figure 4.13 seems to suggest a positive relationship between emerging technologies and online business operations. That is, as online business model tend to use more of emerging technologies, their business operations improves. The graphical result of this analysis is displayed in Figure 4.13.

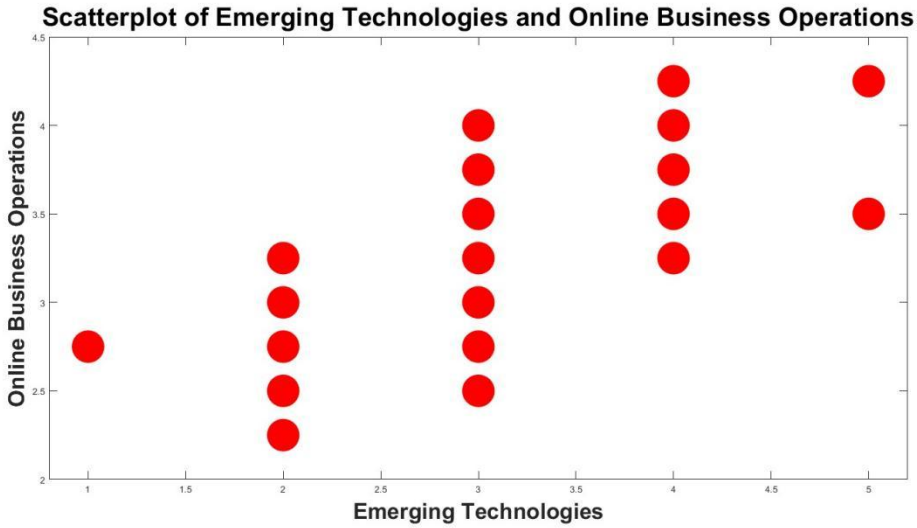

Fig.4. 13: A scatter plot of emerging technologies and online business operations

Table 4.10 shows the result of a numerical correlation analysis using the Pearson's correlation coefficient.

Table4. 10: Pearson's Correlation Coefficient

Response Variable	Predictor Variable	Correlation Coefficient	P-value
Online Business Operations	Emerging technologies	0.6988	0.0000

As displayed in Table 4.10, the correlation coefficient between Emerging Technologies and Online Business Operations id 0.6988, indicating a moderate positive relationship between them. This supports the graphical relationship depicted in Figure 4.13

4.5.2.2 Linear Regression Analysis

Some linear regression analyses were further conducted to model the impact of emerging technologies on online business models. The results of simple linear regression analysis are presented in Table 4.11.

Table4. 11: Results of Simple Linear Regression Analysis

Variable	Estimate	SE	tStat	P-value
Intercept	2.148	0.18113	11.859	7.1563e-16
Emerging Technology	0.38809	0.057334	6.7688	1.6635e-08

R-squared: 0.488, Adjusted R-Squared: 0.478, P-value = 1.66e-08

As shown in Table 4.11, emerging technologies have significant impact on online business models, since Emerging Technology has a p-value (1.6635e-08) less than 0.05. The variable, Emerging Technology has a coefficient of 0.38809 which indicates that for every unit increase in the use of emerging technologies by online businesses, their operations improve by an average of 0.38809. The linear regression model is significant since it has an overall p-value, 1.66e-08, less than 0.05. The model has an R-squared statistic of 0.488, indicating that emerging technologies explain approximately 49% of the variation in online business operations.

The results of the multiple linear regression analysis to model the impact of specific emerging technologies on online business models are presented in Table 4.12. The model has an overall p-value of 1.62e-06 and an R-squared value of 0.506, indicating that it is a significant model which explains approximately 51% of the variations in online business operations.

Table4. 12: Results of Multiple Linear Regression Analysis

Variable	Estimate	SE	tStat	P-value
(Intercept)	-1.0755	0.69712	-1.5427	0.1299
Artificial Intelligence	0.4248	0.13497	3.1474	0.0029215
Blockchain Technology	0.21514	0.15652	1.3745	0.17609
Big Data Analtics	0.2102	0.15981	1.3153	0.019507
IoT	0.36204	0.11876	3.0485	0.0038432

R-squared: 0.506, Adjusted R-Squared: 0.462, P-value = 1.62e-06

As shown in Table 4.12, the significant emerging technologies are AI, Big Data Analytics, and IoT, since they have p-values less than 0.05. AI has a coefficient of 0.4248, indicating that a unit increase in the use of AI by online business models is associated with an average increase of 0.4248 in the effectiveness of their strategic decisions. Big Data Analytics has a coefficient of 0.2102, indicating that a unit increase in the use big data analytics by online business models leads to an average increase of 0.2102 in their understanding of their customers. IoT has a coefficient of 0.36204, which indicates that as the use of IoT by online business models increases by one unit, the effectiveness of their supply chain management increase by an average of 0.36204.

4.5.3 Impact of Emerging Technologies on Supply Chain Management

In order to examine the impact of emerging technologies on supply chain management, the supply chain management professionals were asked to rate, on a scale of 1-5, their agreement with some relevant statements relating to their use of emerging technologies. Table 4.13 shows the mean agreement scores of the supply chain management professionals. It also displays the standard deviations associated with the respective mean scores.

Table4. 13: Mean Agreement Scores of Supply Chain Management Professionals

Statement	Mean Agreem (1-5)
Blockchain technology has enhanced the traceability of products in our supply chain	2.1600(0.8
AI and machine learning have improved our demand forecasting	3.8400(0.9
IoT sensors have improved our inventory management	3.5400(0.1
We are using big data analytics to increase the sustainability of our supply chain	3.5800(0.9

As shown in Table 4.13, the use of AI and Machine Learning by supply chain management professionals for improving their demand forecasting has the highest mean agreement score. This seems to suggest that emerging technologies of AI and machine learning has a positive impact on supply chain management. However, the use of blockchain technology by supply chain management for enhancing the traceability of products in their supply chain has the lowest mean agreement score. This seems to suggest that emerging technology of blockchain technology has less impacted supply chain management. Yet, the use of IoT and big data analytics appears to have more impact on supply chain management than blockchain technology has.

Figure 4.14 displays boxplots of emerging technologies and supply chain management practices. The boxplot representing the use of blockchain technology by supply chain management professionals for enhanced product traceability in their supply chain has a median line lower than those of the use of AI and machine for improved demand forecasting, the use of IoT sensors for improved inventory management, and the use of big data analytics for increased sustainability of supply chain management.

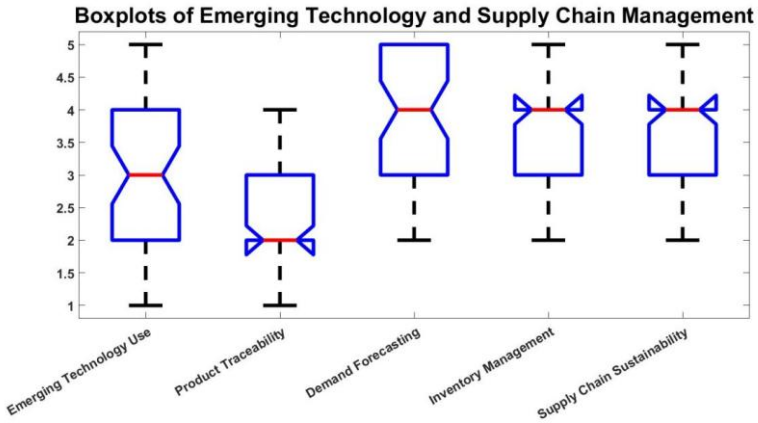

Fig.4. 14: Box plots of emerging technologies and supply chain management

This points to a difference in the impacts of the last three emerging technologies and the former on supply chain management. Whereas the boxplots for the use of IoT for inventory management and the use of big data analytics for supply chain management sustainability are left skewed, the boxplot for the use of blockchain technology for product traceability is right skewed.

4.5.3.1 Correlation Analysis

In order to ascertain the relationship between emerging technologies and supply chain management, both graphical and numerical methods were used. Figure 4.15 is a scatter plot of emerging technologies and and supply chain management.

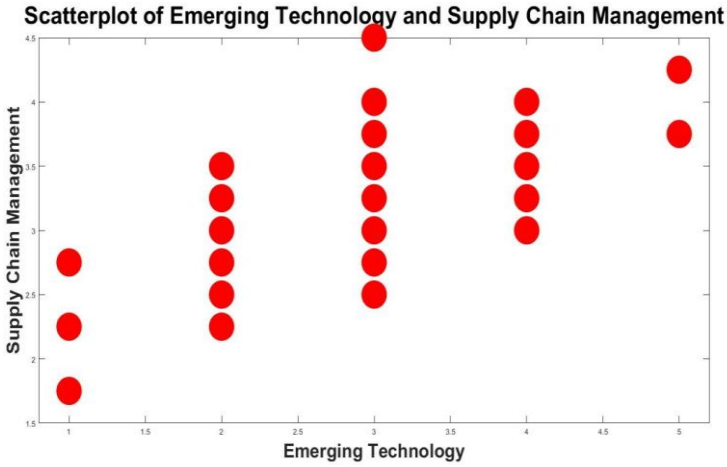

Fig.4. 15: Scatter plot of emerging technology and supply chain management

It could be seen from Figure 4.15 that emerging technologies seem to have a positive relationship with supply chain management.

In Table 4.14, the result of the correlation analysis between emerging technologies and supply chain management is presented.

Table4. 14: Pearson's Correlation Coefficient

Response Variable	Predictor Variable	Correlation Coefficient	P-value
Supply chain management	Emerging technologies	0.7283	0.0000

As shown in Table 4.14, the Pearson's correlation coefficient between the composite variable, emerging technologies and the composite variable, supply chain management is 0.7283. This indicates a fairly moderate positive relationship between emerging technologies and supply chain management.

4.5.3.2 Linear Regression Analysis

Some further linear regression analyses were conducted to model the impact of emerging technologies on supply chain management. Table 4.15 presents the results of the simple linear regression analysis.

Table4. 15: Results of Simple Linear Regression Analysis

Variable	Estimate	SE	tStat	P-value
Intercept	1.9086	0.19606	9.7348	6.0612e-13
Emerging Technology	0.46647	0.063344	7.3641	2.0384e-09

R-squared: 0.53, Adjusted R-Squared: 0.521, p-value = 2.04e-09

As displayed in Table 4.15, Emerging Technology has a p-value of 2.0384e-09, indicating that it has a significant impact on supply chain management. It has a regression coefficient of 0.46647, indicating that as supply chain management

professional increase their use of emerging technologies by one unit, their effective of their supply chain management practices increases by an average of 0.46647. The regression model has a p-value of less than 0.05 and and R-squared statistic of 0.53. These indicate that the model is statistically significant and explains 53% of the variation in supply chain management.

The results of the multiple linear regression analysis are presented in Table 4.16. This analysis sought to further model the impact of specific emerging technologies on supply chain management.

Table4. 16: Results of Multiple Linear Regression Analysis

Variable	Estimate	SE	tStat	P-value
(Intercept)	-0.92487	0.5051	-1.8311	0.0737150
Blockchain Technology	0.12438	0.12092	1.0287	0.3091300
AI and Machine Learning	0.48931	0.11745	4.166	0.0001386
IoT	0.4226	0.13739	3.076	0.0035624
Big Data Analytics	0.061796	0.1216	0.50819	0.0061380

R-squared: 0.595, Adjusted R-Squared: 0.559, P-value = 2.07e-08

As shown in Table 4.16, AI and Machine Learning, IoT and Big Data Analytics have significant impacts on supply chain management. This is indicated by their respective p-values being less than 0.05. Overall, the model is significant (p-value of 2.07e-08 is less than 0.05) and explains approximately 60% of the variability in supply chain management.

CHAPTER FIVE
DISCUSSION

5.1 Introduction

This chapter discusses the results of the data analyses. The discussion of the results is done in the light of existing relevant contemporary literature reviewed in the chapter two of this study. The discussion of the results is carried out in line with the order of the research objectives. The primary objective of this study, as outlined in Chapter One, is to examine the impacts of emerging technologies on online business models, consumer behavior, and supply chain management. To address this objective, a mixed-methods approach was adopted, combining both qualitative and quantitative data collection tools. The questionnaire survey, designed to capture the breadth and depth of these impacts, forms the basis of the analysis detailed in this chapter.

