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Factors influencing Information
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Getambu, Sofia
Strathmore Business School
Strathmore University

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**FACTORS INFLUENCING INFORMATION COMMUNICATION TECHNOLOGY
ADOPTION AMONG LOGISTICS AND TRANSPORT FIRMS IN NAIROBI,
KENYA**



**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR MASTER IN BUSINESS ADMINISTRATION,
STRATHMORE UNIVERSITY.**

NOVEMBER 2020

DECLARATION

This research is my original work and has not been submitted for examination in any other institution.

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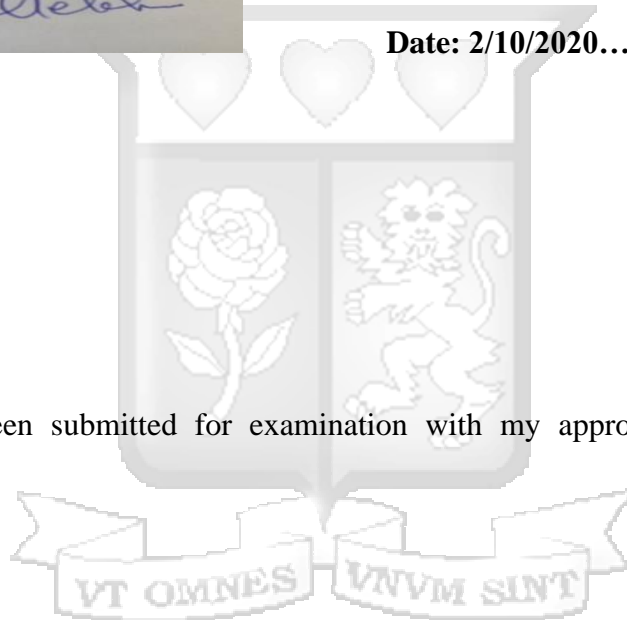
Sofia Getambu

MBA/111546

Sign:  **Date:** 2/10/2020.....

Approval

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



DR. FRED OGOLA

LECTURER

STRATHMORE UNIVERSITY

Sign:  **Date:** 22/10/2020.....

ABSTRACT

Globalization has transformed the world's economy. The steady growth in world economies has tremendously increased industry's demand for the rapid and timely delivery of goods. Transport and logistics is considered the lifeline of many economies as it facilitates globalisation by feeding into all other industries by delivering people and products where they are needed and thereby increasing the overall national outputs. Due to globalisation and increased trade in the world brought about by ICT and the increased use of the internet, there have been enormous growth and innovation in the ICT sector affecting all industries worldwide that are bringing great benefits to companies; however, the transport and logistics firms tend to be slow in the uptake of these technologies. Organizations stand to gain enormously upon adoption of ICT in terms of efficiencies and effectiveness of their operations. The transport and logistics industry is a vibrant sector in the economy can greatly benefit from the adoption of ICT. However, despite the growth and known impact of ICT, the transport and logistics sectors seem to have low adoption rates. To the best of our knowledge, there is little empirical literature identifying the main barriers to ICT adoption specifically in the logistics and transport industry. In the current environment, where a global pandemic has devastated the logistics industry, it was critical to conduct this study and enhance available empirical evidence. This study sought to investigate the extent of information technology and communication adoption in logistic firms and identify the factors that influence ICT adoption among logistics firms in Nairobi, Kenya. Specifically, the study sought to establish the effect of government factors, resource capability, management capability, and organization structure on ICT adoption. The research was grounded on the diffusion of innovation theory and the technology, organization, and environment framework. This study employed a positivism research philosophy with descriptive research being adopted. The study sample, as calculated by the Yamane formula, was 260 logistics firms with one senior-level manager being considered as the unit of observation. The final sample for the study was 240 respondents, with 20 participants being considered during the pre-test of the research instrument. The study relied on primary data that was collected using structured questionnaires. The collected data was edited and coded into SPSS for statistical analysis. The study relied on both descriptive and inferential analysis. The results were presented graphically in line with the objectives of the research. The study results showed there is a positive and significant correlation between government factors, resource capability, management capability, and organization structure on the ICT adoption. The regression results established that 62.2% of the changes in ICT adoption are determined by the government factors, resource capability, management capability, and organization structure. The research concluded there is a positive and significant influence of government factors, resource capability, management capability, and organization structure on the ICT adoption. The study recommended that the management team within the firms should improve their financial resource mobilization, recruitment of qualified employees, invest in modern technological infrastructures and enhance the delegation of duty to staff. The research also recommended that policy-wise the government should improve the business environment and provide incentives through regulations to improve competitiveness and ICT adoption within transport and logistic firms.

TABLE OF CONTENTS

DECLARATION	ii
ABSTRACT	iii
LIST OF TABLES	viii
LIST OF FIGURES	ix
DEFINITION OF TERMS	x
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background to the Study.....	1
1.1.1 Institutional Factors	3
1.1.2 Information Communication Technology Adoption	5
1.1.3 Logistics Firms in Kenya.....	7
1.2 Statement of the Problem.....	8
1.3 Objectives of the Study	10
1.3.1 Specific Objectives	10
1.4 Research Questions	10
1.5 Scope of the Study	11
1.6 Significance of the Study.....	11
CHAPTER TWO	12
LITERATURE REVIEW	12
2.1 Introduction.....	12
2.2 Theoretical Review	12
2.2.1 Diffusion of Innovations Theory	12
2.2.2 Technology Organization Environment Theory	13
2.3 Empirical Review.....	14
2.3.1 Extent of ICT Adoption among Transport and Logistics firms.....	14
2.3.2 Effect of ICT Adoption on Transport and Logistics firms	15

2.3.3 Barriers to ICT Adoption among Transport and Logistics firms.....	17
2.4 Research Gaps.....	22
2.5 Conceptual Framework.....	24
2.6 Chapter Summary	26
CHAPTER THREE.....	27
RESEARCH METHODOLOGY	27
3.1 Introduction.....	27
3.2 Research Philosophy	27
3.2.1 Research Design.....	27
3.3 Population and Sampling	27
3.3.1 Target Population.....	27
3.3.2 Sampling Design and Sample Size	28
3.4 Data Collection Instruments	28
3.5 Data Collection Procedures.....	29
3.6 Research Quality	29
3.6.1 Reliability Tests of Research Instruments	29
3.6.2 Validity Tests of Research Instruments	30
3.7 Data Analysis and Presentation	30
3.8 Ethical Considerations	31
CHAPTER FOUR.....	32
PRESENTATION OF RESEARCH FINDINGS.....	32
4.1 Introduction.....	32
4.2 Response Rate	32
4.2.1 Background Information.....	32
4.2.2 Factors affecting ICT Adoption	33
4.3 Descriptive Analysis	35
4.3.1 Government Factors.....	35

4.3.2 Resource Capability	36
4.3.3 Management Capability	37
4.3.4 Organization Structure	38
4.3.5 ICT Adoption	39
4.4 Correlation Analysis	40
4.5 Regression Analysis.....	41
4.5.1 Regression Assumptions	43
CHAPTER FIVE	45
DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS	45
5.1 Introduction.....	45
5.2 Summary	45
5.3 Discussion of Results.....	46
5.3.1 Government Factors and ICT Adoption	46
5.3.2 Resource Capability and ICT Adoption.....	46
5.3.3 Management Capability and ICT Adoption.....	47
5.3.4 Organization Structure and ICT Adoption.....	48
5.4 Conclusions.....	48
5.5 Recommendations.....	49
5.5.1 Policy Implications	49
5.5.2 Practical Implications.....	49
5.5.3 Theoretical Implications	50
5.6 Limitations of the study	50
5.7 Further Research	51
REFERENCES.....	52
APPENDICES	50
Appendix I: Informed Consent Form.....	50
Appendix II: Questionnaire.....	53

Appendix III: NACOSTI Permit.....60

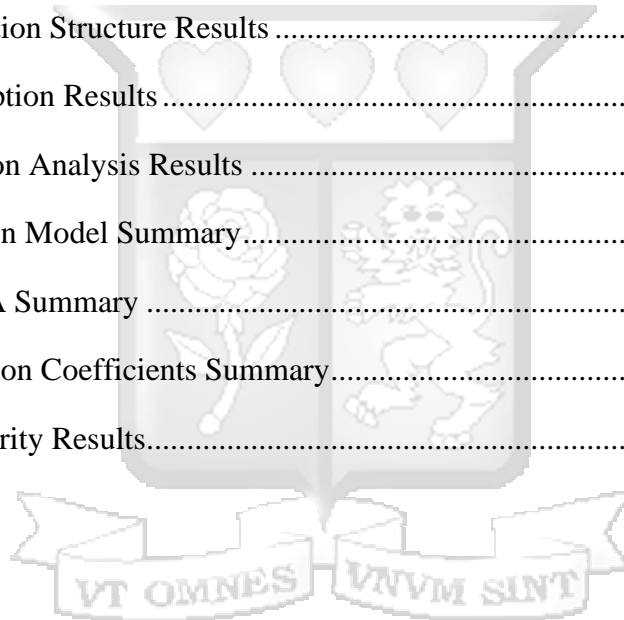
Appendix IV: Ethical Review Authorization Letter61

Appendix V: List of Logistics and Transport Firms62



LIST OF TABLES

Table 2.1 Summary of Research Gaps.....	23
Table 2.2 Operationalization of Research Variables	25
Table 3.1 Reliability Results.....	30
Table 4.1 Demographic Information.....	32
Table 4.2 Factors Affecting ICT Adoption.....	34
Table 4.3 Government Factors Results	35
Table 4.4. Resource Capability Results	36
Table 4.5 Management Capability Results	37
Table 4.6 Organization Structure Results	38
Table 4.7 ICT Adoption Results	39
Table 4.8 Correlation Analysis Results	40
Table 4.9 Regression Model Summary.....	41
Table 4.10 ANOVA Summary	42
Table 4.11 Regression Coefficients Summary.....	42
Table 4.12 Collinearity Results.....	43



LIST OF FIGURES

Figure 2.1 Conceptual Framework25

Figure 4.1 Normal P-P Plot.....44



DEFINITION OF TERMS

Adoption

This is the act or process of beginning to use something new or different activity from what you have been doing before (Ghobakhloo & Tang, 2013).

Institutional factors

These are internal aspects of an organization that has a direct influence on the implementation of the various functions. This study focused on resource capability, organization structure, and management capabilities (Gupta, Bhaskar, & Singh, 2016).

Management Capabilities

This refers to the competencies of the management in coordinating human resource and capital towards accomplishing predetermined objectives using the resources in an efficient and effective manner (Mambo, Ombui, & Kagiri, 2015).

Organizational Structure

Organizational structure determines how the roles, power, and responsibilities are assigned, controlled, and coordinated, and how information flows between the different levels of management (Maingi, Awino, K'Obonyo, & Pokhariyal, 2019).

Resource allocation

Resource allocation includes managing tangible assets such as hardware to make the best use of softer assets such as human capital (Nega, 2019).

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

In the modern business environment, companies operate in extremely dynamic environments, with increased uncertainty and fierce competition. This has pushed multiple companies to search for new sources of competitive advantage. Rapid technological developments are constantly offering new ways for businesses to adopt innovative strategies to ensure high performance. While in the past technological developments empowered manufacturing industries, the development of software has led to the empowerment of the services sectors in the communication ae, also referred to as the digital age (Park & Koh, 2017). Technological innovation in services is often based on the adoption of information and communication technology (ICT) and is strongly associated with higher levels of productivity in firms (Evangelista, McKinnon, & Sweeney, 2013).

Technology is changing how people communicate, connect, and discover, thereby enabling businesses to create new business opportunities while enhancing their current business processes (Solis, 2014). Indeed, technology has simplified our lives in several ways, including providing on-the-go services, internet of things, easy access to information, improved entertainment services, advanced communication tools, encouraged creativity, talent, and innovations, ultimately enhancing productivity and efficiency. Moreover, social networking applications and other Information and Communication Technology (ICT) based innovations are is enabling organizations to enhance their business models by introducing new innovative business approaches, thereby enabling them to create more value for their customers (Njanja, 2016).

Elseoud (2014) noted that the world has witnessed rapid advancements in internet technology with numerous innovations leading to the emergence of new business models, goods, and markets, including the use of electronic instruments in business transactions (e-commerce) and other organizational needs. The growth of the internet social media platforms such as Facebook, WhatsApp, Air BnB, and UBER attests to the extent to which technological changes have impacted on the way we do business and associate disruptions therein. As a result, businesses are coming to terms with the fact that to survive and remain competitive in their different environments, they need to be able to aptly adapt to the rapidly evolving technological and business changes (Latzer, 2009).

In the field of freight transport and logistics, significant developments have been realized in terms of innovative systems and technical infrastructures that support business activities. ICT has shown the potential to reduce costs and improve customer service, thereby enhancing overall competitive advantage. It has been useful in transforming channels of communication between different parties resulting in enhanced coordination within the management, customers, and suppliers. Schönberger, Kopfer, and Kotzab (2013) note that successful adoption of ICT technologies results in reduced costs through optimization of transport operations and improved safety and tracking capabilities. According to Giannopoulos (2004), ICT is the primary enabler of safe and efficient transport between places around the world. Smart car navigation systems and fleet management systems are becoming a common feature in modern businesses. The smooth flow of information has also been enhanced with the proliferation of mobile devices and the internet, thereby improving communication channels within logistics firms.

Wang, Han, and Beynon-Davies (2019) note that the freight transport and logistics sector is experiencing a new wave of digital technologies, which is significantly enhancing the computing power of these firms. The study identified the following emergent technologies cloud computing, Internet of Things (IoT), Social media networks, artificial intelligence (AI), big data analytics, immersive technologies, and distributed ledger technology. These technologies enable smart and digitalized applications and support various practical, sector-specific activities, such as digital rail, smart motorways, and smart port programs.

Companies may fail to reap the benefits of ICT due to institutional challenges they may face in the implementation of various technologies, for example, the people aspect, management skills, and organizational structure that may not support the implementation of the same. As Solis (2014) pointed out, the real threat or opportunity with technological disruption lies in the evolution of employee behavior, values, and expectations towards enabling it to be adopted and thus work in the organization.

These innovations have expanded the capabilities of multiple companies, and as such, Electronic commerce (E-commerce) business practices, upon which ICT adoption thrives, have been identified as drivers of organizational success with significant potential benefits, including improvement in management and operational efficiency, increased revenue, and a source of competitive advantage (Dan, 2014), necessitating the integration of all organs in an

organization to add value (Evangelista & Sweeney, 2003). This study seeks to examine the factors affecting the adoption of ICT in the transport and logistics firms in Kenya.