The questionnaire was distributed to three key stakeholder groups, namely consumers, online business owners/managers, and supply chain professionals, each providing a unique perspective on the integration and effects of emerging technologies. The questionnaire collected data on demographics, awareness and adoption of technologies, consumer shopping behaviour and expectations, and impact on supply chain management practices. The data collected were primarily closed ended questions for ease of analysis, but open-ended questions were included to give context and depth to the findings. The aim of this survey design was to ensure that the impact of emerging technologies would be analysed from every angle, and allow for comparisons across different stakeholders.

This chapter aims to present an overview of the collected data using descriptive statistics, comparisons, and inferential analysis as required. The findings are, where appropriate, presented in the form of tables and graphs to ensure ease of understanding and interpretation. Some descriptive statistics are employed to explore demographic

characteristics of each respondent groups and to understand the frequency of specific responses in key questions. The statistical analyses helped to identify correlations and differences between responses of different groups, while providing a solid grounding for inferences and conclusions.

The subsequent discussion sections of this chapter then contextualize the key findings with the existing literature, connecting the findings with relevant theories and concepts. By discussing each of these points, this chapter provides key insights into how emerging technologies are shaping the online business ecosystem.

5.2 Data Preparation

Prior to conducting the analysis, the raw data collected from the questionnaire survey underwent a series of data preparation steps to ensure accuracy, consistency, and suitability for statistical and thematic analyses. This section details the processes used for data cleaning, variable coding, and categorization, as well as the handling of any missing values and the creation of composite variables.

5.2.1 Data Cleaning

The initial data received from the online survey platform was reviewed for any potential inaccuracies, missing entries, or inconsistencies. First, the data was checked for missing values. The responses with missing values were analyzed for any systematic patterns. While a limited number of responses were found to have missing values, any cases with significant missing information were excluded from further analysis. Second, the data set was checked for any outliers. In certain cases where there were outlier responses on the Likert scale questions or time based responses, these were addressed by reviewing the validity of the response and then removing if required.

5.2.2 Coding and Categorization

The questionnaire included both closed-ended and open-ended questions. First, the numerical data from the closed-ended questions were directly entered into Microsoft Excel Spreadsheet for ease of access and statistical calculations. Following that, the open-ended responses were initially read carefully to gain an overview of the different themes. A coding scheme was developed based on the recurrence of key themes, ideas and concepts from the data. These codes were applied to each of the responses and then grouped into main themes for analysis.

5.3 Variable Types

The questionnaire data consisted of different variable types. The nominal variables included categorical data such as “Gender”, “Education Level”, “Region”, “Business Type”, “Industry Focus”, and “Occupation”. These variables were used for descriptive analysis, frequency distributions and to identify patterns within the data. The ordinal variables included Likert scale ratings for familiarity with technology and levels of agreement with relevant statements. These variables were treated as ordinal where appropriate and the average scores were used for analysis. The interval/ratio variables included demographic data such as “Years in Operation” or “Years of Experience”. Some descriptive statistics such as the mean and standard deviation were used to analyse these variables. Some composite variables were developed by combining information on several different variables into a single score. The first composite variable was Technology Engagement. This was used to categorize the types of consumers that were using specific types of technology. It was an average score of their familiarity score and also the number of technologies they had encountered while purchasing online. The second composite variable was technology implementation. This score was developed to highlight the businesses that had implemented the greatest

number of technologies. It was an overall score based on the total number of technologies being used in the business.

5.4 Creation of Tables and Graphs

Some of the results of data analysis were presented in graphs while others were visualized using suitable graphs including pie charts, bar charts, and scatter plots. Where appropriate, relevant results were tabulated to summarize key findings and trends, which ensured a robust and systematic approach to data visualization, thereby setting the foundation for the further analysis and discussion.

5.5 Descriptive Statistics

This section provides a descriptive overview of the data collected from the questionnaire survey. It presents key demographic characteristics of the respondent groups, explores awareness and adoption of emerging technologies, and summarizes the responses on Likert scales and open-ended questions. The purpose of this section is to offer a detailed and comprehensive summary of the data before moving on to more in-depth analysis in subsequent sections.

5.5.1 Demographic Characteristic of Participants

The survey collected data from a total of 300 respondents, including 200 consumers, 50 online business owners/managers, and 50 supply chain professionals. The following section presents some important demographic characteristics of each participant group.

5.5.1.1 Demographic Characteristics of Consumers

This section describes and visualizes the demographic characteristics of the consumers. Figure 5.1 describes the the distribution of the ages of the consumers using a simple bar chart.

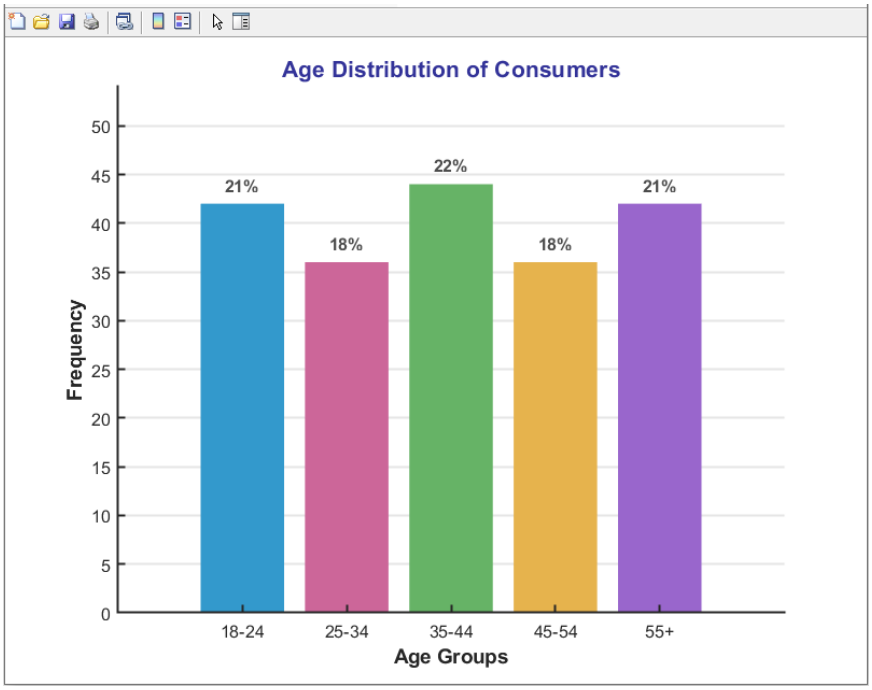

Fig.5. 1: Age distribution of consumers

As displayed in Figure 5.1, majority of the consumers fall within the 35-44 years age bracket, while minority fall within the 25-34 years, and 45-54 years age bracket. This could be attributable to the fact that the consumers within the 35-44 years age bracket may have been in active work service for more years compared to those within the 25-34 years age bracket.

Figure 5.2 describes the distribution of the gender of the consumers using a simple pie chart. It can be seen from the figure that the majority of the consumers were males, representing almost 60%. This could stem from a possible gender disparity within the employment space which may empower males more in terms of purchase power as compared to their female counterparts.

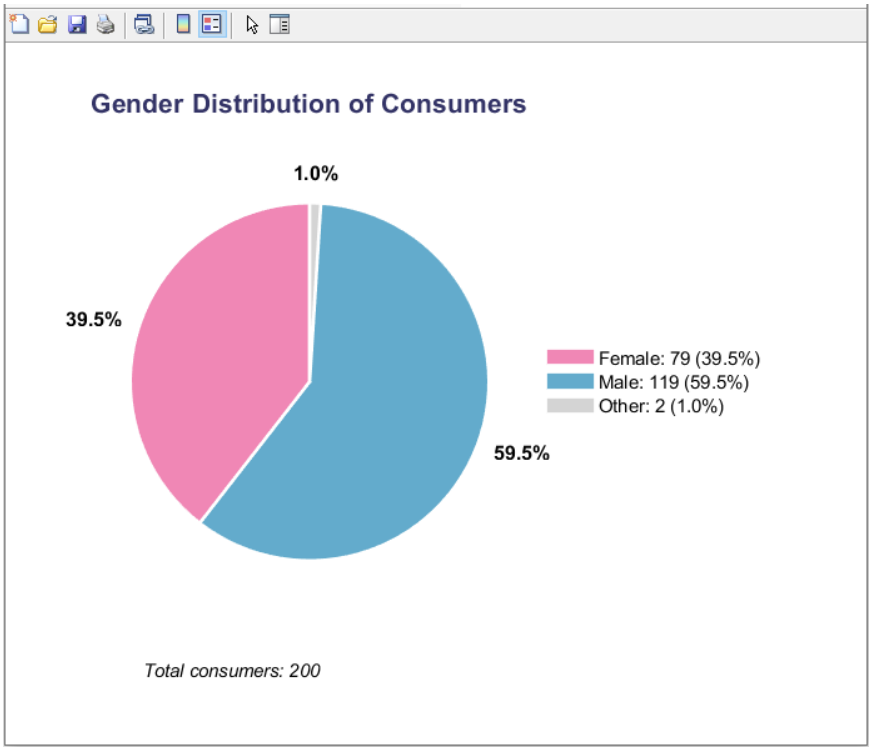

Fig.5. 2: Gender distribution of consumers

The distribution of the levels of education of the consumers is visualized in Figure 5.3. The majority of the consumers have bachelors degree as their highest level of education, representing 35%. However, only a few consumers have a doctoral or doctorate degree, as represented by 4.5% of all the consumers.

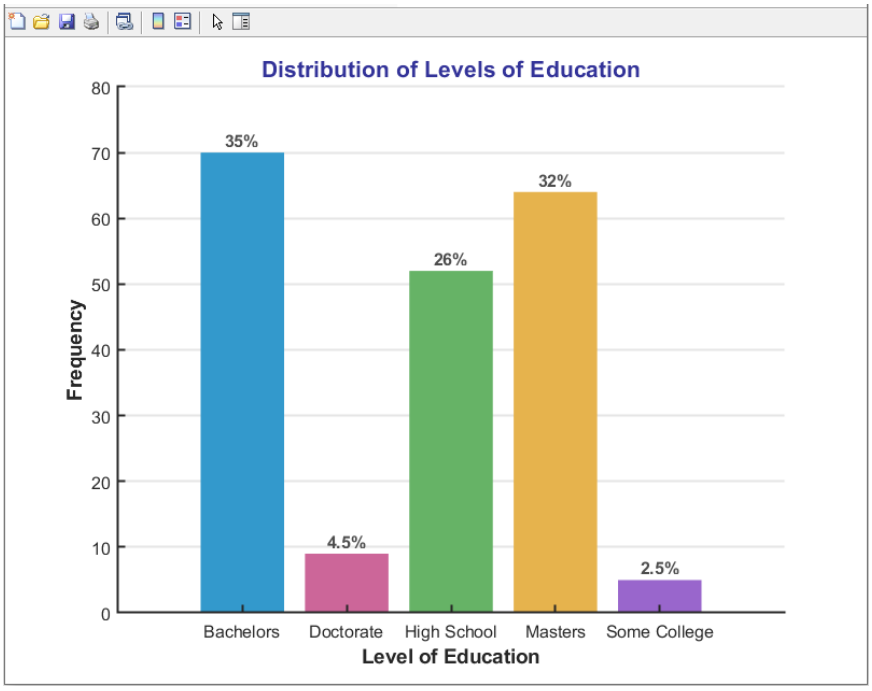

Fig.5. 3: Distribution of levels of education

Figure 5.4 displays the distribution of the frequency of online purchases by the consumers. As represented by 60%, daily online shopping is more common among the consumers than weekly or monthly shopping as represented by 2.5% and 2% respectively.

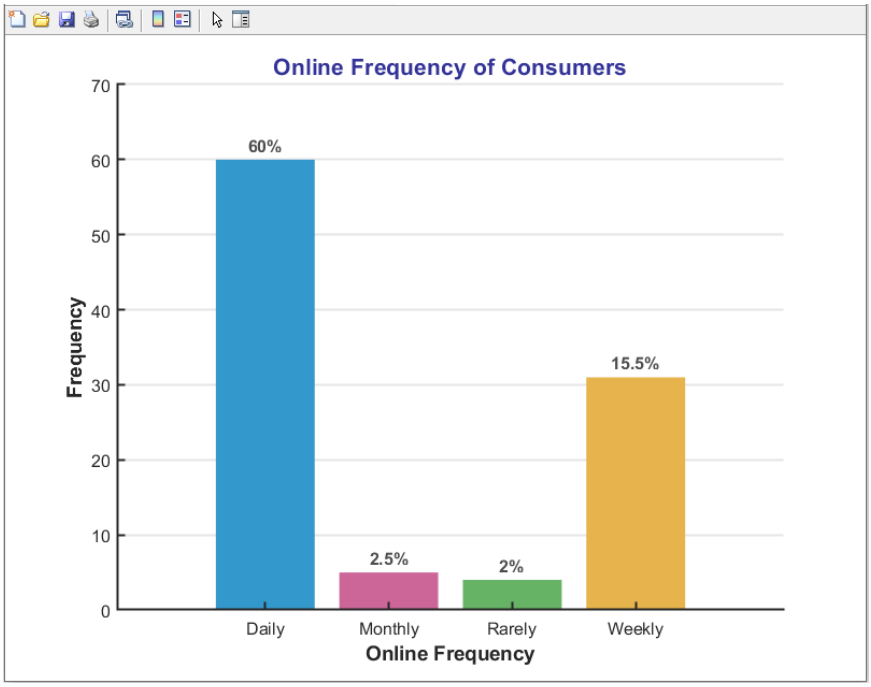

Fig.5. 4: Distribution of online purchases frequency by consumers

5.5.1.2 Demographic Characteristics of Online Businesses

This section describes and visualizes the demographic characteristics of the online business models. Figure 5.5 shows the distribution of the types of online business models. It can be seen that retail business models are more prevalent, followed by subscription-based online business models, as represented by 34% and 30% respectively. The minority of the online business models is the service-based, which is represented by 16%.

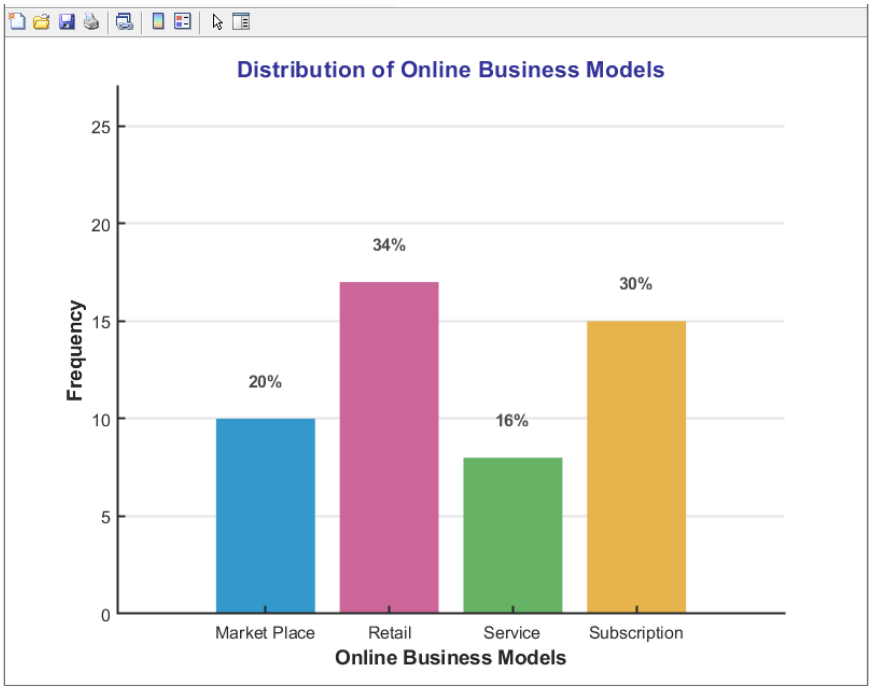

Fig.5. 5: Distribution of online business models

The number of years the online businesses have been in operation is summarized by the mean number of years and the corresponding standard deviations as shown in Table 5.1.

Table5. 1: Years in Operation

Business Type	Mean	Standard Deviation
Market place	8.2	2.5298
Retail	8.1765	4.9274
Service	6.625	3.6621
Subscription	6.2667	303.8816

The market place and retail online business models have been in operation longer than the rest of the online business models. This is indicated by mean years of operations of roughly 8 years.

The distribution of the number of employees of the business models is depicted in Figure 5.6. The majority of the online business models have 15-50 employees whereas the minority has over 200 employees.

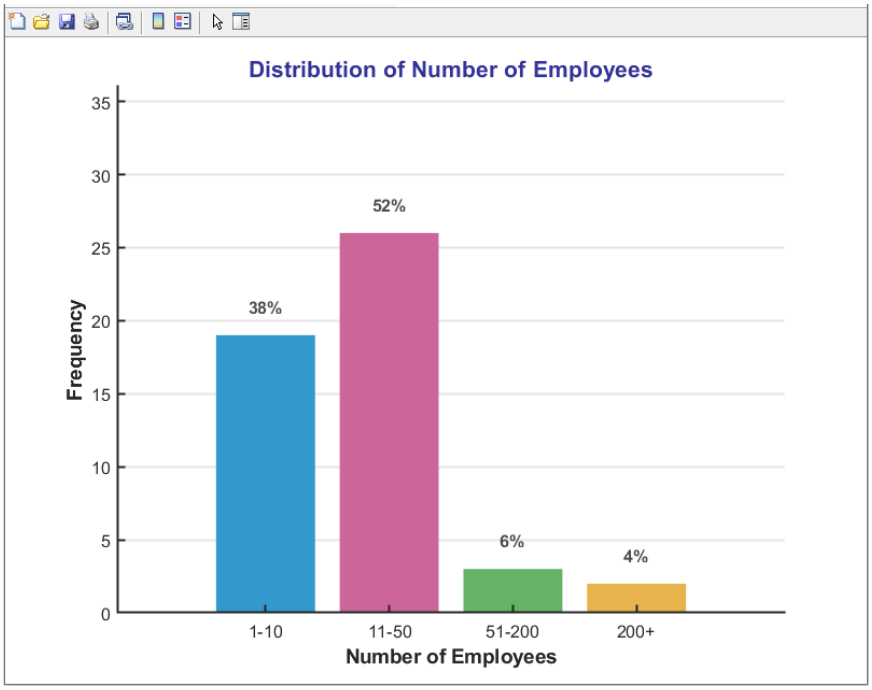

Fig.5. 6: Distribution of number of employees

Figure 5.7 is a simple bar chart visualizing the distribution of the average annual revenues of the online businesses. In terms of average annual revenue, the majority of the online business earn between US$100,000 and US$500,000. The minority, represented by 2%, earn an average annual revenue of over US$1,000,000.

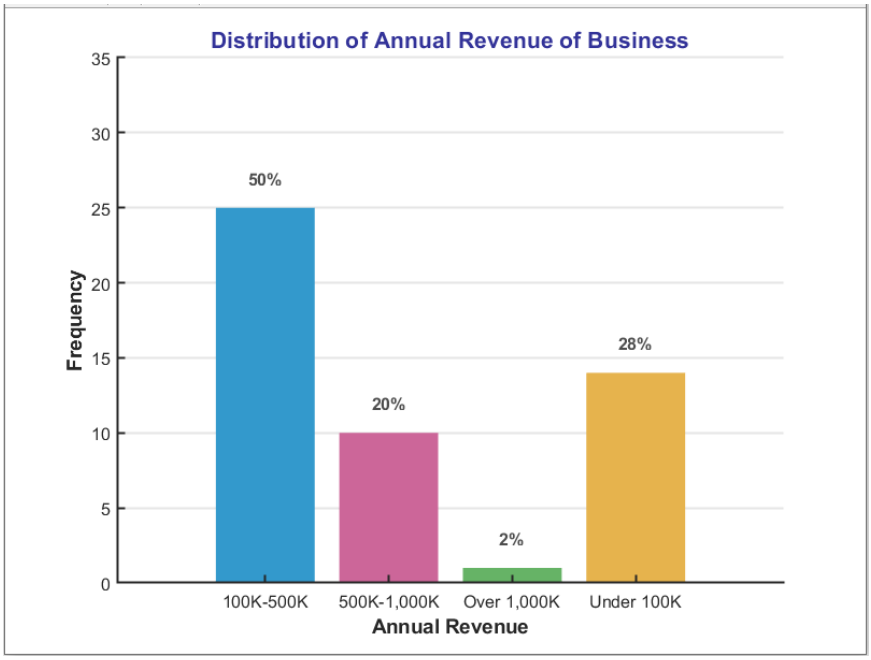

Fig.5. 7: Distribution of average annual revenues of businesses

5.5.1.3 Demographic Characteristics of Supply Chain Professionals

This section describes and visualizes the demographic characteristics of the supply chain management professionals. Figure 5.8 describes the distribution of different supply chain management professionals, in a simple bar chart.

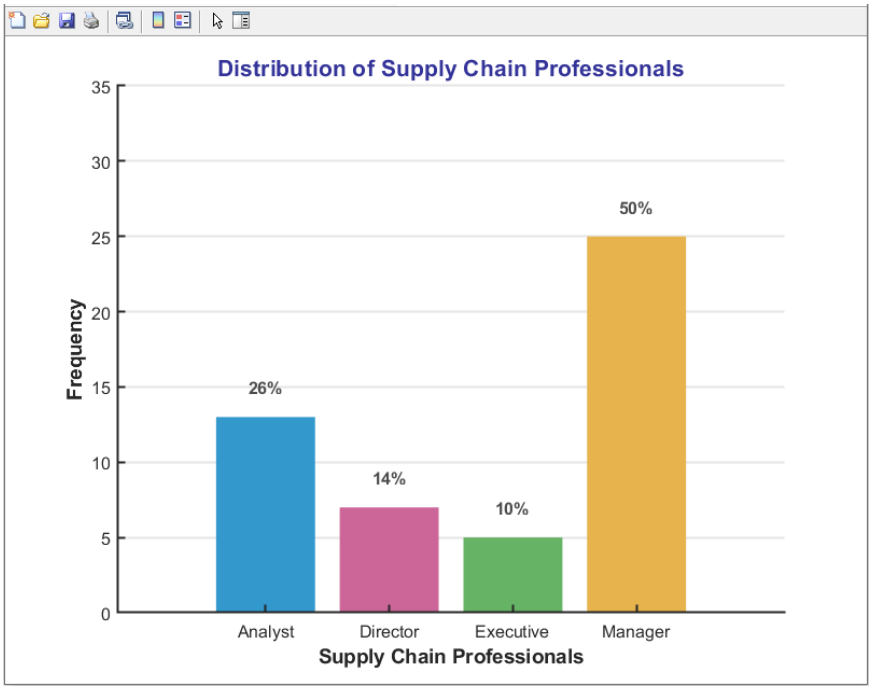

Fig.5. 8: Distribution of supply chain management professionals

The majority of the supply chain management professional, represented by 50%, are Managers, whereas the minority, represented by 10%, are Executive Officers, as displayed in Figure 5.8.

The number of years of experience of the supply chain professionals is summarized by the mean and standard deviation as shown in Table 5.2.

Table5. 2: Years of Experience of Supply Chain Professionals

Revenue Bracket	Mean	Standard Deviation
Analyst	6.2308	3.5626
Director	10.143	4.1404
Executive	5.8	3.2711
Manager	10.52	5.1811

In terms of experience, the managers and directors have more experience than the rest of the supply chain management professionals. This is represented by roughly 10 years of experience of supply chain management.

Figure 5.9 is a simple bar chart showing the distribution of the supply chain management professionals by industry focus.

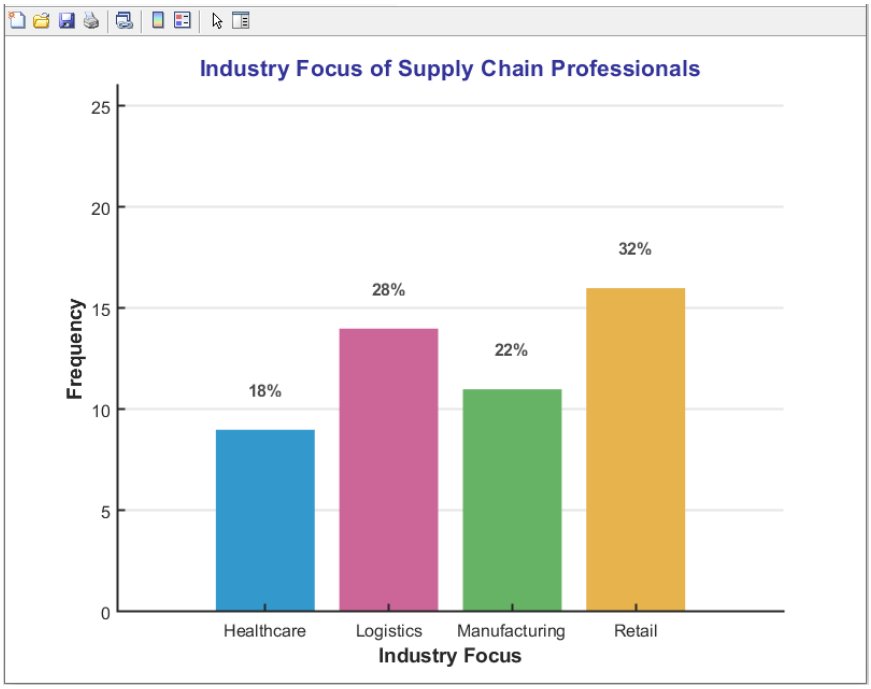

Fig.5. 9: Distribution of supply chain management professionals by industry focus

The retail sectors has the highest number of supply chain management professionals, followed by the logistics sector. The healthcare sector has the lowest number of supply chain management professionals.