1.1.1 Institutional Factors

Gupta, Bhaskar, and Singh (2016) defined institutional factors as internal aspects of an organization that has a direct influence on the implementation of the various functions. Okorley and Nkrumah (2012) define institutional factors as those factors in an organization that have a direct impact on the operations of a firm. Hardy and Williams (2011) indicated that the key institutional factors affecting the implementation of new technologies are employee competencies and resource capacity. Human resource is a critical factor in the attainment of organizational goals because all organizational activities are initiated and determined by the persons who make up that institution and depend on human effort and direction.

Eadie, Perera, and Heaney (2010) identified the characteristics of the top management as a factor influencing technology adoption. They stated that management is in charge of assessing the firm needs, identifying its capabilities and weaknesses, setting the vision and mission, and formulating a strategy aimed at meeting these targets whilst optimizing the available firm resources. World Bank (2013) noted that an effective management system would ensure that the firm has the best capabilities in place to ensure that it meets its core goals, and as such, they play a key role in determining the extent to which a company will adopt new technologies.

Yeng, Osman, Haji-Othman, & Safizal (2015) noted that the adoption rate is low among small businesses due to limited resources, the ownership structure, focus on short-term priorities, internal operations, and poor infrastructural support. In a study covering developing countries Dan (2014) noted that contextual factors, which include lack of access to appropriate ICT infrastructure for e-commerce, inadequate financial resources, a hostile regulatory environment, poor understanding of long-term business goals, contributed to the low adoption rate by small businesses. Jahongir and Shin (2014) argued that the challenges encountered by developing countries were much more than those in developed countries, which had advanced e-commerce policies and infrastructure, thus facilitating ICT adoption. It was, therefore, good to find out if these assertions also applied to Kenyan small businesses.

Melitski, Gavin, and Gavin (2010) found out that there exists a relationship between individual perception of organizational culture and individual willingness to adopt the technology. Their study concluded that organizational culture shapes how organizations choose to use technology. Moraa & Mwangi (2012) agreed that fostering an enabling culture within

organizations is paramount to enabling businesses to adopt and use ICT innovation as they strive to adapt to the rapidly changing business environment.

Depending on the technology or the country, ICT is likely to either have a low or high impact on an organization. Yeng, Osman, Haji-Othman, and Safizal (2015) investigated e-commerce adoption among SMEs in Malaysia and found that organizational context and technological context influenced e-commerce adoption among firms, whereas environmental context had no influence. Al-Bakri and Katsioloudes (2015) indicated that in Jordan, external pressure from trading partners and competitors were the main drivers of ICT adoption. Agwu and Murray (2015) found that many business owners in Nigeria do not comprehend the full impact of e-commerce on their businesses and, as such, did not bother to incorporate e-commerce practices into their day-to-day operations.

Njanja (2016) found out that 54% of Small and Medium Enterprises (SMEs) had adopted ICT. However, the report also found out that most of them were unable to find solutions that fit into their business environments. Besides, the report highlighted a slow rate of ICT adoption among such enterprises owing to the lack of awareness about the existence of available solutions. A study was done by Kibuchi (2011) on the effective management of transportation companies showed that the relationship between unrelated diversification and harmonization of organizational structure was positive while it was negative for vertical integration.

The above literature shows the importance of effective management of institutional factors in ensuring that the firm accomplishes its objectives. Institutional factors are not singular but evolve with time and are determinants of the competitive positioning of the firm. This study sought to conceptualize institutional factors as government factors, management capabilities, resource capabilities, and organizational structure. Government factors are those political decisions that dictate how businesses should operate (Tran & Nguyen, 2019). Since all organizations are required to operate within the limits of the law, these factors can have a positive and negative influence on business operations. They are key determinants of technology assimilation, influence the socio-economic environment, and also have influence over new product and service development. These factors include bureaucracy, corruption level, tariffs and regulations, government stability, import and export restrictions, and competition regulation. This study conceptualizes government factors in terms of taxation policies, business regulations, licensing requirements, and the business operating environment.

Management capabilities are the capabilities of managers to build, integrate, and reconfigure the resources and competencies of the firm to gain a competitive advantage (Ying, Hassan, & Ahmad, 2019). Management capabilities encompass the manager's decision-making ability, acquired skills and competencies, work experience, communication. Multiple studies have identified the role of management capabilities in building strong organizational competencies (Anwar, Khan, and Shah, 2018; Nouman, Taj, and Gul, 2017; Khattak & Shah, 2020). Resource capability is the firm's capacity to transform its tangible and intangible resources resulting in value generation (Musabila, 2012). Resource capability is key to enabling firms to integrate new technologies into their operations (Ahmady, Mehrpour, & Nikooravesh, 2016). A firm's innovative performance has been closely linked with management capability and resource capability. This is because these two aspects are key to ensuring that the firm makes efficient use of resources to foster firm performance. This study will investigate resource capability in terms of innovative capacity, the purchasing power of ICT resources, human resources, infrastructural capacity, and IT knowledge.

The organization structure is the overall systems and processes of control within an organization. It is the process that guides people and groups towards relations on jobs, systems, operating processes, and pre-determined duties and methods of coordination (Monavarian, Asgari, & Ashna, 2007). This study assessed the organizational structure as the control and coordination, level of decentralization, flexibility, and formalization of processes. The above factors are the key institutional factors that assess a firm's level of preparedness and capacity to integrate new technologies.

1.1.2 Information Communication Technology Adoption

Fasanghari M, Roudsari, and Chaharsooghi (2008) define Information & Communication Technology (ICT) is an umbrella term which encompasses any communication application or devices such as radio, cellular phones, television, computer software and hardware, software satellite systems and their application in various firms for various use. ICTs are all those electronic technologies that are capable of accepting data in forms such as texts, voice, graphics, or videos for processing to produce information for decision making. Kushwaha (2011) also defines ICTs as technologies and tools that people use to share, distribute, and gather information to communicate with one another, one on one, or in groups, through the use of computers and interconnected networks. At the basic level, ICT is concerned with storage, retrieval, manipulation, transmission, and receipt of digital information. It also focuses on how these different aspects relate and work with each other.

Great leaps in networking, microsystems, and electronics have fuelled the rapid development and diffusion of ICT into everyday lives. ICT provides new solutions that trigger a range of new developments in business this boosting competitiveness, supporting business growth, and creating jobs (Shoemaker, Rainey III, & Wilson, 2012). ICT adoption is the integration of these technologies into everyday firm operations. It is important to understand the importance of Information Technology in an organization because it is the only way to ensure that the firm benefits from its inclusion in the firm's daily operations. Further, these benefits include an increase in efficiency, effectiveness, and productivity, and these benefits can only be realized if the users of these systems utilize them appropriately (Bhattacharjee & Sanford, 2008). Organizational investments in information technology have increased significantly. These investments may be made with the aim of improving individual performance, but this consequently contributes to the overall success of the organization (Jayamaha, 2008). Over time many companies are continuously realizing the benefits of ICT and are increasingly adopting ICT to ensure their survival and to increase competitive advantage within their various sectors.

The rapid change in technology, products, processes, increased levels of competition, and globalization have made it necessary for businesses around the world to adopt new practices in order to increase their chance of survival and to gain an edge over their competitors (Lawrence, 2013). ICT has become critical in organizations to break down geographical barriers, increase their markets, beat the competition, and improve their processes in order to survive the global competition and key in this area is e-commerce. Said & Azizan (2013) noted that emergent technologies are among the emerging trends in business, and they involved the use of the internet in carrying out business transactions. They further stated that emergent technologies had been used to enhance customer experience, which is one of the strategies that enhance an institution's core competencies. Wanjau, Macharia, & Ayodo (2012) pointed out that ICT innovations facilitate electronic funds transfer, supply chain management, internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems.

In order for businesses to create money and build financial strength, they must engage in the selling and promotion of their goods and services. As such, ICT integration has enabled e-commerce, which has taken the forefront in organizations' drive in ICT adoption because, at the end of the day, companies must sell to sustain their operations. The adoption of e-commerce involves the adoption of technologies aimed at carrying out low-level tasks to the

use of advanced and integrated technologies to accomplish sophisticated commercial transactions (Alton, Mausam, Beh, & Hong, 2011). Al-Somali, Gholami, and Clegg (2015) formulated a three-stage model for e-commerce adoption, stage one being non-interactive e-commerce adoption; the second stage is interactive e-commerce adoption, and the third stage is the stabilized e-commerce adoption. In the third stage, integration has advanced to the point where customers are able to shop and purchase products and services from online platforms. These technological developments are transforming how businesses survey the environment, store their information, handle communication channels, develop and market their products, manage their inventory, and attain sustainable competitive advantage within various firms in Kenya. This study operationalized ICT adoption in terms of inventory management, digital marketing capacity, electronic data interchange, and e-commerce applications.

1.1.3 Logistics Firms in Kenya

Kenya is a critical facilitator of trade in East Africa, serving as a gateway for both imports and exports. Kenya serves Rwanda, Tanzania, Uganda, and South Sudan, with most of the goods traveling through the Mombasa port, which is the main port of the country. The port serves as a hub for international trade in East and Central Africa. This has resulted in diversification and specialization of services offered in the logistics industry, including freight forwarding, customs clearance, sea and air freight, warehousing, project cargo, and part logistics, large courier services alongside smaller firms (East African Logistics Performance Survey, 2012).

The industrial body charged with managing the sector is the Kenya International Freight and Warehousing Association, under the Ministry of Transport. Out of 155 countries, the World Bank's Logistics Performance Index places Kenya at 122, with a 2.43% score (Macharia, Iravo, Ondabu, & Ombui, 2015). The country has, over the years, recorded an increase in the number of international companies, as noted by the World Bank report on the Easy to Do Business Index (2017), which saw Kenya ranked as 92nd most attractive country and 3rd most improved economy. Infrastructural development in the five years between 2013 and 2017 has increased the accessibility of most parts of the country, with more than 12000km of road reportedly being constructed or repaired. This development serves as a call to all foreign companies to invest in the country.

More recently, Kenya Airways (KQ) was authorized to travel directly to the United States via New York City, opening a window of opportunity to logistics firms and increasing trade between the US and Kenya. In 2017, Kenya exported goods worth KES43 billion to the United States, which, in turn, imported goods with a KES47 billion valuation (Kimiti, Chepkwony,

Lagat, & Bonuke, 2019). The Kenyan government is dedicated to increasing the attractiveness of the country to investors and hopes that expanding the volume of these goods would act as a more effective incentive to logistic firms. The construction of the modern port in Lamu and the completion of the Standard Gauge Railway (SGR) serve to increase the country's capacity to handle much larger volumes of goods at the port since these are additional entry points (Macharia, Iravo, Ondabu, & Ombui, 2015). The few examples provide clear evidence that transport and logistics firms play an important role in the country's economic development.

However, the penetration of these technologies in the Kenyan market is still in the early stages of development. Further, despite the potential benefits of ICT usage, a number of studies suggest that the level of ICT adoption among logistics firms in the country has not kept pace with the rapid technological advances, meaning that the firms are unable to properly attest to the benefits of ICT integration. Tellis and Sood (2011) posit that logistics companies are struggling to employ technological innovations in facilitating business success. Bruno, Esposito, Genovese and Gwebu (2011) post that financial power leads to unequal access to ICT usage resulting in a huge digital divide. Larger firms have a higher capacity to accommodate and integrate the latest and more sophisticated technologies, therefore realizing substantial benefits, especially in large markets where competition is more aggressive (Kossai, de Souza, Zaied, & Nguyen, 2020). Further findings by Mutua, Oteyo, and Njeru (2013) on the extent of ICT adoption by SMEs in Kenya indicated that more than 80% of SMEs in the region did not have a viable ICT adoption strategy. This significantly impacts their ability to adopt emerging ICT practices. ICT integration is more than a factor of acquisition of requisite IT infrastructure. Having a strategic roadmap for e-commerce implementation may help SME business owners/managers succeed in their e-commerce ventures.

1.2 Statement of the Problem

In recent years, ICTs have facilitated increased innovation within different sectors. There is a wide variety of ICT applications for the logistics and transport sector, including transportation management, management planning, supply chain execution applications for a real-time sharing of information, automation of firm processes, and fleet and freight management solutions. Tsai and Cheng (2012) articulate that ICT adoption improves a firm's transactional

capability and options through geographical breakdown boundaries, promoting access to global markets. The adoption of e-commerce by a business is not only expected to generate positive returns but also to improve the business to customer relationships (Al-Somali, Gholami, & Clegg, 2015). Wang (2019) notes that while recent technical advances have made digital connectivity more flexible and less costly, it has also resulted in the emergence of complexities and difficulties for organizations regarding the form of electronic links and relationships management both between customers and various supply-chain partners. This points to the need for logistics firms to have the ability to manage a portfolio of ICT systems as a necessary strategic capability for users and providers of freight and logistics services and the key to assuring the effective flow of information and materials in supply chains. Yeng, Osman, Haji-Othman, and Safizal (2015) argue that understanding the critical factors that influence e-commerce adoption among businesses could help both firms that have adopted e-commerce and aspiring SMEs to focus on these factors to ensure successful adoption. This calls for a deeper understanding of the key factors influencing the adoption of e-commerce.

The local transport and logistics industry has faced increased competition from global leaders in the business, which has led to many of the firms remaining in financial distress and innovative ways to improve competitiveness (Kimitei, Chepkwony, Lagat, & Bonuke, 2019). Mutua, Oteyo, and Njeru (2013) indicate that over 60% of local firms have failed in the integration of e-commerce due to a lack of strategic planning and internal firm factors. Low ICT adoption has led to financial challenges and operational challenges within the industry (Mangala & Moronge, 2019). Zailani, Iranmanesh, Nikbin, and Jumadi (2014) found a link between firm factors and the environmental outcomes of green technology innovation adoption. Ayugi (2007) examined the effectiveness and efficiency of the supply chain model in Wrigley's East Africa. He indicated that efficient supply chain activities would increase the organization's performance significantly. Omotayo (2016) studied factors influencing the adoption of ICT among logistics firms and revealed that effective management, communication, and benchmarking practices improve ICT adoption. Mutumba (2018) studied factors influencing the adoption of financial technology by tier 4 microfinance institutions and found out that SACCO size and availability of ICT infrastructure were key predictors. Ajobo (2016) reported that the prevailing business environment, corruption, lack of focussed policies, access to electricity, and internet inhibition were the government factors that influence ICT adoption. Mambo, Ombui, and Kagiri (2015) reported that within government institutions, the

characteristics of the management are the main drivers of the adoption of e-government programs.