5.6 Consumer Awareness of Emerging Technologies

This section presents and discusses the results of the data analyses pertaining to the consumers' awareness of the emerging technologies in the light of existing literature. Table 5.3 describes the consumers' familiarity with the emerging technologies using mean and standard deviation.

Table5. 3: Consumers' Familiarity with Emerging Technologies

Technology	Mean Familiarity Score	Standard Deviation
AI	4.0650	0.7770
Blockchain	2.6300	1.0671
IoT	3.0850	1.3442
Virtual Reality	3.0450	1.3461
Big Data Analytics	2.6350	0.9467

Table 5.3 indicates that the consumers are more familiar with AI, and least familiar with blockchain technology. This is indicated by mean familiarity scores of 4.0650 and 2.6300 respectively.

5.7 Technology Adoption in Online Businesses and Supply Chains

This section presents and discusses the results of the analyses of the data regarding technology adoption by online business models and supply chain management professionals. Table 5.4 describes the adoption of emerging technologies by online business models and supply chain management professionals using frequencies.

Table5. 4: Technology Use by Online Businesses and Supply Chain Professionals

Technology	Online Business (n=50)	Supply Chain Professionals (n=50)
AI	35	30
Blockchain	15	20
IoT	28	38
Virtual Reality	20	25
Big Data Analytics	30	30

As shown in Table 5.4, AI is the most commonly used technology by both supply chain management and online businesses, with IOT a close second. Blockchain is the least used technology by both groups.

5.8 Impact of Emerging Technologies on Consumer Behaviour

This section is dedicated to the presentation and discussion of the results of data analyses on the impacts of emerging technologies on consumers' shopping behaviour, preferences, and expectations in the context of online shopping.

5.8.1 Consumer Preferences and Expectations

The consumers' shopping behaviour, preferences and expectations regarding emerging technologies is described in Table 5.5.

Table5. 5: Consumers' Shopping Behaviour, Preferences, and Expectations

Statement	Mean Agreement Score (1-5)
AI-powered recommendations have influenced my purchases online	2.7350(0.8710)
I prefer to shop from online businesses that have user-friendly websites	3.1300(0.8665)
I value brands that are transparent about the origin of their products	3.2600(0.8462)
I value a cash-on-delivery option when purchasing online	3.0650(1.4216)
I am more likely to buy from brands that I have interacted with on social media	3.2350(0.9154)
I am more likely to buy from online brands that are environmentally conscious	3.0300(1.3183)

Online consumers are more likely to purchase from brands that they have interacted with on social media platforms. This statement has the highest mean agreement score. Online consumers gave slightly lower ratings for their likelihood to purchase from brands that are environmentally conscious. Nonetheless, all the relevant statement received almost the same good ratings from online consumers. That is, online consumers prefer to shop from online business that have user-friendly websites, value brands that are transparent about the origin of their products, value a cash-on-delivery option when purchasing online to almost the same extent. Whereas the importance of

having a variety of payment options was rated 4.5 by online consumers, same-day delivery was rated 3.8. These results indicate that, generally, customers prefer user friendly websites, transparency and environmental consciousness, but may not always be influenced by technology based recommendations or brand presence on social media.

Additionally, the most important element of a positive shopping experience were good customer service, fast delivery and clear communication. The most important factors that would make consumers loyal to a brand were good quality products, good customer service and ethical business practices.

Figure 5.10 shows boxplots of the various emerging technologies and consumers' online shopping behaviour.

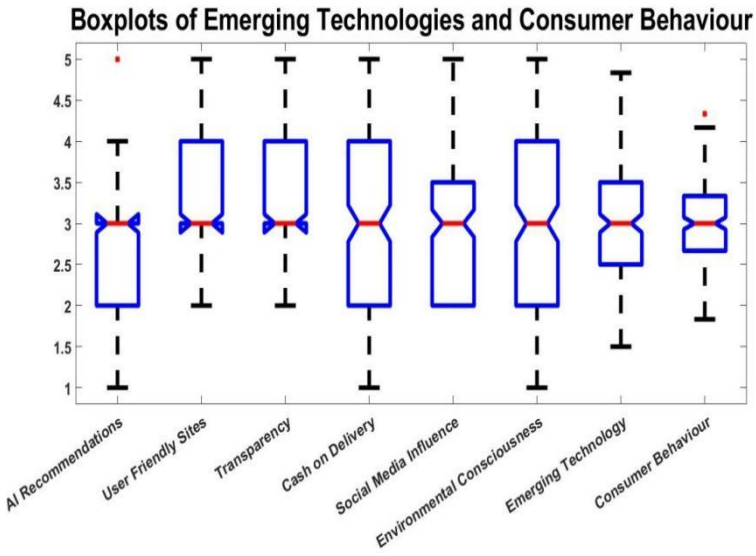

Fig.5. 10: Boxplots of emerging technologies and consumer behaviour

It can be seen from the above figure that there is no presence of influential outliers in the data points of the relevant variables including User-Friendly Sites, Transparency, Cash on Delivery, Consumer Behaviour, and Emerging Technology.

5.8.2 Correlation Analysis

This section presents and discusses the results of the analyses of data pertaining to the linear relationship between adoption of emerging technologies and consumers' online shopping behaviour. Figure 5.11 is scatter plot depicting the linear relationship between emerging technology adoption and consumers' online shopping behaviour, expectation, and preferences.

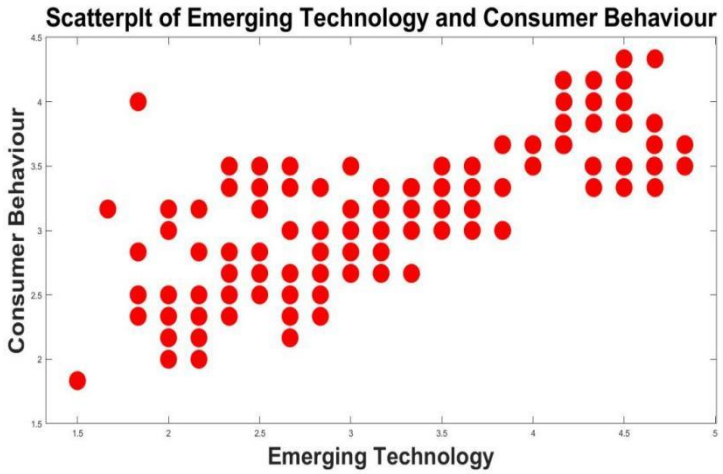

Fig.5. 11: Scatter plot of emerging technology adoption and consumer behaviour

Figure 5.11 seems to suggest a direct relationship between emerging technologies and online consumers shopping behaviour.

Table 5.6 displays the result of the Pearson's correlation analysis between consumers' shopping behaviour and emerging technologies.

Table5. 6: Pearson's Correlation Coefficient

Response Variable	Predictor Variable	Correlation Coefficient	P-value
Consumer behaviour	Emerging technology	0.7522	0.0000

The correlation coefficient of 0.7522 with a p-value of less than 0.05 indicates that there exists a statistically significant direct relationship between adoption of emerging technologies and consumers' online shopping behaviour.

5.8.3 Linear Regression Analysis

This section presents and discusses the results of the analysis of data regarding the impact of emerging technologies on consumers' online shopping behaviour. The results of the simple linear regression analysis to model the relationship between consumer behaviour and emerging technologies are shown in Table 5.7.

Table5. 7: Simple Linear Regression Analysis Output

Variable	Estimate	SE	tStats	P-value
Intercept	-0.33775	0.21758	-1.5523	0.12219
Emerging Technology	1.1314	0.070426	16.065	0.00001

R-squared = 0.566 Adjusted R-Squared = 0.564 P-value = 1e-37

The estimated coefficient of Emerging Technology is 1.1314 with a p-value less than 0.05. This indicates that adoption of emerging technology has a statistically significant positive impact on consumers' online shopping behaviour. The estimated coefficient indicates that an adoption of an additional emerging technology is expected to increase consumers' online shopping by 1.1314. The estimated coefficient of determination of 0.566 means that emerging technologies account for approximately 57% of the variations in consumers' online shopping behaviour. This result is in agreement with the findings of Riar et (2022), Sharma et al (2023), and Hanny et al (2025). They found that augmented reality allows consumers to virtually try products, increasing engagement and purchase intentions through more interactive and personalized experiences.

Table 5.8 displays the results of the multiple linear regression analysis to model the relationship between consumer behaviour and emerging technologies.

Table5. 8: Multiple Linear Regression Analysis Output

Variable	Estimate	SE	tStat	P-value
(Intercept)	0.54833	0.16528	3.3175	0.001085
AI_Recommendations	0.68966	0.043761	15.76	1.64E-36
User_Friendly_Websites	0.057818	0.033714	1.7149	0.047963
Transparency	0.036625	0.033732	1.0858	0.278947
Cash_on_Delivery	0.038436	0.01888	2.0358	0.043134
Social_Media_Influence	0.024115	0.033253	0.72519	0.046921
Environmentally_Conscious	0.10663	0.024414	4.3675	0.891247

R-squared = 0.801, Adjusted R-Squared = 0.794, P-value = 8.43e-65

As displayed in Table 5.8, all the specific emerging technologies have direct impacts on consumers shopping behaviour. However, not all the impacts are statistically significant. AI Recommendations have a statistically significant impact on consumers' shopping behaviour. This is indicated by an estimated coefficient of 0.68966 with a p-value less than 0.05. This means that an additional increase in AI recommendations is accompanied by an average increase of 0.68966 in consumers' online shopping behaviour. User-friendly websites also have a statistically significant direct impact on consumers online shopping behaviour. This is also indicated by an estimated coefficient of 0.057818 and a p-value less than 0.05. This means that for a unit increase in user-friendly features of websites, the online shopping behaviour of consumers increases by an average of 0.057818. Similarly, cash on delivery and social media influence have statistically significant impacts on consumers' online shopping behaviour. For any unit increase in cash on delivery arrangement, consumers' online shopping behaviour is expected to increase by an average of 0.038436. Also, an additional increase in social media advertisements is associated with an average increase of 0.024115 in consumers' online shopping behaviour. Nonetheless, product transparency and environmentally_conscious products seem not to have statistically significant impact

on consumers' online shopping behaviour. This is indicated by the corresponding p-values being greater than the significance level of 0.05. These results are consistent with the findings of Riar et (2022), Sharma et al (2023), Hanny et al (2025), and Waheed and Yang (2018) which reveal that digital marketing technologies, including social media and e-marketing, further shape exploratory buying behaviors and increase consumer engagement. They have add that augmented reality allows consumers to virtually try products, increasing engagement and purchase intentions through more interactive and personalized experiences

5.9 Impact on Emerging Technologies on Online Businesses Models

This section presents the results of data analysis to reveal the impact of emerging technologies on online business models. The mean scores and standard deviation of how emerging technologies have impacted different aspects of online business models is presented in Table 5.9.

Table5. 9: Impacts of Emerging Technologies on Online Business Models

Statement	Mean Agreement Scor (1-5)
AI has helped us make more strategic decisions	3.5000 (0.8391)
Blockchain technology has improved our online security and customer trust	2.5000(0.7354)
We use big data analytics to better understand our customers	3.7200(0.6713)
IoT technology has improved our supply chain	3.5600(0.8609)

Whereas the use of big data technology to understand customers has the highest mean agreement score, the use of bockchain technology to improve online security and customer trust has the lowest mean agreement score. This seems to suggest that in online business operations, big data technology is more leveraged than blockchain technology.

Figure 5.12 shows box plots of the various emerging technologies and online business operations.

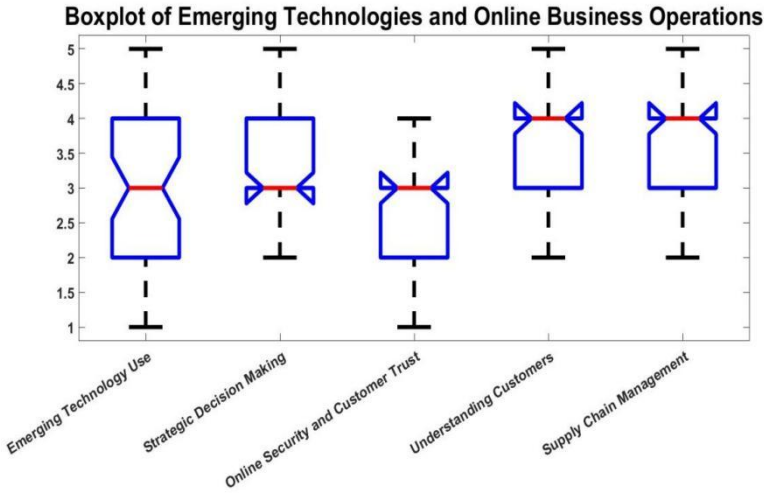

Fig.5. 12: Box plots of emerging technologies and online business operations

The boxplots in Figure 5.12 clearly suggest the presence of no influential outlier in the data points of the relevant variables.

5.9.1 Correlation Analysis

This section presents and discusses the results of the analyses of data in connection with the linear relationship between adoption of emerging technologies and online business operations. Figure 5.13 is scatter plot depicting the linear relationship between emerging technology adoption and online business operations. It seems to suggest a positive relationship between emerging technologies and online business operations.

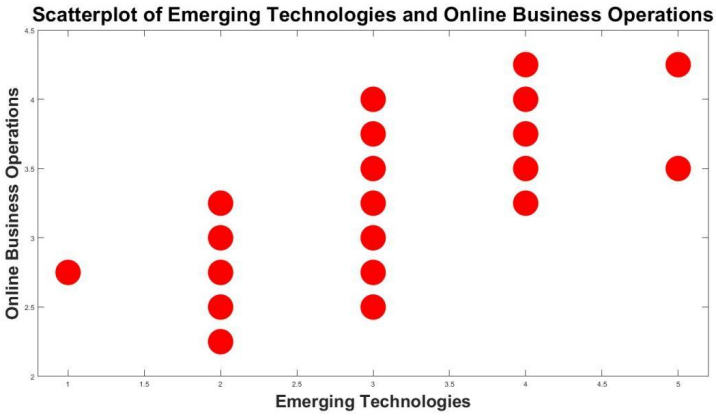

Fig.5. 13: Scatter plots of emerging technologies and business operations

Table 5.10 displays the result of the Pearson's correlation analysis between online business operations and emerging technologies.

Table5. 10: Pearson's Correlation Coefficient

Response Variable	Predictor Variable	Correlation Coefficient	P-value
Online Business Operations	Emerging technologies	0.6988	0.0000

The estimated correlation coefficient of 0.6988 with the corresponding p-value less than 0.05 indicate that emerging technologies have a statistically significant positive relationship with online business operations.

5.9.2 Linear Regression Analysis

The results of the simple linear regression analysis to model the relationship between online business operations and emerging technologies is shown in Table 5.11.

Table5. 11: Simple Linear Regression Analysis Output

Variable	Estimate	SE	tStat	P-value
Intercept	2.148	0.18113	11.859	7.1563e-16
Emerging Technology	0.38809	0.057334	6.7688	1.6635e-08

S-squared: 0.488, Adjusted R-Squared: 0.478, P-value = 1.66e-08

The estimates coefficient of emerging technology, 0.38809, and the p-value of less than 0.05 indicate that adoption of emerging technologies by online business models has a statistically significant direct impact on online business operations. The estimated coefficient of determination of 0.488 means that emerging technologies explain approximately 49% of the variability in online business operations. This result is consistent with the findings of Spilotro et al (2025), Shen et al (2022), and Muhammad et al (2023).

Table 5.12 shows the results of the multiple linear regression analysis to model the relationship between online business operations and emerging technologies.

Table5. 12: Multiple Linear Regression Analysis Output

Variable	Estimate	SE	tStat	P-value
(Intercept)	-1.0755	0.69712	-1.5427	0.1299
Artificial Intelligence	0.4248	0.13497	3.1474	0.0029215
Blockchain Technology	0.21514	0.15652	1.3745	0.17609
Big Data Analtics	0.2102	0.15981	1.3153	0.019507
IoT	0.36204	0.11876	3.0485	0.0038432

R-squared: 0.506, Adjusted R-Squared: 0.462, P-value = 1.62e-06

As shown in Table 5.12, AI, Big Data Analytics, and IoT have statistically significant positive impact on online business models. Although blockchain technology has a positive impact on online business models, it is not statistically significant. Also, the estimate, 0.4248, indicates that a unit increase in the adoption of AI causes an average increase of 0.4248 in online business operations. Blockchain Technology has an estimate of 0.21514, indicating that an adoption of an additional blockchain technology for online business operations is associated with an average increase of 0.21514 in online business operations. Moreover, Big Data Analytics has an estimated coefficient of 0.2102, indicating that an application of an additional big data technology for online business operation results in a corresponding average increase of 0.2102 in online business operations. Finally, an adoption of an additional internet of things technology for online business operation is associated with an average increase of 0.36204 in the operations of online businesses. These findings are consistent with the results of Spilotro et al (2025), Shen et al (2022), and Muhammad et al (2023) which found that technologies such as artificial intelligence (AI), the Internet of Things (IoT), big data analytics, and blockchain are enabling businesses to better understand

customer behavior, personalize marketing efforts, and optimize supply chains, leading to improved performance and internationalization, especially for small and medium-sized enterprises (SMEs)

5.10 Impact of Emerging Technologies on Supply Chain Management

This section presents the results of data analysis to reveal the impact of emerging technologies on supply chain management and sustainability. The mean scores and corresponding standard deviations of how emerging technologies have impacted supply chain management and sustainability are presented in Table 5.13

Table5. 13: Impact of Emerging Technologies on Supply Chain Management

Statement	Mean Agreem (1-5)
Blockchain technology has enhanced the traceability of products in our supply chain	2.1600(0.8
AI and machine learning have improved our demand forecasting	3.8400(0.9
IoT sensors have improved our inventory management	3.5400(0.1
We are using new technologies to increase the sustainability of our supply chain	3.5800(0.9

The use of blockchain technology to enhance the traceability of products in supply chains has the lowest mean agreement score, whereas the use of big data technology for supply chain sustainability has the highest mean agreement score from the supply chain management professionals. This indicates that the use of big data technology by supply chain management professional is more prevalent than the use of blockchain technology.

Figure 5.14 shows box plots of emerging technologies and supply chain management sustainability. The figure seems to suggest presence of no potential outliers in the data points of the relevant variables including Product Traceability, Demand Forecasting, Inventory Management, Supply Chain Sustainability, and Emerging Technology Use.

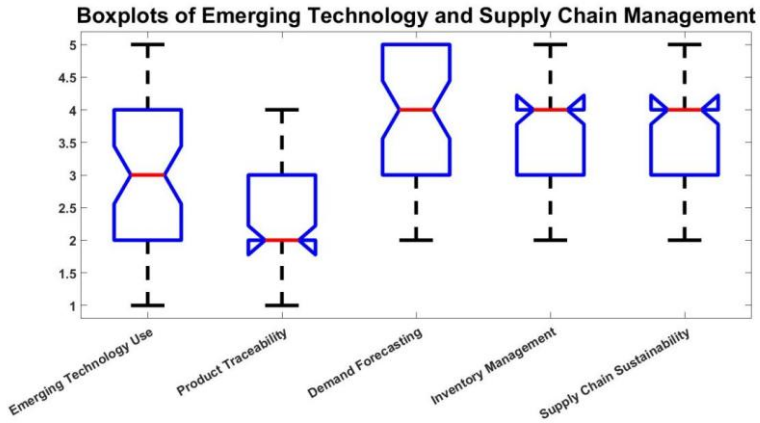

Fig.5. 14: Box plots of emerging technologies and supply chain management sustainability

5.10.1 Correlation Analysis

This section presents and discusses the results of the analyses of data on the linear relationship between adoption of emerging technologies and supply chain management sustainability. Figure 5.15 is scatter plot depicting the linear relationship between emerging technology adoption and supply chain management sustainability. It seems to suggest a visually recognizable positive relationship between the two variables.

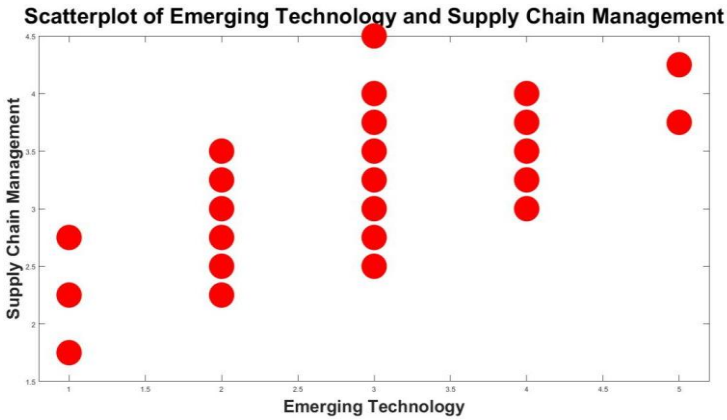

Fig.5. 15: Scatter plot of emerging technology and supply chain management.

Table 5.14 shows the result of the Pearson's correlation analysis between supply chain management and emerging technologies.

Table5. 14: Pearson's Correlation Coefficient

Response Variable	Predictor Variable	Correlation Coefficient	P-value
Supply chain management	Emerging technologies	0.7283	0.0000

As shown in Table 5.14, the correlation coefficient of 0.7283, and p-value of less than 0.05 indicate that there is a statistically significant positive relationship between adoption of emerging technologies and supply chain management.

5.10.2 Linear Regression Analyses

The results of the simple linear regression analysis to model the relationship between supply chain management and emerging technologies are shown in Table 5.15.

Table5. 15: Simple Linear Regression Analysis Output

Variable	Estimate	SE	tStat	P-value
Intercept	1.9086	0.19606	9.7348	6.0612e-13
Emerging Technology	0.46647	0.063344	7.3641	2.0384e-09

R-squared: 0.53, Adjusted R-Squared: 0.521, p-value = 2.04e-09

As shown in Table 5.15, adoption of emerging technologies by supply chain management professionals has a statistically significant positive impact on supply chain management practices. The estimate of 0.46647 means that an additional increase in the adoption of emerging technologies by supply chain management professionals is associated with an average increase of 0.46647 in supply chain management sustainability. The estimated coefficient of determination of 0.53 means that emerging technologies account for 53% of the variations in supply chain management practices and sustainability. This result is consistent with the findings of Liu et al (2023), Varriale et al (2021), and Shen et al (2022) which reveal that technologies such as blockchain and IoT improve traceability and order management, whereas AI and big data analytics optimize forecasting and inventory control.

Table 5.16 shows the results of the multiple linear regression analysis to model the relationship between supply chain management and adoption of specific emerging technologies.

Table5. 16: Multiple Linear Regression Analysis Output

Variable	Estimate	SE	tStat	P-value
(Intercept)	-0.92487	0.5051	-1.8311	0.073715
Blockchain Technology	0.12438	0.12092	1.0287	0.30913
AI and Machine Learning	0.48931	0.11745	4.166	0.0001386
IoT	0.4226	0.13739	3.076	0.0035624
Big Data Analytics	0.061796	0.1216	0.50819	0.6138

S-squared: 0.595, Adjusted R-Squared: 0.559, P-value = 2.07e-08

As displayed in Table 5.16, adoption of blockchain technology, artificial intelligence and machine learning, internet of things, or big data analytics has a statistically significant positive impact on supply chain management practices and sustainability. Blockchain Technology has an estimate of 0.12438, indicating that an adoption of an additional blockchain technology for supply chain management practices is associated with an average increase of 0.12438 in supply chain management sustainability. An adoption of an additional artificial intelligence and machine learning technique for supply chain management is associated with an average increase of 0.48931 in the level of supply chain management sustainability. Similarly, an adoption of an additional internet of things technique for supply chain management is expected to cause an average increase of 0.4226 in the level of supply chain management sustainability. Also, an adoption of an additional big data analysis method for supply chain management is accompanied by an average increase of 0.061796 in supply chain management sustainability level. Again, these results are consistent with the findings of Liu et al (2023), Varriale et al (2021), and Shen et al (2022) which reveal that technologies such

as blockchain and IoT improve traceability and order management, whereas AI and big data analytics optimize forecasting and inventory control.