The literature on ICT adoption in Kenya has focussed on benefits competition, challenges, and drivers (Kimitei, Chepkwony, Lagat and Bonuke, 2019; Mutua, Oteyo and Njeru, 2013; and Omotayo, 2016). These challenges call for effective policy intervention and infrastructure development to ensure the logistics sector remains competitive in the global marketplace. However, the above studies failed to focus on specific factors that influence ICT adoption among logistics firms in Kenya. The slow rate of adoption of ICT technologies is an indicator that firms in developing countries are still facing challenges in integrating performance-enhancing measures. This study sought to identify the challenges to ICT adoption and identify the key factors that push logistics companies to adopt ICT technologies in Kenya. This research sought to expand available knowledge by examining the institutional factors influencing ICT adoption within transport and logistic firms in Nairobi, Kenya.

1.3 Objectives of the Study

The general objective of the study was to examine the factors influencing ICT adoption within logistics and transport firms operating in Nairobi County, Kenya

1.3.1 Specific Objectives

- i. To establish the effect of government factors on ICT adoption among logistics and transport firms in Nairobi County, Kenya
- ii. To establish the effect of management capabilities on ICT adoption among logistics and transport firms in Nairobi County, Kenya
- iii. To establish the effect of resource capability on ICT adoption among logistics and transport firms in Nairobi County, Kenya
- iv. To establish the effect of organization structure on ICT adoption among logistics and transport firms in Nairobi County, Kenya

1.4 Research Questions

- i. What is the effect of government factors on ICT adoption among logistics and transport firms in Nairobi County, Kenya?
- ii. What is the effect of management capabilities on ICT adoption among logistics and transport firms in Nairobi County, Kenya?
- iii. What is the effect of resource capability on ICT adoption among logistics and transport firms in Nairobi County, Kenya?

- iv. To what extent does organization structure have on ICT adoption among logistics and transport firms in Nairobi County, Kenya

1.5 Scope of the Study

This study was geographically limited to the examination of transport and logistic firms operating in Nairobi County, Kenya. The conceptual study framework focused on an examination of the institutional factors that influence ICT adoption. Theoretically, the study was limited to the innovation diffusion theory and the technology, organization, and environmental framework. The study was grounded on a quantitative research approach that employed a descriptive research design. The unit of analysis of the study was the 742 transport and logistics firms in Kenya. The study time scope was limited to a snapshot review of ICT adoption in the industry in the year 2020. The study focused on transport and logistics firms operating in Nairobi County, Kenya. As the capital city, Nairobi has been positioned as a key regional hub in the transport and logistics sector; hence the results of this study were generalized to other areas.

1.6 Significance of the Study

With the recent pandemic (COVID-19) spreading across the globe and the critical role logistic firms serve towards global connectivity, this study is expected to raise awareness on the instrumental role adoption of ICT practices in the logistics industry. The study was beneficial to the management team of transport and logistics firms in identifying how various governmental and institutional factors can be key to improving information communication technology adoption. The findings will further help the firms in identifying the key barriers to information communication technology adoption within the industry. Industry players will find this study important when identifying the key benefits of information communication technology adoption as well as identifying policy loopholes that can be leveraged to improve the current status of information communication technology adoption. The study gives perspective to global participants in the industry, painting a clear image of the level of adoption of ICT practices in logistics firms and the potential of the sector in Kenya. The results of the study were integral in filling the empirical gaps, thus will contribute to the existing literature on ICT adoption among small businesses in developing economies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter sought to critically review the literature related to the constructs of the research. The chapter focused on a review of relevant theories to study themes, a review of empirical studies, the gaps of the research, and the conceptual framework depicting the interaction between the study variables.

2.2 Theoretical Review

This section provides an overview of the theories adopted by the researcher. The section focussed on the diffusion of innovations theory, developed by Rogers in 1962, and the technology organization environment theory contemplated in 1990 (Tornatzky & Fleischer, 1990). The diffusion of innovations theory was key in determining the factors that drive ICT adoption and the extent to which ICT had been adopted in logistics firms, while the technology organization framework was instrumental in identifying the institutional factors that determine ICT adoption within logistics firms.

2.2.1 Diffusion of Innovations Theory

This theory was developed by Rogers in 1962, having two stages that explained how the innovation diffuses from the point of development to the users (Rogers, 2010). According to Rogers, the theory has an aspect of how, why, and the rate at which new ideas related to ICT are adopted in an organization. The DOI is an established theory with four main elements that were identified by Rodgers; innovation, communication channel, time, and the social channel (Rogers, 2004). According to Sahin (2006), the user of information must perceive the innovation as new and then be influenced by the Complexity of the system, compatibility with other existing systems, trial-ability, observations, and the relative advantage when compared with others.

Rogers (2010) posits that under relative advantage, it is how the new technology will create some prestige to the organization and add economic profitability to be competitive. As a service providing firms, there is a need to evaluate the return on investment to ease the need to invest where there are no benefits. The ability to try out new technology by making a minimal investment in the technology and the lowest investment is what Rogers referred to as triability.

The prospect of adapting to new technology all depends on the effort asserted on trying the technology; the lesser the investment, the easier it is to adopt (Sahin, 2006).

The observability, according to Rogers (2010), involves witnessing how the technology is working after its installation and, after that acknowledging the benefits of the technology. The achievement made by the technology can be manifested through a reduction in resistance to change when it comes to system implementation. Whenever the system being implemented portrays signs of success, with positive results and a perfectly functioning system, there is a likelihood that adoption will succeed (Mutshewa, 2016). The users of the systems will ensure there is a successful implementation of this technology and observable results (Sahin, 2006). This theory was critical in this study in examining the level of ICT adoption within transport and logistics firms in Kenya.

2.2.2 Technology Organization Environment Theory

This theory was contemplated in 1990 (Tornatzky & Fleischer, 1990) and identifies three aspects of a firm that play a key role in determining the extent of technological adoption in firms; technological context, organizational context, and environmental context. Managing an organization's strategy execution process normally entails internal, building, and strengthening strategy-supporting resources and competitive capabilities. Ample resources must be allocated to the activities to facilitate the realization of the strategic objectives of the company (Oliveira & Martins, 2011).

The technological context refers to the internal and external competencies relevant to the firm, including current practices and equipment owned by the firm and the composition of technologies that the firm can own but has not yet incorporated (Hage, 1980). In our study, the technical context referred to the ICT systems themselves and ICT infrastructure available to facilitate the ICT adoption in transport and logistics firms. Organizational context refers to descriptive measures about the organization, such as scope, size, and managerial structure. The organizational context of the theory addressed the management capacities and the organizational structure. Environmental factors determining technological adoption include the industry, competitors, and government policies that influence how an organization will behave (Tornatzky & Fleischer, 1990). In the study, the environmental factors were addressed by studying the government factors that influenced the ICT adoption in transport and logistics firms.

The TOE framework is a key analytical framework that can be adopted when attempting to explain factors contributing to the adoption and use of different types of innovation in technology. It has a solid theoretical basis that can be important when assessing the application of ICT to IS innovation domains (Tornatzky & Fleischer, 1990). Rogers (2002) notes that this theory emphasizes both the internal and external characteristics of the organization as the main drivers for innovation within an institution. The Technology, Organization, and Environment (TOE) theory, as formulated by Tornatzky and Fleischer (1990), was considered very important for the current study as it informs the main barriers to ICT adoption within transport and logistics firms grouped into technological factors, organization factors, and environmental factors. Hence this framework was ideal in this study in anchoring the main barriers to ICT adoption within the logistic and transports firms, which are grouped into; government factors, management capabilities, resource capability, and the organization structure. These aspects cover the TOE elements within a firm, which are vital to ICT adoption.

2.3 Empirical Review

The study undertook a review of the various studies that are in line with the themes of this research. The empirical review helped in identifying the various gaps that motivate this study.

2.3.1 Extent of ICT Adoption among Transport and Logistics firms

Chieh-Yu and Yi-Hui (2014) researched technological innovation for China's Logistics Industry, sampling 1500 respondents. Collecting data using questionnaires, conclusions showed that technological, organizational, and environmental factors significantly influence ICT adoption and that the performance of the supply chain significantly improves with the adoption of emergent innovative technologies. The study only focuses on supply chain performance, while this study examined ICT adoption in the logistics industry in Kenya.

According to Makanyeza (2017), investigating what determines consumers' adoption of mobile money services in Zimbabwe noted that perceived usefulness, perceived self-efficacy, influence from social groups, relative advantages, and perceived compatibility had more effects on the adoption of mobile money payment services compared to other types of perceived risk. Perceived ease of use was also found to have an effect. The researcher's findings indicated that behavioral intentions also affected the perception of the adoption of payment services. The study was only limited to the examination of the adoption of mobile money, while this research examines ICT adoption within transport and logistics firms.

According to Moraa and Mwangi (2012), Kenya has witnessed rapid developments in its ICT sector, and this has contributed to the fast rate of adoption of ICT technologies within businesses operating in the country. This is because many business owners have seen the importance of ICT technologies in enhancing operational effectiveness and the level of customer satisfaction. Wanjiru and Abdalla (2014) revealed that ICT technologies contribute significantly by reducing the time required to carry out business transactions and by increasing the quality of experience by the customer, contradicting previous authors who posited the importance of adopting ICT services as a cost-reduction measure. The above studies, however, fail to focus on the extent of adoption of ICT within transport and logistics firms, which is the context of this research.

Gacuru and Kabare (2015) posit that the adoption of ICT elements in businesses increases the efficiency and effectiveness of logistics operations. This is because ICT equipment has transformed how different elements in the supply chain interact to ensure better coordination, thus reducing errors and unforeseen eventualities. Atieno (2014) asserts that logistics firms adopt e-commerce practices to increase efficiency. According to East African Logistics Performance Survey (2012), report findings indicated that 54.4% of logistic companies experience delays due to insufficient ICT infrastructure. Innovation has improved the management of in-transit goods, with companies being able to monitor and track their goods more effectively with tracking software. This has resulted in the streamlining of transport systems and general cargo security. 31.25% of companies in the logistics industry use telecommunication software to track and keep abreast with the progress of their shipments.

2.3.2 Effect of ICT Adoption on Transport and Logistics firms

Kirmani Wani and Saif (2015) investigated the impacts of ICT on effective financial management in Indian public financial services and found that operations in the financial market where ICT is not in use, there is an inability by the financial markets to consistently respond to new development globally and finance companies are disadvantaged in acquiring information compared to their competitors. They noted that there is a high correlation between the system used in financial management and the outcome regarding financial reporting and social accountability. They found that the use of ICT in public financial management leads to cost-cutting, transparency in reporting, clear budgeting procedures, and ease in record keeping. The study focuses on ICT adoption within public financial firms in India, while this study examined the effect of ICT on transport and logistics firms in Kenya.

Zhong and Zhou (2011) and Bhandari (2012) asserts that logistic companies use transport management technologies such as global positioning system (GPS), electronic data interchange (EDI), enterprise resource planning (ERP) systems, radio frequency tags (RFTs), radio frequency identification (RFID), automated inventory tracking system (AITS), and distribution requirement planning (DRP). Adisa (2017) investigated transport management technologies and the performance of third-party logistics providers in Kenya. The target population was 1,121 logistics companies operating in Kenya. It was revealed that the organization uses GPS, bar-coding technology, and warehouse management systems to track goods and vehicles. It was also established that there was a positive and significant relationship between intelligent transport systems, telecommunication, and information technology and performance.

Balogun (2016) investigated the effects of ICT adoption on the performance of the Nigerian Banking Industry. Targeting 450 employees from 15 banks in the country, the researcher adopted questionnaires to collect data. It was determined that technological innovation influenced the bank's employee's performance, customer satisfaction, and improvement in banks' profitability. The study recommended that banks effectively manage technology innovation and adoption to ensure an increase in employee performance, customer satisfaction, sustainable profit, increased return on investment, returns on equity, and achieve a competitive advantage in the banking industry. The study is focused on banking institutions in Nigeria, while this study focuses on ICT adoption in logistic firms in Kenya.

Kioko, Malowe, Martkin, and Moody (2015) noted that ICT is a technology used to support information gathering, processing, tabulation, and presentation in a meaningful form. ICT is used in different areas, and in all these, the common factor is its acceptance as a technology used to facilitate the movement of information through the use of a variety of electronically aided communications for ease of access and decision making. The study only focuses on the benefits of ICT adoption, while this research examined the barriers to adoption within the logistics industry in Kenya.

Mugo (2014) examined how the adoption of ICT strategy in Kenya has increased over the years. Although the patterns are still inconsistent, and the adoption rate slows, the awareness is still on the rise. ICT and organizational integration provide a value synergy through comparability, alignment of strategies and objectives, and the collaboration of healthcare personnel. The study focuses on the adoption of ICT strategy within healthcare firms in Kenya, while this research analyses the adoption of ICT and barriers to adoption in logistic firms in

Kenya. Macharia, Iravo, Ondabu, and Ombui (2015) assessed the influence of technology adoption on the performance of logistics firms in Nairobi County. Findings showed that the successful adoption of ICT infrastructure resulted in reduced transaction costs, improved coordination within the supply chain network, all of these improved the level of efficiency and reduced wastage of both resources and time.

Musau, Namusonge, Makokha, and Ngeno (2017) conducted research on the effect of transport management and firm output among textile manufacturing firms in Kenya. It was concluded that transport management influences the performance of the supply chain. The study recommended that the organization must come up with new strategies such as; scheduling, route planning, fleet management, and vehicle tracking. Through this, the organization was able to become more competitive. Kimulu (2014) conducted research on logistics outsourcing and the performance of commercial banks in Kenya. The findings revealed that route optimization had been achieved, and fleet tracking tools increased vehicle visibility to a large extent while vehicle scheduling improved to a moderate extent.

Mukangu and Ndungu (2016) assert that the use of ICT equipment has enabled organizations to increase productivity, operational efficiency, reduce cost, improve the design process and inventory management. Wachira (2013) looked into how technological innovation has influenced the financial outcomes of Kenyan banks. Findings showed that innovations in bank technology have resulted in increased access to information and services by both customers and customers, thus enhancing the banking experience. The above studies show the existence of a positive correlation between ICT adoption and financial performance.

2.3.3 Barriers to ICT Adoption among Transport and Logistics firms

The study categorized the main barriers to ICT adoption within the transport and logistic firms in Kenya as the government factors, management capabilities, resource capabilities, and the organization structure.