5.11 Results of Qualitative Data Analysis

This section discusses the results of the thematic analysis of the qualitative data analysis. The following key themes emerged from the analysis of open-ended responses.

The consumers consistently valued personalize experience and transparency, and felt concerned about the security and use of their data. Also, online business owners and managers expressed a desire to maintain good customer service and improve engagement. They also highlighted the costs of implementing new technology and difficulty obtaining qualified personnel. Finally, the supply chain management professionals were concerned with the high cost of new technology and the difficulty integrating it with existing systems. They expressed confidence in the way technology had improved visibility and their ability to manage risk.

5.12 Chapter Summary

This chapter has presented the results of the analyses of both quantitative and qualitative data analyses. The chapter presented the procedure for data preparation, coding, and categorization. It also presented the study variables and visualized their respective distributions in pie charts, bar chart and tables. Some descriptive statistics and demographic characteristics of the participants were also discussed in this chapter. In line with the research objective of this study, results on correlation and linear regression analyses were discussed in the light of existing literature in this chapter. The discussions included consumer awareness of emerging technologies, emerging technology adoption by online businesses and supply chain management professionals, as well as the impacts of emerging technologies on consumers online shopping

behaviour, online business models, and supply chain management practices. Moreover, the chapter discussed the results of the small qualitative analyse to underpin and contextually complement the quantitative findings. Overall, the results show that awareness of emerging technologies by consumers, and the adoption of emerging technologies have statistically significant positive impacts on consumers' online shopping behaviour, online business models, and supply chain management practices.

CHAPTER SIX

CONCLUSIONS

6.1 Introduction

This chapter summarizes the study and key findings, draws conclusions based on the findings, and presents some recommendations for practice and future research. The

study sought to assess the impact of emerging technologies on online business models, consumer behaviour, and supply chain management. This study utilized a mixed-method research approach with a correlational design to examine the effects of emerging technologies on online business models, consumer behaviour, and supply chain management. The quantitative part of the study focused on questionnaire data from supply chain management professionals, consumers, and online businesses owners. This type of data was then analyzed using statistical methods to identify correlations and impacts. The qualitative component of this study explored the perspectives and experiences concerning emerging technologies and their impacts on online business models, consumer behaviour, and supply chain management.

6.2 Summary of Key Findings

The study found that the consumers were more familiar with AI, followed by IoT and VR, as represented by mean familiarity scores of 4.0650, 3.0850, and 3.0450 respectively. However, they were less familiar with blockchain and big data technologies, represented by mean familiarity scores of 2.6300 and 2.6350 respectively. However, AI and big data technologies were the most used emerging technologies by both online business and supply chain management professionals, with blockchain technology and VR the least used emerging technologies. In other words, AI was found to be the most commonly used emerging technology by both supply chain management professionals and online businesses, with IoT a close second.

Regarding the second objective of this study: to examine the impact of emerging technologies on consumer behaviour, the results showed that AI-powered recommendations influence consumers' online shopping behaviour significantly. Next is user-friendly websites. That is, consumers tend to shop more on user-friendly website with AI recommendation or personalized advertisements. However, the least driver of

consumers' online purchases is a brand's transparency about the origin of their products and environmental consciousness. Also, the results indicated that the most important element of a positive online shopping experience were good customer service, fast delivery and clear communication. Moreover, the most important factors that would make consumers loyal to a brand were good quality products, good customer service and ethical business practices.

As shown by the results of the regression analyses, emerging technology is a significant predictor of consumers shopping behaviour. In specific terms, a unit increase in consumers' familiarity with emerging technologies is associated with an average 1.1314 increase in their online shopping behaviour. In modelling the impact of emerging technologies on consumer behaviour, 57% of the variability in consumer behaviour is explained by emerging technologies. A unit increase in consumers' encounter with AI recommendations is associated an average 0.68966 increase in their online purchases. Similarly, a unit increase in consumers' encounter with user-friendly websites, on average, leads to 0.057818 increase in consumers' preference to shop online. Moreover, a unit increase in consumers' level of interaction with a brand on social media platforms is associated with an average increase of 0.024115 in their likelihood to shop online from the brand.

On the third objective of this study, which sought to assess the effect of emerging technologies on business logistics operations, the study results indicated that a positive relationship between emerging technologies and online business operations. That is, as online business model tend to use more of emerging technologies, their business operations improves. emerging technologies in the form of big data analytics and and IoT have impacted online business models more that AI and blockchain technology have. Emerging technologies have significant impact on online business models. The

results indicated that for every unit increase in the use of emerging technologies by online businesses, their operations improve by an average of 0.38809. The emerging technologies explain approximately 49% of the variation in online business operations.

In more specific terms, a unit increase in the use of AI by online business models is associated with an average increase of 0.4248 in the effectiveness of their strategic decisions. Again, a unit increase in the use of big data analytics by online business models leads to an average increase of 0.2102 in their understanding of their customers. Moreover, as the use of IoT by online business models increases by one unit, the effectiveness of their supply chain management increases by an average of 0.36204.

The last objective of this study sought to examine the impact of emerging technologies on supply chain management practices. In the light of this, the results of the study showed that that emerging technologies have positive relationship with supply chain management. As they have a significant impact on supply chain management. The results indicated that as supply chain management professional increase their use of emerging technologies by one unit, the effective of their supply chain management practices increases by an average of 0.46647. Overall, emerging technologies explain 53% of the variation in supply chain management practices. More specifically, AI and machine learning, IoT and big data technology have significant impacts on supply chain management practices and together they explain approximately 60% of the variability in supply chain management sustainability.

6.3 Conclusions

This study has examined the role of emerging technologies, AI, IoT, VR, blockchain, and big data, in shaping consumer behaviour, business logistics operations, and supply chain management practices. The findings reveal useful insights into the

varying degrees of consumer familiarity with these technologies, their adoption across industries, and their differential impacts on business performance.

First, the study established that consumers exhibit the highest familiarity with AI, followed by IoT and VR, while blockchain and big data remain relatively less understood. Despite this disparity in awareness, AI and big data emerged as the most widely utilized technologies in both online business and supply chain management, whereas blockchain and VR saw comparatively lower adoption rates. This suggests that while consumer knowledge does not always align with industry adoption, businesses prioritize technologies that offer immediate operational benefits, such as AI-driven analytics and automation.

Second, the research demonstrated that emerging technologies significantly influence consumer behaviour, with AI-powered recommendations and user-friendly websites being the strongest drivers of online shopping activity. Conversely, factors such as brand transparency and environmental consciousness had minimal impact, indicating that convenience and personalization outweigh ethical considerations in immediate purchasing decisions. Regression analyses further reinforced these findings, revealing that a unit increase in consumer familiarity with emerging technologies corresponds to a 1.1314-point rise in online shopping engagement. Notably, AI recommendations alone accounted for a 0.68966 increase in purchase likelihood, underscoring their pivotal role in shaping digital commerce.

Third, the study confirmed a robust positive relationship between emerging technologies and business logistics operations. Big data analytics and IoT were found to have the most substantial impact, enhancing strategic decision-making, customer insights, and supply chain efficiency. The regression model indicated that a unit increase in technology adoption improved business operations by an average of

0.38809, with AI contributing most significantly (0.4248) to strategic effectiveness. These results highlight the transformative potential of data-driven technologies in optimizing online business models.

Finally, the investigation into supply chain management revealed that emerging technologies significantly enhance operational effectiveness, with AI, IoT, and big data collectively explaining 60% of variability in supply chain sustainability. A unit increase in technology adoption was associated with a 0.46647 improvement in supply chain efficiency, emphasizing their critical role in modern logistics.

6.4 Recommendations

Based on the findings of this study, the following recommendations are proposed for businesses, supply chain professionals, policymakers, and future researchers to optimize the adoption and impact of emerging technologies in e-commerce and supply chain management.

Given the significant influence of AI-powered recommendations on consumer purchasing behavior, businesses should prioritize the integration of AI-driven personalization tools into their digital platforms. Investments in machine learning algorithms that enhance product recommendations, dynamic pricing, and targeted advertising can substantially improve conversion rates and customer engagement. Additionally, since user-friendly website design emerged as a key driver of online shopping, companies should focus on optimizing website usability, ensuring seamless navigation, mobile compatibility, and fast load times to enhance the overall customer experience.

Furthermore, the study highlights that big data analytics and IoT contribute meaningfully to operational efficiency and customer insights. Businesses should leverage big data to refine demand forecasting, inventory management, and customer

segmentation, while IoT applications should be expanded for real-time tracking and supply chain visibility. Given the relatively low adoption of blockchain, firms operating in sectors requiring high transparency, such as luxury goods or pharmaceuticals, should explore blockchain for anti-counterfeiting and supply chain traceability.

The findings indicate that AI, IoT, and big data analytics significantly enhance supply chain efficiency and sustainability. Supply chain managers should adopt AI-driven predictive analytics to optimize logistics, reduce lead times, and minimize disruptions. IoT-enabled sensors and RFID technology should be deployed for real-time monitoring of goods in transit, ensuring better inventory accuracy and reduced wastage. Additionally, big data should be utilized for supplier performance analysis and risk management, enabling more resilient supply chains.

Since emerging technologies collectively explain a substantial portion (53%) of supply chain management effectiveness, organizations should invest in upskilling their workforce in data analytics and automation. Training programs and partnerships with technology providers can facilitate smoother integration of these tools into existing operations.

The study reveals that consumer familiarity with blockchain and big data remains low, potentially hindering widespread adoption. Policymakers should support public awareness campaigns and educational initiatives to demystify these technologies, particularly in industries where they offer transformative potential, such as finance, healthcare, and logistics. Additionally, regulatory frameworks should be developed to ensure ethical AI use, data privacy compliance, and cybersecurity in e-commerce and supply chain applications.

Governments and industry associations should also incentivize small and medium-sized enterprises (SMEs) to adopt emerging technologies through grants, tax benefits,

or subsidized training programs. Given the competitive advantage conferred by digital transformation, fostering an ecosystem that supports technological integration will be crucial for economic growth.

While this study provides empirical evidence on the impact of emerging technologies, further research is needed to explore longitudinal effects and industry-specific variations. Future studies could investigate:

i. The long-term consumer trust implications of AI-driven personalization, particularly concerning data privacy.
ii. Sector-specific barriers to blockchain adoption, particularly in industries where transparency is critical.
iii. The role of augmented reality (AR) in e-commerce, as VR showed limited current influence but holds future potential.
iv. Comparative studies across different geographic markets to assess cultural and infrastructural influences on technology adoption.

6.5 Chapter Summary

This chapter presented a summary of the study, key findings, conclusions, and recommendations. Overall, this study contributes to the growing body of literature on digital transformation by empirically validating the profound influence of emerging technologies across multiple business dimensions. The findings suggest that while consumer awareness varies, businesses stand to gain substantial operational and strategic advantages by integrating AI, big data, and IoT into their frameworks. Future research could explore longitudinal effects and sector-specific adoption patterns to further refine these findings. Ultimately, as digital innovation continues to evolve, organizations that strategically leverage these technologies will likely maintain a competitive edge in an increasingly dynamic marketplace.

References

Agrawal, S. (2017). The impact of emerging technologies and social media on different business (es): Marketing and management. *Maximizing Business Performance and Efficiency Through Intelligent Systems*, 37-49. https://doi.org/10.4018/978-1-5225-2234-8.ch002

Akbari, M., & Hopkins, J. L. (2022). Digital technologies as enablers of supply chain sustainability in an emerging economy. *Operations Management Research, 15*(3), 689-710. https://doi.org/10.1007/s12063-021-00226-8

Alazab, M., Alhyari, S., Awajan, A., & Abdallah, A. B. (2021). Blockchain technology in supply chain management: an empirical study of the factors affecting user adoption/acceptance. *Cluster Computing, 24*(1), 83-101. https://doi.org/10.1007/s10586-020-03200-4

Allioui, H., & Mourdi, Y. (2023). Unleashing the potential of AI: Investigating cutting-edge technologies that are transforming businesses. *International Journal of Computer Engineering and Data Science (IJCEDS), 3*(2), 1-12.

Álvarez-Aros, É., & Bernal-Torres, C. (2021). Technological competitiveness and emerging technologies in Industry 4.0 and Industry 5.0. *Anais da Academia Brasileira de Ciencias, 93* 1, e20191290. https://doi.org/10.1590/0001-3765202120191290.