2.3.3.1 Effect of Government Factors on ICT Adoption

Gupta, Bhaskar, and Singh (2016) studied the critical factors influencing e-government adoption in India. The study adopted an exploratory research design and collected data using structured questionnaires. The findings indicate that trust in the systems, citizen satisfaction, funding availability, and adaptability with regulations and organization laws influenced adoption rates. The study focuses on e-government applications while this study examines ICT adoption in Kenyan logistic firms. Jena (2019) analyzed the barriers to higher and faster

adoption of e-commerce in India. The study adopted a quantitative research design with the DEMATEL analysis utilized. The results showed that technical barriers were the most important barriers, followed by legal and regulatory barriers for faster e-commerce penetration in India. The study, however, does not focus on the extent of adoption within logistic firms, which is the focus of this research.

Ajobo (2016) examined the motivators for and inhibitors to information communication technology (ICT) use and adoption by SMEs in Nigeria. The study adopted a qualitative approach, with interviews being considered in the data collection. Findings show that the prevailing business environment, corruption, lack of focussed policies, access to electricity, and internet inhibited the use and adoption of ICT. The study further notes that intense competition and capabilities lack skilled management also limited adoption rates. Agboh (2015) analyzed the drivers and challenges of ICT adoption by SMEs in Accra metropolis, Ghana. The study utilized a survey research design with data collected from 189 working MBA students. The study utilized quantitative analysis techniques. The results show that lack of internal capabilities, high cost of ICTs, poor infrastructure, inadequate government policies, financial constraints, and lack of information were the main challenges to the adoption of ICT. This study focused on registered logistics companies in Kenya in examining the barriers to ICT adoption.

Nega (2019) studied the factors affecting the adoption of e-commerce from the perspectives of Ethiopian Banks. The study adopted a mixed research approach focusing on all the registered commercial banks in the country. The results of the study indicate that the complexities of the technologies, the usefulness of the technologies, supporting services, and government support have a statistically significant influence on the adoption of e-commerce within the banks. The study was limited to financial industry firms while this research examines the ICT adoption within the logistics industry.

Nyandoro (2016) analyzed the factors influencing information communication technology (ICT) acceptance and use in small and medium enterprises (SMEs) in Kenya. The study used a quantitative approach to data collection and analysis. The results indicate that cost reduction and business relationships were the most influential factors of ICT acceptance. The study indicates that supportive government policies are integral to the utilization of ICT within Kenyan SMEs. Mwai (2016) conducted research on the factors influencing the adoption of ICT by small and medium enterprises in the hospitality industry in Kenya. The research relied on

both quantitative and qualitative data and the results posit that industry market characteristics, customer characteristics, government regulations, taxation policies, incentives and technology characteristics influence the adoption of ICTs by SMEs. The above studies are not confined to the logistics industry, which is the focus of this study; hence findings may not be generalizable.

2.3.3.2 Effect of Management Capabilities on ICT Adoption

Management competency or capacity is a mix of knowledge and skills that are needed for effective performance (Bhardwaj, 2013). Generally, management capacity is mixed with the persons' knowledge, skills, ability, and how employees behave in the workplace; these aspects are an outcome that was reflecting organizations' performance level (Martina, Hana, & Jiri, 2012). Tripathi and Agrawal (2014) found out that there is a positive relationship between competencies and organization performance. Awa, Baridam, and Nwibere (2015) found that the IT-related experience of top management has a positive influence on e-commerce adoption in Nigeria.

Omotayo (2016) assessed the factors influencing information and communication technology selection (ICT) in logistics on third-party logistics service providers in Malaysia. The study adopted a descriptive research design with questionnaires being utilized in collecting data from 150 respondents. The study indicates that management support, communication process, and benchmarking practices were critical in ICT selection. The study focused on third-party logistics firms in Malaysia, while this research examines logistics firms in Kenya. Mutumba (2018) examined the factors influencing the adoption of financial technology by tier 4 microfinance institutions in Kampala. The study adopted a cross-sectional research design with questionnaires being utilized in data collection. The study results indicate that ICT infrastructure availability, perceived usefulness, SACCO size, and management structure were critical to the adoption of financial technologies. The study focuses on financial institutions while this study examines ICT adoption in logistics firms in Kenya.

Mwangi (2016) investigated ICT adoption and performance of the supply chain of parastatals in Kenya's Energy Sector. The study involved nine companies, with the findings pointing to the existence of a strong relationship between ICT adoption and performance of the supply chain of Kenya's energy sector. The main challenge to ICT implementation identified was the level of managerial commitment and interest in emergent technologies. The study focused on factors determining the adoption of communication technologies. The study also identified the inability of staff to adapt to changes, poor managerial support, and lack of ICT competent

employees as the main hindrances to the implementation process. The study is limited to state parastatals, while this research analysed ICT adoption within the transport and logistic firms in Nairobi City.

Mambo, Ombui, and Kagiri (2015) examined the factors influencing the implementation of e-procurement in the national government. The study employed stratified sampling in selecting respondents and relied on both qualitative and quantitative data. The study indicates that improved management commitment, allocation of responsibility, supportive structures, monitoring process, coordination activities, set goals, strategies, and baseline marks will enhance e-procurement implementation. The study only focuses on the e-procurement process, while this study focuses on ICT adoption in transport and logistics firms in Nairobi.

2.3.3.3 Effect of Resource Capability on ICT Adoption

According to Otido (2013), resource capability ensures the provision of time, financial, human, and knowledge resources vital for the adoption of various strategies within the firm. The key sources of resources include people, information and technology, and finance (Carola & Steven, 2013). According to Kirui (2013), human resource personnel and financial resources are key strategic resources during the implementation of new resources; this makes management key in the implementation of e-commerce practices. Chatzoglou and Chatzoudes (2016) studied the factors affecting e-commerce adoption among small businesses. The study sampled 600 SME.s in Greece, with questionnaires being adopted in the data collection process. The findings indicate that 71% of changes in e-business adoption were determined by the scope of the firm, the size of the firm, the IT infrastructure, the internet capabilities, and CEO knowledge, which did not have a significant effect on adoption. The study, however, fails to examine the extent of ICT adoption within logistics industry firms.

Ghobakhloo and Hong Tang (2013) found that the cost of adopting e-commerce practices significantly influences the adoption of ICT in developing countries. Aminu (2013) identified a lack of supporting infrastructure such as broadband connectivity as the main deterrent to the adoption of e-commerce among Nigerian SMEs. Tob-Ogu, Kumar, and Cullen (2018) examined ICT adoption in road freight transport in Nigeria. The study adopted a case study research design with research data collected using an interview schedule and observation checklists. The results of the study indicate a strong positive association between the size of the firm and the adoption of ICT. The study indicates that business competitiveness and firm characteristics such as personnel capability, financial resources, and culture positively

influenced ICT adoption. The study fails to consider how managerial and organizational structures influence ICT adoption in Kenyan transport and logistics firms.

Lubanga, Gakobo, Ochieng, and Kimando (2017) analyzed the factors influencing the adoption of the e-payment system in Kenyan public transport with a focus on matatu plying Nairobi-Kitengela route. The study utilized an exploratory research design, with 175 matatu owners being considered in the research. The study notes that 41% of the matatu industry firms had adopted e-payment systems. The results show that human skills, the cost of the ICT systems, and the compatibility of the technology positively influenced the adoption of e-payment systems.

2.3.3.4 Effect of Organization Structure on ICT Adoption

Each organization in the world operates with its own unique structure. The structure of an organization reflects its history, relationships, and internal policies and preferences (Carola & Steven, 2013). It is important to ensure that the organization structure matches and aims with the strategy to ensure that the company meets its obligations and goals. Alton, Mausam, Beh, and Hong (2011) suggest that both organic and mechanistic structures are applied at a strategic level during the adoption of new strategies. Mechanistic structures allow the board to exert authority for the policies developed, while organic structures are applied to communicate the strategy to the organization effectively. Organic structures are more flexible, enabling firms to adjust their strategies to ensure that it accommodates any changes that may occur during the implementation stage (French, Lumpkin, Alan, Gerry, & Bongjin, 2012).

Zailani, Iranmanesh, Nikbin, and Jumadi (2014) examined the determinants and environmental outcomes of green technology innovation adoption in the transportation industry in Malaysia. The study utilized a survey research design, with 252 samples being collected from transportation firms. Findings indicate that customer pressure, environmental uncertainty, and human resources coordination improved green innovation adoption. The study shows that organizational support and government support does not significantly influence green technology adoption. The study fails to consider how management factors and resource factors influence ICT adoption in Kenya.

Awa, Ojiabo, and Orokor (2017) examined Integrated technology-organization-environment (TOE) taxonomies for technology adoption. The research applied a survey research design with logistic regression being employed in the study. Results show that technology factors, organization factors, environmental factors, and task allocation improved technology adoption.

The study notes that social factors had a statistically negative effect on technology adoption. The study, however, fails to examine the extent of ICT adoption in Kenyan transports and logistics firms.

Mose, Njihia, and Magutu (2013) explored the critical success factors and challenges in e-procurement adoption among large scale manufacturing firms in Nairobi, Kenya. The research applied a descriptive research design, with 455 manufacturing firms being considered in the study. The findings indicate that employee involvement, commitment, management commitment, and reliability of information technology influenced the adoption of e-procurement. The study also indicates that resistance to change, lack of approvals, and the existence of old IT equipment limited technology adoption. The study, however, does not focus on the organization structure within logistic firms in Kenya.

Maingi, Awino, K'Obonyo, and Pokhariyal (2019) focused on the moderating effect of organization structure on the relationship between strategic planning and competitive advantage. The research applied a cross-sectional research design with a census survey being conducted across 124 manufacturing firms in Kenya. The findings indicate that overall strategic planning has a statistically significant influence on competitive advantage and that organizational structure partially moderates the relationship between strategic planning and competitive advantage. The study notes that integration, formalization, centralization, and specialization were critical to improving competitiveness within the firms. The study, however, fails to link organization structure and ICT adoption in logistics firms in Kenya, which is the focus of this research.

2.4 Research Gaps

The study reviewed several studies that helped in developing the contextual gaps, empirical gaps, and methodological gaps. The summary of the gaps is presented in Table 2.1 below.

Table 2.1 Summary of Research Gaps

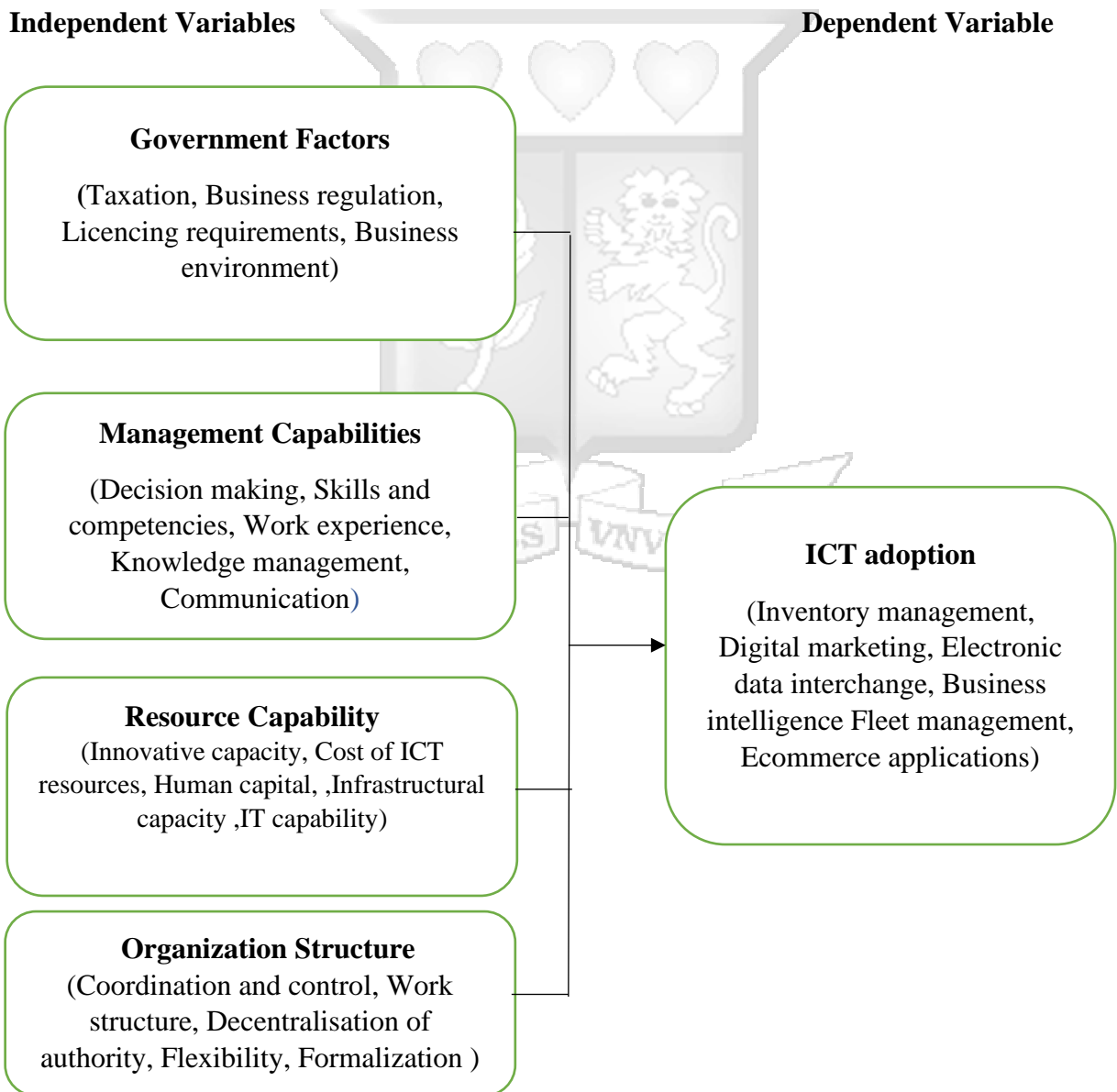
Author	Title	Findings	Research Gap
Kirmani Wani and Saif (2015)	Impact of ICT on effective financial management in Indian public financial services	The study found that the use of ICT in public financial management leads to cost-cutting, transparency in reporting	The study focuses on ICT adoption within public financial firms in India, while this study examined the effect of ICT on transport and logistics firms in Kenya
Makanyeza (2017)	Determinants of consumers' adoption of mobile money services in Zimbabwe	The findings indicated that behavioural intentions also affected the perception of the adoption of payment services	The study was only limited to the adoption of mobile money, while this research examines ICT adoption within transport and logistics firms
Mutumba (2018)	Factors influencing the adoption of financial technology by tier 4 microfinance institutions in Kampala	The study results indicate that ICT infrastructure availability and management structure were critical to the adoption of financial technologies	The study focuses on financial institutions while this study examines ICT adoption in logistics firms in Kenya
Omotayo (2016)	Factors influencing information and communication technology selection (ICT)	The study indicates that management support, communication process, and benchmarking practices were critical in ICT selection	The study focused on third-party logistics firms in Malaysia, while this research examines logistics firms in Kenya
Zailani, Iranmanesh,	Determinants and environmental outcomes of green	The study shows that organizational support and government support	The study fails to consider how management factors and

Nikbin, and technology does not significantly resource factors
 Jumadi (2014) innovation influence the green influence ICT adoption
 adoption technology adoption in Kenya.

Source: Research Data (2020)

2.5 Conceptual Framework

A conceptual framework is a structure believed to be the best way to explain the natural progression of the phenomenon that the researcher wants to study. It links the general idea with the concepts, empirical research, and theories used to expound the study (Adom, Hussein, & Joe, 2018). The below conceptual framework depicts the interaction between institutional factors and e-commerce adoption within transport and logistics firms in Kenya.



Source: Research Data (2020)

Figure 2.1 Conceptual Framework

The above conceptual framework presented the hypothesized relationship between institutional factors and e-commerce adoption. The study focuses on the resource capacity, management capabilities, and organization structure effect on e-commerce adoption. The study further sought to examine the effect of ICT adoption on the transport and logistics firms in Kenya. The operationalization of the study variables is shown in the table below:

Table 2.2 Operationalization of Research Variables

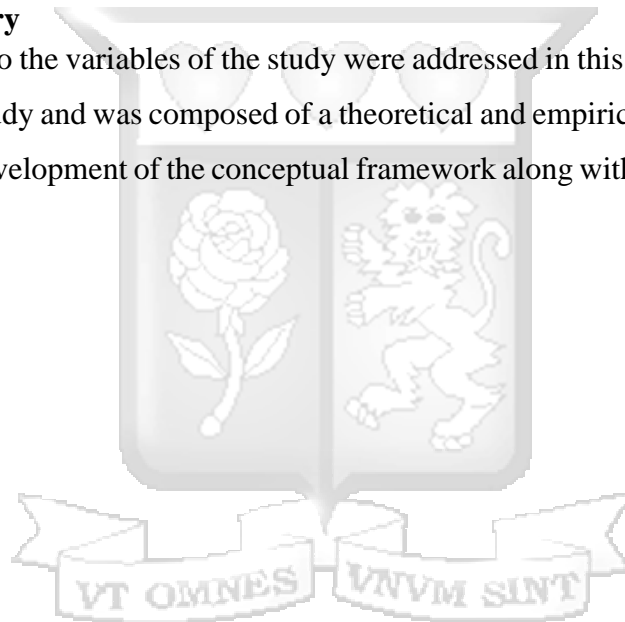
Variable	Construct	Scale	Analysis	Supporting Literature
Resource capacity	<ul style="list-style-type: none"> • Innovative capacity • Cost of ICT resources • Human capital • Infrastructural capacity • IT capability 	Interval scale	Correlation analysis Regression analysis	Chatzoglou, P., & Chatzoudes, D. (2016); Tob-Ogu, Kumar, and Cullen (2018).
Management capabilities	<ul style="list-style-type: none"> • Decision making • Skills and competencies • Work experience • Knowledge management • Communication 	Interval scale	Correlation analysis Regression analysis	Mwangi, M. K. (2016); Mambo, Ombui, and Kagiri (2015)
Organization structure	<ul style="list-style-type: none"> • Coordination and control • Work structure • Decentralization of authority • Flexibility • Formalization 	Interval scale	Correlation analysis Regression analysis	Mose, J. M., Njihia, J. M., & Magutu, P. O. (2013);
Government factors	<ul style="list-style-type: none"> • Taxation • Business regulation • Licencing requirements • Business environment 	Interval scale	Correlation analysis Regression analysis	Nyandoro, C. K. (2016); Mwai (2016)

Variable	Construct	Scale	Analysis	Supporting Literature
ICT adoption	<ul style="list-style-type: none"> • Inventory management • Digital marketing • Electronic data interchange • Business intelligence • Fleet management • Ecommerce applications 	Interval scale	Correlation analysis Regression analysis	Kioko, S. N., Marlowe, J., Matkin, D. S., Moody, M., Smith, D. L., & Zhao, Z. J. (2015); Macharia, Iravo, Ondabu, and Ombui (2015)

Source: Research Data (2020)

2.6 Chapter Summary

The literature related to the variables of the study were addressed in this chapter. This literature was relevant to this study and was composed of a theoretical and empirical review—this review cumulated with the development of the conceptual framework along with the operationalization of the variables table.



CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presented the methodology that was applied to solving the research problem. This chapter reviewed the philosophy and research design to be utilized, the population of the study, the sampling design, the sample size, the data collection instruments, and the procedures that were relied upon in the study. The chapter reviewed the analysis and presentation techniques as well as the ethical considerations.

3.2 Research Philosophy

According to Kothari (2017), the research philosophy delineates the belief about how data about a given phenomenon ought to be gathered, analysed, and utilized. The author further notes that four main philosophies exist: positivism, pragmatism, realism, and interpretivism. The author highlights that despite the paradigms being important in knowledge building, they, however, differ in their ontology, epistemology, and axiology. As such, a positivist philosophy was adopted since the study sought to investigate relationships between components in the phenomena using a scientific approach (Kothari & Garg, 2014). Additionally, the philosophy is adopted since the study aims to investigate world phenomena without interfering with it (Cooper & Schindler, 2014).

3.2.1 Research Design

The research design is a specific plan or blueprint created to answer the research question and provision of variance control. A descriptive research design was adopted in this study. According to Atmowardoyo (2018), a descriptive research design is a research method that is used to describe the existing phenomena as accurately as possible. The only work that the researcher has is collecting the necessary available data through instruments such as questionnaires, observation, and interviews. It enables the researcher to define subjects through the creation of a group of problems, events, or people (Cooper & Schindler, 2014).

3.3 Population and Sampling

3.3.1 Target Population

The population is defined by Cooper and Schindler (2014) as the total collection of elements that the researcher wishes to make an inference from. The study population was transport and logistic firms operating within Nairobi County. According to the Kenya Revenue Authority (August 2019), there were 742 transport and logistics firms operating in Nairobi City County.

The focus of the study was on the employees of the transport and logistics firms operating in the county. The respondents were selected since, as the key personnel in charge of technology adoption in the firm, they are expected to have the requisite information necessary to solving the research problem.

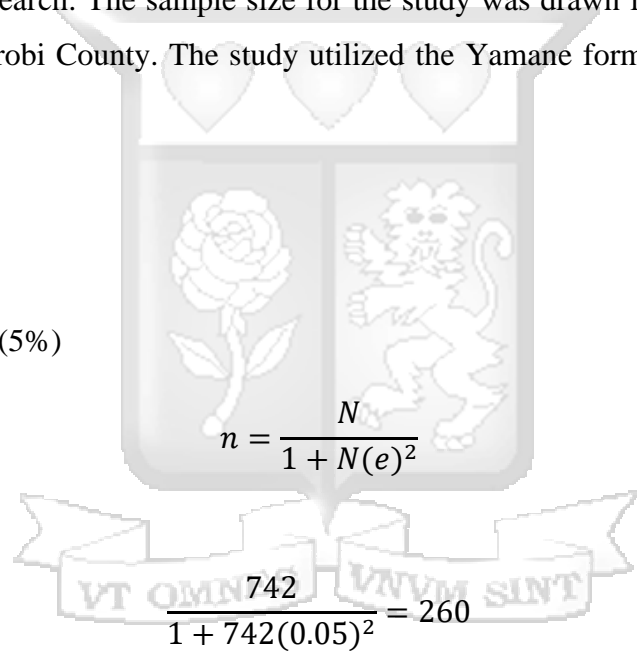
3.3.2 Sampling Design and Sample Size

According to Cooper and Schindler (2014), a list of features through which the sample is obtained is called the sample frame. This study obtained the sampling frame from all transport and logistics firms operating within Nairobi City County. Babbie (2009) postulates that two types of sampling techniques exist – probability and non-probability sampling. The study adopted non-probability sampling with judgemental sampling being utilized in selecting the participants of the research. The sample size for the study was drawn from the transport and logistics firms in Nairobi County. The study utilized the Yamane formula in calculating the sample for the study.

n =sample size,

N = population size

e =level of precision (5%)



The sample respondents for the study were 260-respondents.

3.4 Data Collection Instruments

This study relied on primary research data that was collected using a structured research questionnaire. A questionnaire is one of the research instruments used to gather data from a large sample and diverse regions. The questionnaire normally is regarded as a confidential way of responding to study questions with minimal bias (Uma & Bougie, 2016). The research questionnaire was arranged into three main sections and was developed in line with the literature adopted in the study and the conceptualization of the study variables. The first section of the instrument contained questions on background information, and the second section

captured statements on the independent variables, while the third section contained statements on the dependent variables of the research.

3.5 Data Collection Procedures

Due to the mono method adopted for this study, the data collection method adopted is quantitative in nature, where questionnaires were administered via an online survey tool and self-administered to increase the response rate and accuracy. Gratton and Jones (2014) note various advantages of using questionnaires in data collection, such as they maintain anonymity, provide relatively cheap access over geographically distributed areas, and as well they potentially reduce bias when well structured. The study applied for ethical approval before conducting the data collection. The study also applied for a research permit from NACOSTI before conducting data collection. This study ensured that all the research participants are notified of their rights to participate in this research. The study fostered the rate of response among the participants by including electronic data collection procedures which enhanced the reach to personnel within the firms who may be working remotely.

3.6 Research Quality

A pilot study is conducted before the actual study takes place using a small pre-arranged respondent who has a similar character with those to take part in the actual study. According to Ellis and Levy (2017), the main aim of conducting it is not to examine the research hypothesis but to examine the process and the instruments, sample selection strategies, and any aspects that may make the study unsuccessful. Piloting involves testing the validity and reliability of the data collection tool and herein the questionnaire. The study conducted a pre-test of the research instruments with 26 (10% of sample respondents) logistics and transport firms within Nairobi City County that were left out of the main study.

3.6.1 Reliability Tests of Research Instruments

Reliability data is an indication of how the data being used is free from any errors and able to provide consistency (Kirk & Miller, 2015). When measuring the consistency of the data collection instruments, Cronbach's alpha, which is an internal technique, was computed through the use of SPSS. As a rule of thumb, for a construct to be considered reliable, it has to meet a threshold of an alpha score of 0.7 and above. The study utilized the Cronbach's alpha in the examination of the reliability of the research instrument. The study selected the constructs of the study with an alpha score of above 0.7.

Table 3.1 Reliability Results

Item	N	Cronbach's Alpha	N of Items
Government factors	20	.845	8
Management capabilities	20	.820	8
Resource capabilities	20	.830	8
Organization structure	20	.865	8
ICT adoption	20	.910	8

Source: Research Data (2020)

Golafshani (2003) provides the following rule of thumb: “>.9 Excellent, >.8 Good, >.7 Acceptable, >.6 Questionable, >.5 Unacceptable”. The above results show that the study constructs had a Cronbach alpha above 0.7, which is the minimum acceptable level. This implied that the study instrument was adequate to be adopted for the main analysis.

3.6.2 Validity Tests of Research Instruments

Before the instruments of data collection are used, there is always a need to check if they measure the purposes they were supposed to gauge. Therefore, the strength of the research instrument is explained as a gauge determining the degree to which research instruments measure the intended purpose (Kothari, 2009). The study applied both content and construct validity. The content validity of the study was employed by examining the research instruments with the help of the supervisor. Construct validity was applied by examining if the research instrument has captured all the objectives of the research.

3.7 Data Analysis and Presentation

Cooper and Schindler (2014) define data analysis as an activity that involves reduction and accumulation of data to a manageable size, summary development, and identification of patterns and application of appropriate techniques in analysis. This study utilized the Statistical Package for Social Science (SPSS) to conduct the data analysis after sorting and coding the raw data and findings presented in the form of Tables and Figures. The study utilized descriptive analysis such as frequencies, percentages, means and standard deviation in presenting the summary of the responses obtained. The study further utilized correlation analysis to determine the direction of association between the study variables. The research also employed regression analysis to determine the strength of the relationship between

independent variables and ICT adoption on transport and logistics firms. The study adopted collinearity and normality tests in testing for linear regression assumptions.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where:

Y = Dependent Variable (ICT adoption)

Independent variables being;

X₁ is government factors

X₂ is management capabilities

X₃ is resource capabilities

X₄ is organization structure

α = the constant

$\beta_1 - 4$ = the regression coefficient or change included in Y by each X

3.8 Ethical Considerations

This research made sure that all the relevant ethical guidelines are adhered to in the course of the study. The study ensured that the confidentiality of the respondents is maintained throughout the study process. The study participants were also assured of their voluntary participation in the research. The study ensured that ethical approval is obtained from Strathmore University, and a research permit is sought from NACOSTI. This study ensured that all the collected research data is utilized only for academic purposes.

CHAPTER FOUR

PRESENTATION OF RESEARCH FINDINGS

4.1 Introduction

This chapter presented the various results derived from the analysis of the collected research data. The study employed quantitative analysis techniques, including descriptive and inferential techniques.

4.2 Response Rate

The study was able to obtain responses from 176 logistics firms, which represented a 73% response rate from the final sample that took part in the main research. The study was not able to get responses from 27% of the participants who were contacted to take part in the research (n=67).

4.2.1 Background Information

The study explored the demographic profile of the participant, and the various responses received are summarized in the table below.