Ameen, N., Hosany, S., & Tarhini, A. (2021). Consumer interaction with cutting-edge technologies: Implications for future research. *Computers in Human Behavior, 120*, 106761. https://doi.org/10.1016/j.chb.2021.106761

Anklam, E., Bahl, M. I., Ball, R., Beger, R. D., Cohen, J., Fitzpatrick, S., ... & Slikker Jr, W. (2022). Emerging technologies and their impact on regulatory science. *Experimental Biology and Medicine, 247*(1), 1-75. https://doi.org/10.1177/15353702211052280

Aryal, A., Liao, Y., Nattuthurai, P., & Li, B. (2020). The emerging big data analytics and IoT in supply chain management: a systematic review. *An International Journal, 25*(2), 141-156.

Attaran, M. (2020, July). Digital technology enablers and their implications for supply chain management. In Supply Chain Forum: *An International Journal 21*(3), 158-172. Taylor & Francis. https://doi.org/10.1080/16258312.2020.1751568

Averina, T., Barkalov, S., Fedorova, I., & Poryadina, V. (2021). Impact of digital technologies on the company's business model. In *E3S web of conferences* 244, p. 10002. EDP Sciences. https://doi.org/10.1051/e3sconf/202124410002

Bazarova, A. A, & Botavina, E. B. (2022). The impact of the digital economy on new business models: the emergence of outsourcing, e-commerce and app stores. *E-Management, 5*(3):83-89. https://doi.org/10.26425/2658-3445-2022-5-3-83-89

Biswal, S., Ganesh, A., & Madhavan, P. (2020). Robotic automation of employee onboarding using neural computing. *International Journal of Scientific & Technology Research, 9*, 353-357.

Buell, R., & Kalkanci, B. (2019). How transparency into internal and external responsibility initiatives influences consumer choice. Harvard Business School Working Papers. https://doi.org/10.2139/ssrn.3385443.

Chauhan, D. R. (2022). *Planning and Real-Time Resource Allocation in Freight Logistics Systems Utilizing Emerging Transportation Technologies* (Doctoral dissertation, Portland State University).

Chia, R. (2017). A process-philosophical understanding of organizational learning as "wayfinding" Process, practices and sensitivity to environmental affordances. T*he Learning Organization, 24*(2), 107-118. https://doi.org/10.1108/TLO-11-2016-0083

Choy, L. T. (2014). The strengths and weaknesses of research methodology: Comparison and complimentary between qualitative and quantitative approaches. *IOSR Journal of Humanities and Social Science, 19*(4), 99-104.

Christopher, M. (2016). *Logistics & supply chain management*. Pearson UK.

Comi, A., & Russo, F. (2022). Emerging information and communication technologies: the challenges for the dynamic freight management in city logistics. *Frontiers in Future Transportation*, 3, 887307. https://doi.org/10. 3389/ffutr.2022.887307

Corbett, D. J., Hall, M., Hanna, L. A., & Barry, H. E. (2023). The ongoing emergence of technology in healthcare to enhance patient outcomes. In *Emerging Drug Delivery and Biomedical Engineering Technologies,* 195-210. CRC Press.

Crossan, F. (2003). Research philosophy: towards an understanding. Nurse Researcher, 11(1), 46.

Davenport, T. H. (2014). *Big data at work: dispelling the myths, uncovering the opportunities*. Harvard Business Review Press.

Davenport, T. H., & Ronanki, R. (2018). Artificial intelligence for the real world. *Harvard Business Review, 96*(1), 108-116.

Demaci, U. (2022). Exploring the impact of emerging technologies on business models, customer behaviour, and workforce implications. *Journal of Management and Administration Provision, 2*(1), 26-34. https://doi.org/10.55 885/jmap.v2i1.185

Dempsey, D., Kelliher, F., Dempsey, D., & Kelliher, F. (2018). Dempsey, D., Kelliher, F., Dempsey, D., & Kelliher, F. (2018). Recurring revenue model in practice. *Industry Trends in Cloud Computing: Alternative Business-to-Business Revenue Models, 139*-183. https://doi.org/ 10.1007/978-3-319-63994-9_8.

Dhandapani, G., & Ramachandran, V. (2021). An IoT-based cloud deployment framework for effective classification of machine conditions. *Internet of Things*. https://doi.org/10.5772/INTECHOPEN.95846.

Dixon, M. F., Halperin, I., & Bilokon, P. (2020). *Machine learning in finance: from theory to practice*. Springer Nature.

Dokku, S. R., Nagamalleswara, V., Srinivas, K., Challa, V. N. S. K., & Narayana, M. S. (2023). Impact of artificial intelligence on the Indian retail industry. *Financial Engineering, 1*, 316-325. Retrieved from https://wseas.com/ journals/fe/2023/a605107-2296.pdf

dos Santos Rocha, C., Magnani, M., Ramos, G. L. D. P. A., Bezerril, F. F., Freitas, M. Q., Cruz, A. G., & Pimentel, T. C. (2022). Emerging technologies in food processing: impacts on sensory characteristics and consumer perception. *Current Opinion in Food Science*, *47*, 100892. https://doi.org/10. 1016/j.cofs.2022.100892

Ekblaw, A., Azaria, A., Halamka, J. D., & Lippman, A. (2016). A case study for blockchain in healthcare: "MedRec" prototype for electronic health records and medical research data. *Proceedings of IEEE Open & Big Data Conference*, 13-15.

Esteva, A., Robicquet, A., Ramsundar, B., Kuleshov, V., DePristo, M., Chou, K., ... & Dean, J. (2019). A guide to deep learning in healthcare. *Nature Medicine, 25*(1), 24-29. https://doi.org/10.1038/s41591-018-0316-z

Goodchild, A., & Toy, J. (2018). Delivery by drone: an evaluation of unmanned aerial vehicle technology in reducing CO2 emissions in the delivery service industry. Transportation Research Part D: *Transport and Environment, 61*, 58-67. https://doi.org/10.1016/j.trd.2017.02.017

Gopal, S., Gupta, P., & Minocha, A. (2023, May). Advancements in fin-tech and security challenges of the banking industry. In *2023 4th International*

Conference on Intelligent Engineering and Management (ICIEM), 1-6. IEEE. https://doi.org/10.1109/ICIEM59379 .2023.10165876

Goswami, U. (2010). Inductive and deductive reasoning. The Wiley-Blackwell Handbook Of Childhood Cognitive Development, 399-419.

Grady, D. G., Cummings, S. R., & Hulley, S. B. (2013). Research using existing data. Designing Clinical Research, 192-204. Retrieved from https://bjcancer.org/ Sites/Uploaded/File/2016/11/3063616094311566789375 8 2961.pdf#page=208

Gubbi, J., Buyya, R., Marusic, S., & Palaniswami, M. (2013). Internet of Things (IoT): A vision, architectural elements, and future directions. *Future Generation Computer Systems, 29*(7), 1645-1660. https://doi.org/10.1016/j.future.201 3.01.010

Gupta, A., & Singh, R. K. (2024). Applications of emerging technologies in the logistics sector for achieving circular economy goals during COVID-19 pandemic: analysis of critical success factors. *International Journal of Logistics Research and Applications, 27*(4), 451-472. https://doi.org/10.1080/ 13675567.2021.1985095

Hanny, R., Nurranto, H., Hubeis, M. A., Rizan, M., & Wibowo, S. F. (2025). The role of search engine optimization in influencing psychological factors in purchasing behavior consumer. *JIM: Journal Of International Management, 4*(01), 1-25. https://doi.org/10.62668/jim.v4i01.1450

Hill, C., Zhang, G., & Miller, K. (2018). Collaborative planning, forecasting, and replenishment & firm performance: An empirical evaluation. *International Journal of Production Economics, 196*, 12-23. https://doi.org/10.1016/J.IJP E.2017.11.012.

Hoffman, D. L., Moreau, C. P., Stremersch, S., & Wedel, M. (2022). The rise of new technologies in marketing: A framework and outlook. *Journal of Marketing, 86*(1), 1-6. https://doi.org/10.1177/00222429211061636

Ingaldi, M., & Ulewicz, R. (2019). How to make e-commerce more successful by the use of Kano's model to assess customer satisfaction in terms of sustainable development. *Sustainability*. https://doi.org/10.3390/su11184830.

Islam, S. M. R., Kwak, D., Kabir, M. H., Hossain, M., & Kwak, K. S. (2015). The Internet of Things for health care: A comprehensive survey. *IEEE Access, 3*, 678-708. https://doi.org/10.1109/ACCESS.2015.2437951

Javornik, A. (2016). 'It's an illusion, but it looks real!' Consumer affective, cognitive and behavioural responses to augmented reality applications. *Journal of Marketing Management, 32*(9-10), 987-1011. https://doi.org/10.1080/0267257X.2016.1174726

Junaid, S. B., Imam, A. A., Balogun, A. O., De Silva, L. C., Surakat, Y. A., Kumar, G., ... & Mahamad, S. (2022, October). Recent advancements in emerging technologies for healthcare management systems: a survey. In *Healthcare 10*(10), 1940. MDPI. https://doi.org/10.3390/healthcare10101940

Kashani, M., Madanipour, M., Nikravan, M., Asghari, P., & Mahdipour, E. (2021). A systematic review of IoT in healthcare: Applications, techniques, and trends. *J. Netw. Comput. Appl., 192,* 103164. https://doi.org/10.1016/J.JNCA.2021.103164.

Kedah, Z. (2023). Use of e-commerce in the world of business. *Startupreneur Business Digital* (SABDA Journal). https://doi.org/10.33050/sabda.v2i1.273.

Keswani, H., & Vlachos, I. (2022). Achieving supply chain resilience through risk management and mitigation discipline. *Proceedings of the International Conference on Industrial Engineering and Operations Managemen*t. https://doi.org/10.46254/an12.20220291.

Kshetri, N. (2018). Blockchain's roles in meeting key supply chain management objectives. International *Journal of Information Management, 39*, 80-89. https://doi.org/10.1016/ j.ijinfomgt.2017.12.005

Kumar, A., Killingsworth, M., & Gilovich, T. (2020). Spending on doing promotes more moment-to-moment happiness than spending on having. *Journal of Experimental Social Psychology, 88*, 103971. https://doi.org/10.1016/j.jesp.2020.103971.

Lee, J., Suh, T., Roy, D., & Baucus, M. (2019). Emerging technology and business model innovation: the case of artificial intelligence. *Journal of Open*

*Innovation: Technology, Market, and Complexity, 5(*3), 44. https://doi.org/10.3390/joitmc5030044

Li, F. (2020). The digital transformation of business models in the creative industries: A holistic framework and emerging trends. *Technovation, 92*, 102012. https://doi.org/10.1016/j. technovation.2017.12.004

Lieberman, S. (2021). Commentary: managing human experience as a core marketing capability. *Journal of Marketing, 85*, 219 - 222. https://doi.org/10.1177/00222 42920973035.

Liu, L., Song, W., & Liu, Y. (2023). Leveraging digital capabilities toward a circular economy: Reinforcing sustainable supply chain management with Industry 4.0 technologies. *Comput. Ind. Eng.*, 178, 109113. https://doi.org/10.1016/j.cie.2023. 109113.

Luo, X., Tong, S., Fang, Z., & Qu, Z. (2019). Frontiers: Machines vs. humans: The impact of artificial intelligence chatbot disclosure on customer purchases. *Marketing Science, 38*(6), 937-947. https://doi.org/10.1287/mksc.2019.1192

Luo, Y., Abidian, M. R., Ahn, J. H., Akinwande, D., Andrews, A. M., Antonietti, M., ... & Chen, X. (2023). Technology roadmap for flexible sensors. *ACS Nano, 17*(6), 5211-5295. https://doi.org/10.1021/acsnano.2c12606

Ma, L., & Sun, B. (2020). Machine learning and AI in marketing – Connecting computing power to human insights. *International Journal of Research in Marketing*. https://doi.org/ 10.1016/j.ijresmar.2020.04.005.

Mosconi, P., Radrezza, S., Lettieri, E., & Santoro, E. (2019). Use of health apps and wearable devices: Survey among Italian associations for patient advocacy. *JMIR mHealth and uHealth, 7*. https://doi.org/10.2196/10242.

Muhammad, N., Yahaya, S., Suleiman, I., Karim, F., & Ago, A. (2023). The Impact of Industry 4.0 on Digital Marketing: Leveraging Emerging Technologies for Business Growth. *International Journal of Academic Research in Business and Social Sciences*. https://doi.org/10.6007/ijarbss/v13-i12/19723.