Table 4.1 Demographic Information

Characteristics	Grouping	Frequency	Percentage
Age of respondents	Below 30 years	43	24.4%
	31-34 years	40	22.7%
	35-40 years	48	27.3%
	41-44 years	25	14.2%
	45-50 years	17	9.7%
	Over 50 years	3	1.7%
Gender	Male	121	68.8%
	Female	55	31.2%
Working experience	Less than 1 year	3	6.3%
	1-5 years	57	31.8%
	6-10 years	35	37.5%
	Over 10 years	43	24.4%
	Diploma	68	38.6%

Education qualification	Degree	100	56.8%
	Postgraduate	8	4.6%
Job department	Finance	31	17.6%
	Procurement	72	40.9%
	Marketing	53	30.1%
	Human resource	20	11.4%

Source: Research Data (2020)

The results revealed that most of the respondents, 27.3% (n=48), were of the age 35-40 years, 22.7% (n=40) were between 31-34 years, while 24.4% (n=43) were below 30 years of age. This showed that most of the personnel within the industry were middle-aged. The findings showed that the majority of the respondents, 68.8% (n=121), were male employees within logistic firms, while 31.2% (n=55) were female employees. This finding indicated that the industry is largely dominated by male personnel. The research indicated that 37.5% (n=35) of the employees have worked for 6-10 years, and 31.8% (n=57) have worked for between 1-5 years. This implies that respondents have different work experiences, which can be integral to providing information that is reliable in answering the study questions. The findings also showed that the majority of the participants, 56.8% (n=100), have attained a university degree, with 4.6% (n=8) have obtained a postgraduate degree. The results also showed that 40.9% (n=72) were procurement managers, and 30.1% (n=53) were marketing managers. The results showed that the participants were in senior positions within the firm thus were able to offer relevant information to solving the research problem.

4.2.2 Factors affecting ICT Adoption

The study reviewed the extent to which various factors impact the adoption of ICT within the logistic firms, and the study results are presented below. The key adopted is as follows; VGE = very great extent, GE = great extent, ME = moderate extent, LE = little extent and NE = no extent.

Table 4.2 Factors Affecting ICT Adoption

Statement	VGE	GE	ME	LE	NE
Do the costs of infrastructure communication technology influence the adoption levels	5.1%	4.0%	27.8%	45.5%	17.6%
Does the support of the management team influence information communication technology adoption levels	4.0%	4.7%	36.4%	36.4%	18.8%
Does the business regulations influence information communication technology adoption levels	2.8%	6.3%	34.1%	41.5%	15.3%
Does the taxation policies influence information communication technology adoption levels	1.7%	6.8%	47.7%	37.5%	6.3%
Does the perceived usefulness influence information communication technology adoption levels	-	2.3%	26.1%	42.6%	29%

Source: Research Data (2020)

The study respondents noted that to a little extent, 45% of the respondents and 27.8%, to a moderate extent, indicated that the costs of infrastructure communication technology influence the adoption levels. The findings also showed that 36.4% of the participants, to a moderate extent, the support of the management team influence information communication technology adoption levels. The findings also noted that 41.5% of the respondents indicated to a little extent and 34.1% to a moderate extent indicated that the business regulations influence information communication technology adoption levels. The results showed that 47.7% of the respondents noted that, to a moderate extent, the taxation policies influence information communication technology adoption levels. The research showed that 42.6% of the respondents indicate that too little extent, and 29% to no extent the perceived usefulness influence information communication technology adoption levels. The findings showed that generally the costs, taxation policies, and perceived usefulness of the information and communication technologies were key factors to adoption within transport and logistics firms.

4.3 Descriptive Analysis

The study employed descriptive analysis in interpreting the responses obtained from the Likert scale questions. The findings are presented in line with the objectives of the research using means and standard deviation.

4.3.1 Government Factors

The study sought responses from the participants on the various government factors in relation to the logistic firms. The participants were presented with 7-statements, and the findings are presented.

Table 4.3 Government Factors Results

	N	Mean	Std. Deviation
The government regulations in place support the adoption of information communication technology	176	2.8864	1.04123
The availability of the relevant infrastructures is key to the adoption of information communication technology	176	3.6250	.84600
The tax policies put in place by the relevant bodies are supportive of the adoption of information communication technology	176	3.4375	.94812
The various business regulations put in place within the logistics industry are key to technology adoption	176	3.7784	.92074
The licensing requirements allow for the adoption of ICT within logistic firms in Kenya	176	3.7159	.92519
The incentives offered to stimulate digitization within the firm influence adoption of ICT	176	3.7614	1.03641

Source: Research Data (2020)

The respondents noted that to a moderate extent (mean = 2.8864, dev = 1.04123), the government regulations in place support the adoption of information communication technology. The results also noted that, to a great extent, the availability of the relevant infrastructures is key to the adoption of information communication technology, as shown by mean = 3.625 and moderate deviation of .84600. The study also indicates, to a great extent, the various business regulation put in place within the logistics industry are key to technology adoption (mean = 3.7784, dev = .92074). The results showed that, to a great extent, the incentives offered to stimulate digitization within the firm influence adoption of ICT as indicated by mean = 3.7614 and a high deviation of 1.03641. The study results indicated that

improving on business regulations, enhancing the incentives and availing support infrastructure would be critical to expanding ICT adoption within the firms.

4.3.2 Resource Capability

The study presented 8-statements to the respondents on the various resource capabilities within the logistic firms, and their responses are presented in the table.

Table 4.4. Resource Capability Results

	N	Mean	Std. Deviation
There are many functions of the organization that have been automated	176	3.4830	1.14630
The organization has enough resources to facilitate to drive technology-adoption	176	3.4602	.80613
The availability of relevant skilled staff within the firm determines adoption of information communication technology	176	3.6818	.78625
Our firm has created a pool of technically-proficient staff	176	3.7670	.83306
Our firm has access to technological infrastructure	176	3.9489	.72719
Our firm has expanded the information technology capability among the staff members	176	3.8068	.76879
The organization has the desired financial strength to implement ICT	176	3.6648	.81844
The human resource personnel at the organization are qualified to drive ICT adoption	176	3.4716	.82065

Source: Research Data (2020)

The participants indicated that, to a great extent, the firm has access to technological infrastructure (mean = 3.9489, dev = .72719). The study also noted that, to a great extent, mean = 3.8068 and moderate deviation = .76879 that the firm has expanded the information technology capability among the staff members. The result also showed that, to a great extent, the firm had created a pool of technically-proficient staff (mean = 3.767, dev = .83306). The findings noted that, to a moderate extent, the human resource personnel at the organization are qualified to drive ICT adoption (mean = 3.4716, dev = .82065). The research also showed that the organization has enough resources to facilitate to drive technology-adoption as denoted by mean = 3.4602. The findings implied that having technically-skilled personnel, improving

access to technological infrastructure and strengthening the financial strength of the firm is vital to ICT adoption.

4.3.3 Management Capability

The research questionnaire contained 8-statements that were presented to the respondents on the various resource capability within the logistic firms, and their responses are presented in the table.

Table 4.5 Management Capability Results

	N	Mean	Std. Deviation
The management team within our firm is supportive of technology adoption	176	3.9432	.90532
The management team empowers employees to undertake innovation in service deployment	176	3.9716	.92229
The management team has put in place clear ICT policies to guide system deployment	176	3.7500	.96511
The management involves employees within the firm in decision making	176	3.7955	1.01034
The management has put in place measures to support knowledge management within the firm	176	3.7898	.85263
The management team within the firm have the requisite technological competencies needed for system integration	176	3.9148	.93112
The management within the firm has developed an elaborate communication and feedback system	176	4.0455	.91850
The management team is capable of providing direction and control	176	4.1250	.89203

Source: Research Data (2020)

The results showed that most respondents revealed to a great extent (mean = 4.0455, dev = .91850) the management within the firm has developed an elaborate communication and feedback system. The findings also indicated that, to a very great extent (mean = 4.125, dev = .89203) that the management team is capable of providing direction and control. The respondents noted that, to a great extent, the management team empowers employees to undertake an innovation in service deployment, as shown by mean = 3.9716, dev = .92229. The researchers noted that, to a great extent, the management team within our firm is supportive of

technology adoption, as indicated by mean = 3.9432, dev = .90532. The study participants indicated that, to a great extent, the management team within the firm has the requisite technological competencies needed for system integration, as denoted by a mean of 3.9148 and a moderate deviation of .93112. The findings show that to a great extent the management of the firms should enhance employee empowerment, improve technological competencies and have an elaborate communication and feedback systems that can ideally support ICT adoption.

4.3.4 Organization Structure

The study questionnaire contained 8-statements that were presented to the respondents on the various organizational structure within the logistic firms, and their responses are presented in the table.

Table 4.6 Organization Structure Results

	N	Mean	Std. Deviation
Our firm has laid down clear coordination processes	176	3.9318	.85918
Our firm has a well-designed control system to guide the delegation of duty within the firm	176	4.0909	.85036
The firm has developed clear structures to guide the chain of command	176	3.9659	.90014
The firm has deployed formalization processes in the internal processes	176	4.0170	.91010
The current organization structure allows employee participation in decision making	176	3.9545	.95510
The organization structure allows for the free flow of information critical to ICT adoption	176	3.9432	1.01821
The organization structure enhances institutional effectiveness within the firm	176	4.0284	.90351
Communication keeps employees updated regularly about the plans and progress towards ICT adoption	176	4.0568	.99551

Source: Research Data (2020)

The participants indicated, to a great extent, there is a well-designed control system to guide the delegation of duty within the firm, as shown by mean = 4.0909 and dev = .85036. The study responses showed that, to a great extent, the communication keeps employees updated regularly about the plans and progress towards ICT adoption, as noted by mean = 4.0568 and

deviation of .99551. The research noted agreement that the firm has deployed formalization processes in the internal processes, as shown by mean = 4.017 and dev = .9101. The findings noted that, to a great extent, the current organization structure allows employee participation in decision making as syndicated by a mean of 3.9432 and a high deviation of 1.01821. The study also indicated that, to a great extent, the firm had developed clear structures to guide the chain of command as denoted by a mean of 3.9659. The results have indicated that vital to firms in enhancing ICT adoption is having a clear structure, formalizing processes within the firm, having a control systems and enhancing institutional effectiveness.

4.3.5 ICT Adoption

The study questionnaire contained 8-statements that were presented to the respondents on the various ICT adoption within the logistic firms, and their responses are presented in the table.

Table 4.7 ICT Adoption Results

	N	Mean	Std. Deviation
Our organization has deployed various technology in the inventory management within logistics firms	176	3.8523	.90762
Our organization utilizes various digital marketing tools within the internal processes	176	3.8636	.98772
Our organization has adopted various electronic data interchange processes	176	3.9091	.95183
The organization relies on business intelligence systems in decision making	176	3.6477	1.08538
The firm has deployed various technologies in fleet management	176	3.8807	.89600
The firm relies on various eCommerce technologies in the day-to-day operations	176	3.8125	.92215
The ease of use of the various technologies within the firm determine the level of adoption	176	4.0739	.90092
The ability of integration of the technologies to the firm processes determines adoption levels	176	4.1250	.90475

Source: Research Data (2020)

The findings showed that to a very great extent (mean = 4.125, dev = .90475) that the ability of integration of the technologies to the firm processes determines adoption levels. The study also showed that, to a great extent, the ease of use of the various technologies within the firm

determines the level of adoption (mean = 4.0739, dev = .90092). The study also showed that, to a great extent, the organization had adopted various electronic data interchange processes, as noted by a mean of 3.9091. The research noted that, to a great extent that the firm has deployed various technologies in fleet management as denoted by a mean of 3.8807. The respondents indicated that, to a great extent, the organization utilizes various digital marketing tools within the internal processes (mean = 3.8636, dev = .98772). The study results showed that firms have been able to improve in their digitalization efforts, reliance on technology-driven inventory management, fleet management and data management.

4.4 Correlation Analysis

The study applied correlation analysis to establish the type and significance of the effect of the study variables. The findings are presented in the table below.

Table 4.8 Correlation Analysis Results

		Government Factors	Resource Capability	Management Capability	Organization Structure	ICT Adoption
Government Factors	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	176				
Resource Capability	Pearson Correlation	.380**	1			
	Sig. (2-tailed)	.000				
	N	176	176			
Management Capability	Pearson Correlation	.408**	.627**	1		
	Sig. (2-tailed)	.000	.000			
	N	176	176	176		
Organization Structure	Pearson Correlation	.400**	.513**	.795**	1	
	Sig. (2-tailed)	.000	.000	.000		
	N	176	176	176	176	
ICT Adoption	Pearson Correlation	.461**	.635**	.712**	.695**	1
	Sig. (2-tailed)	.000	.000	.000	.000	

N	176	176	176	176	176
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** . Correlation is significant at the 0.01 level (2-tailed).

Source: Research Data (2020)

The first objective sought to establish the effect of government factors on ICT adoption among transport and logistics firms in Nairobi County, Kenya. The findings indicated there is a moderate positive and significant effect of government factors on the ICT adoption within transport and logistics firms $P= .461$, $Sig = .000 < .05$. The study analysed the effect of management capabilities on ICT adoption among transport and logistics firms in Nairobi County, Kenya. The results showed there is a strong positive and significant effect of resource capability on the ICT adoption within transport and logistics firms $P= .635$, $Sig = .000 < .05$.

The third objective sought to establish the effect of resource capability on ICT adoption among transport and logistics firms in Nairobi County, Kenya. The findings showed there is a strong positive and significant effect of management capability on the ICT adoption within transport and logistics firms $P= .712$, $Sig = .000 < .05$. The last study objective examined the effect of organization structure on ICT adoption among transport and logistics firms in Nairobi County, Kenya. The findings showed that is a strong positive and significant effect of organization structure on the ICT adoption within transport and logistics firms $P= .695$, $Sig = .000 < .05$.

4.5 Regression Analysis

Regression analysis is a set of statistical methods used for the estimation of relationships between a dependent variable and one or more independent variables. It can be utilized to assess the strength of the relationship between variables and for modeling the future relationship between them. The research sought to analyse the magnitude of influence of the various factors on the ICT adoption within the transport and logistics firms. The study employed multiple linear regression to determine the strength of the relationship, and the regression findings are presented below.

Table 4.9 Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.789 ^a	.622	.613	3.23425

Source: Research Data (2020)

a. Predictors: (Constant), Organization Structure, Government Factors, Resource Capability, Management Capability

The regression results are interpreted using the coefficient of determination. The study findings showed a $R^2 = .622$, which implied that 62.2% of the level of ICT adoption is determined by the organization structure, government factors, resource capability, management capability within the transport and logistic firms in Kenya.

Table 4.10 ANOVA Summary

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2941.496	4	735.374	70.301	.000 ^b
	Residual	1788.726	171	10.460		
	Total	4730.222	175			

Source: Research Data (2020)

a. Dependent Variable: ICT Adoption

b. Predictors: (Constant), Organization Structure, Government Factors, Resource Capability, Management Capability

The ANOVA test was conducted to examine the statistical significance of the multiple regression model adopted. The findings of the research showed a f -calculated = 70.301, $Sig = .000 < .05$. This indicated that there is a statistically significant relationship between organization structure, government factors, resource capability, management capability, and the ICT adoption within transport and logistic firms in Kenya.

Table 4.11 Regression Coefficients Summary

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.820	2.112		-.388	.698
	Government Factors	.149	.059	.135	2.549	.012
	Resource Capability	.376	.084	.275	4.486	.000
	Management Capability	.236	.085	.238	2.775	.006
	Organization Structure	.287	.072	.310	3.964	.000

Source: Research Data (2020)

a. Dependent Variable: ICT Adoption

$$Y = -.820 + .149X_1 + .376X_2 + .236X_3 + .287X_4 + 2.112$$

The regression coefficient for government factors ($B_1 = .149$) was statistically significant $Sig = .012 < .05$, which indicated that a change in government factors would result in a 0.149 change in the ICT adoption in transport and logistic firms. The research showed a coefficient of resource capability ($B_2 = .376$) and was statistically significant $.000 < .05$, which implied that changing resource capability by a unit will lead to a 0.376 change in the level of ICT adoption. The study yielded a regression coefficient of management capability ($B_3 = .236$), which was statistically significant $.006 < .05$, and this showed that changing a unit of management capability will contribute to a .236 change in the ICT adoption. The regression coefficient for organization structure ($B_4 = .287$) was statistically significant $Sig = .000 < .05$, which indicated that a change in organization structure would result in a 0.287 change in the ICT adoption in transport and logistic firms.

4.5.1 Regression Assumptions

4.5.1.1 Collinearity Tests

Multicollinearity occurs in statistics multiple correlation model two independent variables or more are highly correlated. OLS assumes that there's no exact linear relationship among explanatory (Cooper & Schindler, 2014). The study utilized variance inflation factor in testing for collinearity.

Table 4.12 Collinearity Results

Model	Collinearity Statistics	
	Tolerance	VIF
1 (Constant)		
Government Factors	.794	1.260
Resouce Capability	.588	1.700
Management Capability	.300	3.328
Organization Structure	.360	2.774

a. Dependent Variable: ICTAdoption

As a rule of thumb VIF values of less than 10 indicate there is no collinearity problems thus meeting regression assumptions. The findings above show that all the variables had VIF values of less than 10 thus meeting the collinearity threshold.

4.5.1.2 Normality Tests

Normality test was conducted to deduce whether the shape of the sample distribution mirrored the shape of the normal curve. If the sample is normally distributed, the population from which it came was normally shaped and one could assume normality in the research data. The figure below indicates that the observations of the study were in line with the normality curve as shown by the normal p-p plot below.

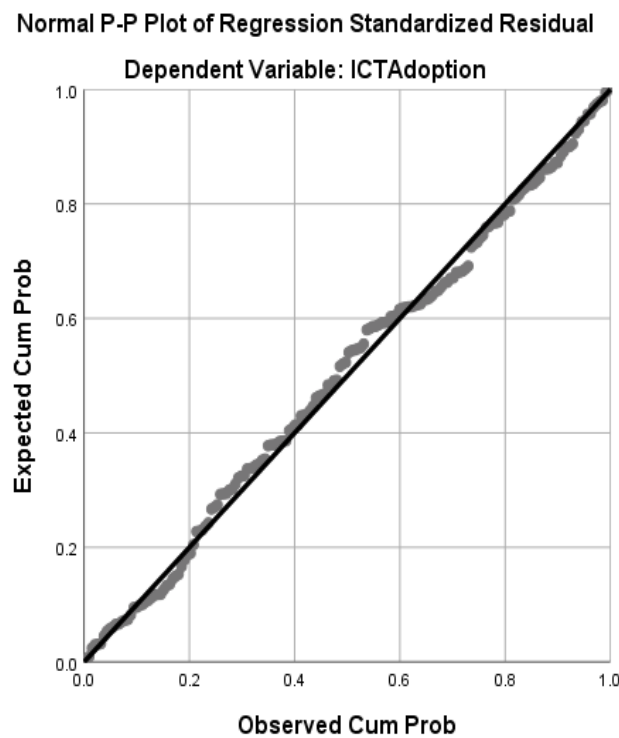


Figure 4.1 Normal P-P Plot



CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presented a summary of the research, a discussion of the study results, and the conclusions of the research. The chapter also presented the recommendations and suggestions for further research.

5.2 Summary

The current environment has negatively impacted the transport and logistics firms across the globe. More so, in Kenya, with most local transports and logistics firms lagging behind in ICT adoption, they have witnessed challenges in maintaining normal operations. The current study sought to examine the factors influencing the adoption of ICT within the transport and logistic firms in Kenya. The study specifically reviewed the effect of government factors, management capability, resource capability, and the organization structure on ICT adoption. The study was informed by the diffusions of innovations theory and the technology organization environment theory. The study adopted a descriptive research design that allowed the utilization of quantitative approaches in answering the study problem.

The focus of the study was on 260 logistic and transport firms drawn from Nairobi County. Pretesting of the study instrument was conducted in 20 firms that were excluded from the final study sample. The pilot results indicated that all the variables met the threshold for internal consistency; hence we adopted for the main research. The study relied on a Likert scale questionnaire in the data collection. The study employed a mix of Google forms and drop and pick methods in the data collection. The collected research data was edited and coded into SPSS 25 for subsequent analysis. The research was able to garner responses from 176 logistics firms, which implied a 73% response rate. The study applied descriptive analysis in the presentation of the summary responses.

The research utilized correlation analysis to determine the type of association between the study variables. The results of the study established that; there is a positive and significant effect of government factors on the ICT adoption; a positive and significant effect of resource capability on the ICT adoption, a positive and significant effect of management capability on the ICT adoption, and a positive and significant effect of organization structure on the ICT adoption. The study further sought to determine the combined magnitude of the four factors on the ICT adoption, and the regression results indicated that 62.2% of changes in ICT adoption are

determined by the organization structure, government factors, resource capability, management capability within the transport and logistic firms in Kenya.

5.3 5.3 Discussion of Results

The study results were discussed in line with the literature reviewed in the study earlier.

5.3.1 Government Factors and ICT Adoption

The review of the participants' responses indicated that, to a moderate extent, government regulation had supported the adoption of ICT. The findings also showed that, to a great extent, the available infrastructure is key to the adoption of ICT. The results also pointed out that tax policies and business regulations, to a great extent, do influence ICT adoption. The findings also showed that the licensing requirements in place are essential to ICT adoption. The findings indicated that offering incentives could stimulate digitalization and ICT adoption. The results show that government factors and their impact are in line with the environment factors as indicated in the TOE framework guided the adoption of new technology. The theory of Diffusion of Innovation Theory was reaffirmed further in this study by results that showed there is a significant effect of government factors (such as Taxation, Business regulation, Licensing requirements, Business environment) on the adoption of ICT.

These findings are further supported by Nyadoro (2016), who posited that ICT adoption significantly improves through government influence in building relationships and cost reduction initiatives, while Jena (2019) reported that legal and regulatory barriers were the main barriers to e-commerce adoption. Agboh (2015) and Nega (2019) reported that the cost of ICT equipment, poor infrastructure, and inadequate government support and supporting services coupled with financial support, strongly influence ICT adoption. Mwai asserted that government regulations, incentives, and taxation policies play a key role in ICT adoption.

5.3.2 Resource Capability and ICT Adoption

The findings of the study revealed that, to a great extent, most of the functions within transport and logistics firms had been automated. The participants noted, to a great extent, the organization's resources are vital to driving technology adoption. The study also indicated that the presence of skilled staff and technically-proficient staff are essential to ICT adoption. The results of the study indicated that the transport and logistics firms, to a great extent, do have access to technological infrastructure. The study showed that transport and logistics firms had expanded the technological capability of their employees and their qualifications help in driving ICT adoption. The TOE framework further showed that requisite organization factors such as adequate human resources, financial resources and internal competencies can improve

ICT adoption. The findings of this study established that resource capabilities are vital to ICT adoption. This reaffirms the applicability of the framework in directing ICT adoption within firms.

The study also showed that the transport and logistics firms have the requisite financial strength that can help guided ICT adoption. Similarly, Lubanga, Gakobo, Ochieng, and Kimando (2017), Kirui (2013), and Tob-Ogu, Kumar, and Cullen (2018) reported that financial, human, and knowledge resources as well as firm characteristics strongly influence ICT adoption. Ghobakhloo and Hong Tang (2013) and Otido (2013) found that resource acquisition, maintenance, and acquisition, coupled with firm size and characteristics, significantly influence the rate of e-commerce adoption. Further, requisite human skills, cost, and level of compatibility significantly influence ICT acceptability.

5.3.3 Management Capability and ICT Adoption

The research revealed that the management within the transport and logistics firms, to a great extent, are supportive of ICT adoption and empower employees to undertake innovations. The findings showed that the management has put in place ICT policies to guide systems deployment. The results indicated that the management within the firm involves employees in decision making and support knowledge management within the firm. The study also showed that the management team has the necessary competencies to support ICT adoption. The research also indicated that, to a great extent, the management team ensures there are a clear communication and feedback system as well as control and direction. This is in tandem with what the Diffusion of Innovation Theory postulated on management capacity being a critical factor in ICT adoption. Consistent with the TOE framework the findings showed that having management competencies is vital to ensuring firms adopt ICT seamlessly. The study showed that decision making, work experience and skills exhibited are vital to fostering ICT adoption within transport and logistic firms.

These findings are similar to Tripathi and Agrawal (2014), Awa, Baridam, and Nwibere (2015), and Omotayo (2016), who found a positive link between management competency and e-commerce adoption. Mambo, Ombui, and Kagiri (2015), Mutumba (2018), and Mwangi (2016) reported that better management structures, improved managerial commitment, ICT-driven strategies, adaptability, managerial support, ICT training, and benchmarking practices significantly influence e-procurement adoption. (Bhardwaj, 2013) reported that management competency influences organizational attitudes, which impact ICT adoption rates.

5.3.4 Organization Structure and ICT Adoption

The study showed that, to a great extent, the transport and logistics firms have laid down clear coordination processes and have designed a control system to guide the delegation of duties. The findings also indicated the firm has a clear chain of command, and internal processes have been formalized. The respondents indicated, to a great extent, the structure within the firm ensures employees are involved in decision making. The study also indicated, to a great extent, there is a free flow of information within the firm. The respondents noted, to a great extent, the firm structure has to enhance effectiveness within the firm, and communication keeps employees updated on the pace of ICT adoption. Consequently, analysis of organization factors of size, scope, and management (coordination and control, work structure, decentralization of authority, flexibility, formalization) found that ICT to a great extent was impacted by a free flow of information, clear chains of command, form internal processes and delegation. The findings reaffirm that organization factors are vital to improving ICT adoption. This is consistent with TOE framework that postulated that working in collaboration, technology, organization and environment factors are key predictors of technology adoption within firms.

This is in agreement with Mose, Njihia, and Magutu (2013), Zailani, Iranmanesh, Nikbin, and Jumadi (2014) and Awa, Ojiabo, and Orokor (2017) who reported that management and employee attitudes, compatibility with organization structure, task allocation, customer pressure and reliability of ICT equipment improve ICT adoption. Maingi, Awino, K'Obonyo, and Pokhariyal (2019) reported that strategic planning, which includes formalization, centralization, integration, and specialization, significantly influences organizational capabilities allowing for a more streamlined approach to e-commerce adoption. Further, firm characteristics, whether mechanistic or organic, were noted by Alton, Mausam, Beh, and Hong (2011) to strongly influence the effectiveness of ICT adoption within an organization.

5.4 Conclusions

The research concluded that government factors, management capability, resource capability, and organization have a statistically significant influence on ICT adoption within logistics and transport firms. The study concluded that government factors do have a significant influence on ICT adoption. This implied that supportive regulations, adequate infrastructure, better tax policies, and incentives, and licensing requirements could significantly improve ICT adoption. The study concluded that resource capability does have a significant influence on ICT adoption. This showed that having adequate financial resources, relevant and skilled staff, adequate

technological infrastructure, and improving technical capabilities can lead to higher ICT adoption.

The research concluded that management capability has a statistically significant influence on ICT adoption within the transport and logistic firms. The study established that a supportive management team, empowering employees, having clear policies, elaborate communication channels, and technological competencies are significant predictors of ICT adoption. The study concluded that organization structure does have a significant influence on ICT adoption of transport and logistic firms. The research opined that having clear coordination processes, formalization of firm processes, enhancing employee participation, having clear structures, and a well-designed control system will improve ICT adoption.

5.5 Recommendations

5.5.1 Policy Implications

The study recommends that policymakers can leverage the results of this study to develop incentive programs that will entice more transport and logistic firms to improve their ICT adoption. Further, the government, in coordination with logistic industry players, could undertake mapping of available infrastructure in place and come up with programs to support the layout of technological infrastructure across the country. This will help in improving awareness of the various ICT tools that can be implemented across the logistic industry players. The study also recommends that the government should relax the tax systems and improve the business environment as this will expand the competitiveness of the transport and logistics firms.

5.5.2 Practical Implications

The study recommends that transport and logistics firms should seek alliances with local lenders to improve their financial resources, which can allow them to invest in emerging technologies that can foster their efficiency. Further, the management teams should tap into the tech-savvy youths within the country who can form a talent-rich human resources team that can be the backbone of ICT adoption across the firms. Furthermore, the firms should improve the delegation of duty and empower their employees, which can lead to creativity and innovativeness within the workplace. The study also recommends that the management team within the firm should constantly review the internal processes within the firm to ensure they are aligned to the digital environment, which can ensure seamless operations within the firm.

The research recommends that the transport and logistics firms should invest in effective communication and feedback systems, which will enable stakeholders such as customers, industry players, and employees to communicate on the various impacts of ICT adopted within the firm. The study also recommends that the firms should improve the information flow within the firm as this will lead to a better learning environment, which can foster the resourcefulness of the employees, which can lead to better ICT adoption.

The research also recommends that the firms should improve their structure through the delegation of decision-making and formalization efforts, which can improve the efficiencies in adopting new technologies. The study also recommends that the firm should constantly review the emerging technologies to ensure the currently deployed technologies within the firm are not redundant. Further, the study recommends that the transport and logistics firms should conduct regular monitoring and evaluation of existing technologies to ensure they are actually supporting the attainment of the desired goals.

5.5.3 Theoretical Implications

The Diffusion of Innovation Theory explains how innovation diffused from development to the users and answers the how, why, and the rate at which ICT related ideas are adopted within the organization. This theory has significant and relevant implications in the study as it proved that organization structure (Coordination and control, Work structure, Decentralisation of authority, Flexibility, Formalization) and the management capabilities (Decision making, Skills, and competencies, Work experience, Knowledge management, Communication) were critical in the acceptance, communication, training and usage of innovations in an organization as they both depended on the human factor of both employees and management to ensure successful adoption of ICT in the transport and logistics firms. The study proved that the theory of Technology organization environmental framework was relevant as it confirmed that because of the relevance of ICT in organizations, the organizational section of the theory that covers scope, size, and management structure confirmed that the management capabilities and the organizational structures did play a significant role in the study. Lastly, the environmental context of the theory, which covers industry, competitors, and government policies, addressed the significance and relevance of the study of government factors in the study.