Nagy, J., Oláh, J., Erdei, E., Máté, D., & Popp, J. (2018). The role and impact of Industry 4.0 and the Internet of Things on the business strategy of the value

chain - The case of Hungary. *Sustainability*. https://doi.org/10.3390/SU101034 91.

Nakamoto, S. (2008). Bitcoin: A peer-to-peer electronic cash system. Retrieved from https://bitcoin.org/bitcoin.pdf Retrieved from https://assets.pubpub.org/d8wct4 1f/31611263538139.pdf

Nand, A., Sohal, A., Fridman, I., Hussain, S., & Wallace, M. (2023). An exploratory study of organisational and industry drivers for the implementation of emerging technologies in logistics. *Industrial Management & Data Systems, 123*(5), 1418-1439. https://doi.org/10.1108/IMDS-08-2022-0467

Napitupulu, N. A., & Hidayat, Z. (2020, August). The influence of online shopping applications, strategic promotions, and hedonist habits on e-shopaholic behaviour. In *2020 International Conference on Information Management and Technology (ICIMTech)*, 922-927. IEEE. https://doi.org/ 10.1109/ICIMTech50 083.2020.9211181

Ngai, E. W., Hu, Y., Wong, Y. H., Chen, Y., & Sun, X. (2011). The application of data mining techniques in financial fraud detection: A classification framework and an academic review of literature. *Decision Support Systems, 50*(3), 559-569. https://doi.org/10.1016/j.dss. 2010.08.006

Novocin, A., & Weber, B. (2022). Emerging technologies and the transformation of exchange trading platforms. https://doi.org/10.3905/jpm.2022.1.390.

Olutimehin, D. O., Ofodile, O. C., Ejibe, I., Odunaiya, O. G., & Soyombo, O. T. (2024). The role of technology in supply chain risk management: Innovations and challenges in logistics. *International Journal of Management & Entrepreneurship Research*, *6*(3), 878-889. https://doi.org/10.51594/ijmer.v6i3. 941

Ovodenko, A. A., Peshkova, G. Y., & Zlobina, O. V. (2020, December). Digital evolution of consumer behaviour and its impact on digital transformation of small and medium business sustained development strategy. In *2nd International Scientific and Practical Conference on Digital Economy (ISCDE 2020)*, 424-428. Atlantis Press. https://doi.org/10.2991/ aebmr.k.201205.071

Pandey, P., & Pandey, M. M. (2021). *Research methodology tools and techniques*. Bridge Center. Retrieved from http://dspace.vnbrims.org:13000/jspui/bitstream/123456789/4666/1/RESEARCH%20METHODOLOGY%20TOOLS%20AND%20TECHNIQUES.pdf

Polit, D. F., & Beck, C. T. (2010). Generalization in quantitative and qualitative research: Myths and strategies. *International Journal of Nursing Studies, 47*(11), 1451-1458. https://doi.org/10.1016/j.ijnurstu.2010.06.004

Purohit, S., Arora, R., & Paul, J. (2022). The bright side of online consumer behaviour: Continuance intention for mobile payments. *Journal of Consumer Behaviour, 21*(3), 523-542. https://doi.org/10.1002/cb.2017

Raghupathi, W., & Raghupathi, V. (2014). Big data analytics in healthcare: promise and potential. *Health Information Science and Systems, 2*(1), 3. https://doi.org/10.1186/2047-2501-2-3

Raji, M. A., Olodo, H. B., Oke, T. T., Addy, W. A., Ofodile, O. C., & Oyewole, A. T. (2024). E-commerce and consumer behaviour: A review of AI-powered personalization and market trends. *GSC Advanced Research and Reviews, 18*(3), 066-077. https://doi.org/10.30574/ gscarr.2024.18.3.0090

Rangaswamy, E., Nawaz, N., & Changzhuang, Z. (2022). The impact of digital technology on changing consumer behaviours with special reference to the home furnishing sector in Singapore. *Humanities and Social Sciences Communications*, *9*(1), 1-10. https://doi.org/ 10.1057/s41599-022-01102-x

Ranta, V., Aarikka-Stenroos, L., & Väisänen, J. M. (2021). Digital technologies catalyzing business model innovation for circular economy—Multiple case study. *Resources, Conservation and Recycling, 164*, 105155. https://doi.org/10.1016/j.resconrec.2020.105155

Rautela, R., Kumar, S., Pandey, S., Prakash, N., Malik, P., & K, A. (2023). Significance of Emerging Technological Advancements in Transition of Green Economy. *2023 IEEE Devices for Integrated Circuit (DevIC)*, 221-224. https://doi.org/10.1109/DevIC57758 .2023.10134956.

Reding, D. F., & Eaton, J. (2020). Science and technology trends 2020-2040. Exploring the S&T edge. *NATO Science & Technology Organization*, 94-103. Retrieved from https://apps.dtic. mil/sti/pdfs/AD1131124.pdf

Riar, M., Xi, N., Korbel, J., Zarnekow, R., & Hamari, J. (2022). Using augmented reality for shopping: a framework for AR induced consumer behavior, literature review and future agenda. *Internet Res., 33,* 242-279. https://doi.org/10.1108/intr -08-2021-0611.

Rickardo, G., & Gladson, V. (2023). Disruptive technologies in supply chain management such as artificial intelligence and blockchain. *World Journal of Advanced Research and Reviews*, *18*(1), 604-608. https://doi.org/10.30574/wja rr.2023.18.1.0656

Riva, G., Baños, R. M., Botella, C., Mantovani, F., & Gaggioli, A. (2016). Transforming experience: the potential of augmented reality and virtual reality for enhancing personal and clinical change. *Frontiers in Psychiatry, 7*, 164. https://doi.org/10.3389/fpsyt .2016.00164

Rogers, D. S., Leuschner, R., & Choi, T. Y. (2020). Supply Chain Management Meets Financial Statements. *World Scientific Book Chapters*, 93-109. https://doi.org/ 10.1142/978178 6348272_0009.

Rosário, A. T., & Dias, J. C. (2023). How has data-driven marketing evolved: Challenges and opportunities with emerging technologies. *International Journal of Information Management Data Insights, 3*(2), 100203. https://doi. org/10.1016/j.jjimei.2023.100203

Saberi, S., Kouhizadeh, M., Sarkis, J., & Shen, L. (2018). Blockchain technology and its relationships to sustainable supply chain management. *International Journal of Production Research, 57*, 2117 - 2135. https://doi.org/10.1080/0020 7543.2018.1533261.

Saberi, S., Kouhizadeh, M., Sarkis, J., & Shen, L. (2018). Blockchain technology and its relationships to sustainable supply chain management. *International Journal of Production Research*, 57, 2117 - 2135. https://doi.org/10.1080/002 07543.2018.1533261.

Savelsbergh, M., & Van Woensel, T. (2016). 50th anniversary invited article - city logistics: challenges and opportunities. *Transportation Science, 50*(2), 579-590. https://doi.org/10. 1287/trsc.2016.0675

Sharma, P., Ueno, A., Dennis, C., & Turan, C. (2023). Emerging digital technologies and consumer decision-making in retail sector: Towards an integrative conceptual framework. Comput. *Hum. Behav., 148*, 107913. https://doi.org/10. 1016/j.chb.2023.107913.

Shekhawat, S. (2022, December). Use of AI and IoT to make retail smarter. In *2022 3rd International Informatics and Software Engineering Conference* (IISEC), pp. 1-5. IEEE. https://doi.org/10.1109/IISEC56263.2022.9998202

Shen, B., Dong, C., Tong, X., & Ngai, E. (2022). Emerging technologies in e-commerce operations and supply chain management. *Electron. Commer. Res. Appl., 55*, 101203. https://doi.org/10.1016/j.elerap.2022.101203.

Simchi-Levi, D., & Wu, M. (2018). Powering retailers' digitization through analytics and automation. *International Journal of Production Research, 56*, 809 - 816. https://doi.org/ 10.1080/00207543.2017.1404161.

Simões, A. C., Rodrigues, J. C., & Ribeiro, S. (2021, June). Impacts on business models resulting from digitalization. In *2021 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC)*, 1-8. IEEE. https://doi.org/10.1109/ICE/ITMC52061. 2021.9570115

Singh, S., Rathore, S., & Park, J. (2020). Block IoT intelligence: A blockchain-enabled intelligent IoT architecture with artificial intelligence. *Future Gener. Comput. Syst., 110*, 721-743. https://doi.org/10.1016/j.future.2019.09.002.

Spilotro, C., Secundo, G., & Del Vecchio, P. (2025). Discovering the impact of emerging technologies on SMEs' digital marketing strategies: a conceptual framework. *International Marketing Review.* https://doi.org/10.1108/imr-11-2023-0301.

Tandon, U., Kiran, R., & Sah, A. N. (2018). The influence of website functionality, drivers and perceived risk on customer satisfaction in online shopping: an emerging economy case. *Information Systems and e-Business Management*, *16*, 57-91. https://doi.org/10. 1007/s10257-017-0341-3

Trabucchi, D., Buganza, T., & Pellizzoni, E. (2017). Give away your digital services: Leveraging big data to capture value new models that capture the value embedded in the data generated by digital services may make it viable for companies to offer those services for free. *Research-Technology Management, 60*(2), 43-52.

Tripathi, P. K., Deshmukh, A. K., & Nath, T. (2023). Emergent technologies for supply chain risk and disruption management. In *Supply Chain Risk and Disruption Management: Latest Tools, Techniques and Management Approaches*, 73-94. Singapore: Springer Nature Singapore. https://doi.org/10. 1007/978-981-99-2629-9_4

Turgay, S., & Erdoğan, S. (2023). Enhancing trust in supply chain management with a blockchain approach. *Journal of Artificial Intelligence Practic*e. https://doi.org /10.23977/jaip.2023.060609.

Tyrväinen, O., Karjaluoto, H., & Saarijärvi, H. (2020). Personalization and hedonic motivation in creating customer experiences and loyalty in omnichannel retail. *Journal of Retailing and Consumer Services, 57*, 102233. https://doi.org/ 10.1016/j.jretconser.2020.102233.

Varriale, V., Cammarano, A., Michelino, F., & Caputo, M. (2021). Sustainable supply chains with blockchain, IoT and RFID: A simulation on order management. *Sustainability*. https://doi.org/10.3390/SU13116372.

Waheed, A., & Yang, J. (2018). Achieving consumers' attention through emerging technologies: The linkage between e-marketing and consumers' exploratory buying behavior tendencies. *Baltic Journal of Management, 13*, 209-235. https://doi.org/10.1108/BJM-04-2017-0126.

Wu, F., Wu, T., & Yuce, M. (2018). An Internet-of-Things (IoT) network system for connected safety and health monitoring applications. *Sensors (Basel, Switzerland), 19*. https://doi.org/10.3390/s19010021.

Xiong, Y. (2022). The impact of artificial intelligence and digital economy consumer online shopping behaviour on market changes. *Discrete Dynamics in Nature and Society*, *2022*(1), 9772416. https://doi.org/10.1155/2022/9772416

Yang, G. Z., Nelson, B. J., Murphy, R. R., Choset, H., Christensen, H., Collins, S. H., ... & McNutt, M. (2017). Combating COVID-19—the role of robotics in managing public health and infectious diseases. *Science Robotics, 5*(40), eabb5589. https://doi.org/10.1126/scirobotics .abb5589

Yang, M., Fu, M., & Zhang, Z. (2021). The adoption of digital technologies in supply chains: Drivers, process and impact. *Technological Forecasting and Social Change, 169*, 120795. https://doi.org/10.1016/j.techfore.2021.120795

Zbakh, M., Bakhouya, M., Essaaidi, M., & Manneback, P. (2018). Cloud computing and big data: Technologies and applications. *Concurrency and Computation: Practice and Experience, 30*. https://doi.org/10.1002/cpe.4517.

Zhang, Y. (2023). Fintech: Exploring the digital transformation of banking & financial services. *BCP Business & Management, 46*(1), 85-91.

Zhao, Y., Zhou, Y., & Deng, W. (2020). Innovation mode and optimization strategy of B2C E-Commerce logistics distribution under big data. *Sustainability*. https://doi.org/10.3390/ su12083381.

Zheng, Z., Xie, S., Dai, H., Chen, W., Chen, X., Weng, J., & Imran, M. (2019). An overview on smart contracts: Challenges, advances and platforms. *Future Gener. Comput. Syst., 105*, 475-491. https://doi.org/10.1016/j.future.2019.12.019.