5.6 Limitations of the study

The limitation of the study was that the study was only conducted in transport and logistics firms within Nairobi City. Owing to the high infrastructure development and connectivity within the capital, the current study results may not be applicable in marginalized areas in the

country. This research thus suggests a more comprehensive study can be conducted across the country with more factors being considered to examine the extent of ICT adoption.

5.7 Further Research

This research only considered ICT adoption; however, further research work can be conducted to examine the impact of various ICT systems on the operational performance of transport and logistics firms.



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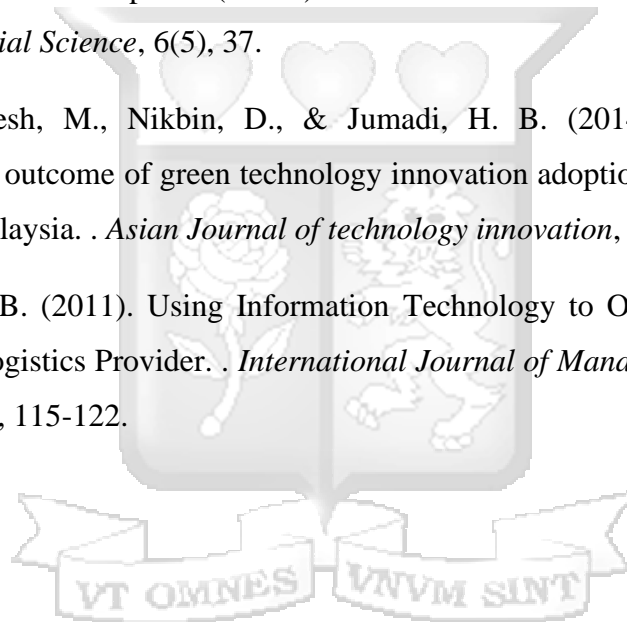
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APPENDICES

Appendix I: Informed Consent Form

Title of the Proposed Study:

FACTORS INFLUENCING INFORMATION COMMUNICATION TECHNOLOGY ADOPTION AMONG LOGISTICS (TRANSPORT) FIRMS

Section I:

Investigator:

SOFIA GETAMBU

MBA/111546/2018

Institutional Affiliation: **Strathmore Business School (SBS)**

Section II: Information Sheet–The Study

2.1: Why is this study being carried out?

The research is being undertaken as a partial requirement for the academic award of Masters of Business Administration Degree. The intent of the research will be purely for academic purposes and no research data sought will be utilized beyond that parameter.

2.2: Do I have to take part?

No. Your participation in the study will be voluntary. Even upon consent to take part in the study, you may decline to take part in the study at any point within the course of the exercise. The study will ensure that all participants are aware of their rights to cease their participation at any point.

2.3: Who is eligible to take part in this study?

There are 742 transport and logistics firms operating in Nairobi City County, according to the Kenya Business Directory (2018). The focus of the study will be on the technology manager of the transport and logistics firms as they are in charge of technology adoption in the firm. This study unit of analysis for the study will be 260-respondents. The respondents of this study will be key personnel in charge of technology adoption in the logistics firms. The respondents are expected to have the requisite information necessary to solving the research problem.

2.4: Who is not eligible to take part in this study?

The research will not consider non-senior personnel members within the firms. Further the study will not be open to people not working within the industry.

2.5: What will taking part in this study involve for me?

The researcher will only seek your opinion in filling up selected items on the **FACTORS INFLUENCING INFORMATION COMMUNICATION TECHNOLOGY ADOPTION**

AMONG LOGISTICS (TRANSPORT) FIRMS . The researcher will require you to go through the items in the questionnaire and respond to them to the best of your knowledge and without bias. The responses obtained will be for the previously mentioned purposes only. If you are satisfied that you fully understand the goals behind this study, you will be asked to sign the informed consent form (this form) and then taken through a questionnaire to complete.

2.6: Are there any risks or dangers in taking part in this study?

There are no risks in taking part in this study. All the information you provide will be treated as confidential and will not be used in any way without your express permission.

2.7: Are there any benefits of taking part in this study?

The findings of the research are expected to be of importance to multiple stakeholders within the logistics industry. The study will be beneficial to the top managers in the logistics firms, to the government related parastatals , traders as well as to future researchers and academicians.

2.8: What will happen to me if I refuse to take part in this study?

Participation in the study is entirely voluntary. Even if you decide to take part at first but later change your mind, you are free to withdraw at any time without explanation.

2.9: Who will have access to my information during this research?

Only the people who are closely concerned with this study will have access to your information. Any information you provide will be treated with utmost confidentiality.

2.10: Who can I contact in case I have further questions?

Any query can be directed to me Sofia Getambu +254720851896. You can also contact my supervisor Dr. Fred Ogolla, at the Strathmore University, **Academic Director- MBA programs via fogola@strathmore.edu or +254708400457.**

If you want to ask someone independent anything about this research please contact : The Secretary–Strathmore University Institutional Ethics Review Board, **P. O. BOX 59857 , 00200** , Nairobi, email **ethicsreview@strathmore.edu** Tel number: **+254703034375**

I, _____, have had the study explained to me. I have understood all that I have read and have had explained to me and had my questions answered satisfactorily. I understand that I can change my mind at any stage.

Please tick the boxes that apply to you;

Participation in the research study

I AGREE to be part of the research ()

I DO NOT AGREE to be part of the research ()

Storage of information on the completed questionnaire

I AGREE to have my completed questionnaire stored for future data analysis ()

I DON'T AGREE to have my completed questionnaire stored for future data analysis ()

Participants Name:

Participants Signature: Date:

I, _____ (Name of person taking consent) certify that I have followed the SOP for this study and have explained the study information to the study participant named above, and that s/he has understood the nature and the purpose of the study and consents to the participation in the study.

Signature: Date:

Name: **Sofia Getambu**



Appendix II: Questionnaire

This questionnaire consists of two parts; kindly answer all the questions by ticking in the appropriate box provided. Please do not write your name anywhere on the form. Your views was treated with utmost confidentiality, purely for academic purposes only.

SECTION A: GENERAL INFORMATION

1. What is your age bracket? (Tick as appropriate)

- | | | | |
|----------------|--------------------------|---------------|--------------------------|
| Below 30 years | <input type="checkbox"/> | | |
| 31 - 34 years | <input type="checkbox"/> | 35 – 40 years | <input type="checkbox"/> |
| 41 – 44 years | <input type="checkbox"/> | 45 – 50 years | <input type="checkbox"/> |
| Over 50 years | <input type="checkbox"/> | | |

2. What is your gender? (Tick as applicable)

- | | |
|--------|--------------------------|
| Male | <input type="checkbox"/> |
| Female | <input type="checkbox"/> |

3. What is your working experience in the company? (Tick as applicable)

- | | | | |
|------------------|--------------------------|---------------|--------------------------|
| Less than 1 year | <input type="checkbox"/> | 6-10 years | <input type="checkbox"/> |
| 1-5 years | <input type="checkbox"/> | Over 10 years | <input type="checkbox"/> |

4. What is your education qualification? (Tick as applicable)

- | | | | |
|-------------------|--------------------------|---------------|--------------------------|
| Secondary | <input type="checkbox"/> | Diploma level | <input type="checkbox"/> |
| University Degree | <input type="checkbox"/> | Postgraduate | <input type="checkbox"/> |

5. What is your current job department? (Tick as applicable)

- | | |
|----------------|--------------------------|
| Finance | <input type="checkbox"/> |
| Procurement | <input type="checkbox"/> |
| Marketing | <input type="checkbox"/> |
| Human Resource | <input type="checkbox"/> |

6. To what extent do the costs of infrastructure communication technology influence the adoption levels?

- To a very great extent () To a great extent ()
 To a moderate extent () To a little extent ()
 To no extent ()

7. To what extent does the support of the management team influence information communication technology adoption levels?

- To a very great extent () To a great extent ()
 To a moderate extent () To a little extent ()
 To no extent ()

8. To what extent does the business regulations influence information communication technology adoption levels?

- To a very great extent () To a great extent ()
 To a moderate extent () To a little extent ()
 To no extent ()

9. To what extent does the taxation policies influence information communication technology adoption levels?

- To a very great extent () To a great extent ()
 To a moderate extent () To a little extent ()
 To no extent ()

10. To what extent does the perceived usefulness influence information communication technology adoption levels?

- To a very great extent () To a great extent ()
 To a moderate extent () To a little extent ()
 To no extent ()

PART B: BARRIERS TO INFORMATION COMMUNICATION TECHNOLOGY ADOPTION

Kindly indicate to what extent do the following factors are barriers to the adoption of information communication and technology within logistics firms.

5= To a very strong extent 4= To a strong extent 3= To moderate extent 2= To a minimal extent 1= Not at all

No	Government Factors	1	2	3	4	5
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1.	The government regulations in place support the adoption information communication technology					
2.	The availability of the relevant infrastructures is key to the adoption of information communication technology					
3.	The tax policies put in place by the relevant bodies are supportive of adoption of information communication technology					
4.	The various business regulations put in place within the logistics industry are key to technology adoption					
5.	The licencing requirements allow for the adoption of ICT within logistic firms in Kenya					
6.	The incentives offered to stimulate digitalization within the firm influence adoption of ICT					
7.	There are many functions of the organisation that hve been automated					

PART C: RESOURCE CAPABILITY AMONG LOGISTICS (TRANSPORT) FIRMS

Please indicate in the table with a tick (√) your level of agreement based on the below scale:

5= To a very strong extent 4= To a strong extent 3= To moderate extent 2= To a minimal extent 1= Not at all

No	Resource Capability	1	2	3	4	5
1.	The organization has enough resources to facilitate to drive technology-adoption					

2.	The availability of relevant skilled staff within the firm determines adoption of information communication technology					
3.	Our firm has created a pool of technically-proficient staff					
4.	Our firm has access to technological infrastructure					
5.	Our firm has expanded the information technology capability among the staff members					
6.	The organization has the desired financial strength to implement ICT					
7.	The human resource personnel at the organization are qualified to drive ICT adoption					
8.	The costs of the information communication technology tools determine the firm's adoption rate					

PART D: MANAGEMENT CAPABILITY AMONG LOGISTICS (TRANSPORT) FIRMS

Please indicate in the table with a tick (√) your level of agreement based on the below scale:

5= To a very strong extent 4= To a strong extent 3= To moderate extent 2= To a minimal extent 1= Not at all

No	Management Capability	1	2	3	4	5
1.	The management team within our firm is supportive of technology adoption					
2.	The management team empowers employees to undertake innovation in service deployment					
3.	The management team has put in place clear ICT policies to guide system deployment					

4.	The management involves employees within the firm in decision making					
5.	The management has put in place measures to support knowledge management within the firm					
6.	The management team within the firm have the requisite technological competencies needed for system integration					
7.	The management within the firm has developed an elaborate communication and feedback system					
8.	The management team is capable of providing direction and control					

PART E: ORGANIZATION STRUCTURE AMONG LOGISTICS (TRANSPORT) FIRMS

Please indicate in the table with a tick (√) your level of agreement based on the below scale:

5= To a very strong extent 4= To a strong extent 3= To moderate extent 2= To a minimal extent 1= Not at all

No	Organization Structure	1	2	3	4	5
1.	Our firm has laid down clear coordination processes					
2.	Our firm has a well-designed control system to guide the delegation of duty within the firm					
3.	The firm has developed clear structures to guide the chain of command					
4.	The firm has deployed formalization processes in the internal processes.					

5.	The current organization structure allows employee participation in decision making					
6.	The organization structure allows for the free flow of information critical to ICT adoption					
7.	The organization structure enhances institutional effectiveness within the firm					
8.	Communication keeps employees updated regularly about the plans and progress towards ICT adoption					

PART F: INFORMATION COMMUNICATION TECHNOLOGY IN LOGISTICS (TRANSPORT) FIRMS

Please indicate in the table with a tick (√) your extent of adoption of ICT within the firm

5= To a very strong extent 4= To a strong extent 3= To moderate extent 2= To a minimal extent 1= Not at all

No	Information Communication Technology Adoption	1	2	3	4	5
1.	Our organization has deployed various technology in the inventory management within logistics firms					
2.	Our organization utilizes various digital marketing tools within the internal processes					
3.	Our organization has adopted various electronic data interchange processes					
4.	The organization relies on business intelligence systems in decision making					
5.	The firm has deployed various technologies in fleet management					

6.	The firm relies on various e-commerce technologies in the day-to-day operations					
7.	The ease of use of the various technologies within the firm determine the level of adoption					
8.	The ability of integration of the technologies to the firm processes determines adoption levels					

9. **To what extent have you adopted information communication technology tools within the firm?**

- To a very great extent () To a great extent ()
 To a moderate extent () To a little extent ()
 To no extent ()

10. **What are the benefits accruing from information communication technology adoption within the firm?** Tick the ones applying to your firm.

- Improved profitability () Increased efficiency ()
 Cost reduction () Better decision making ()
 Improved employee productivity () Better customer service ()
 Improved logistical support () Stakeholder engagement ()

Thank you for your participation in the study

Appendix III: NACOSTI Permit



REPUBLIC OF KENYA

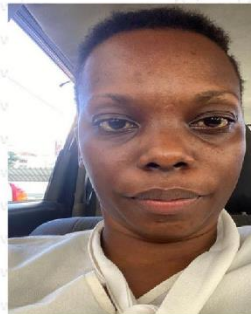


NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Ref No: **102477**

Date of Issue: **26/August/2020**

RESEARCH LICENSE



This is to Certify that Miss., Sofia Getambu of Strathmore University, has been licensed to conduct research in Nairobi on the topic: Factors Influencing Information Communication Technology Adoption among Logistics Firms for the period ending : 26/August/2021.

License No: NACOSTI/P/20/6311

102477

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Verification QR Code



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Appendix IV: Ethical Review Authorization Letter



Strathmore
UNIVERSITY

21st October 2020

Ms Getambu, Sofia
sofiagetambu@gmail.com

Dear Ms Getambu,

**RE: Factor Influencing Information Communication Technology Adoption
Among Logistics (Transport) Firms**

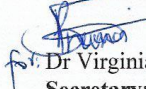
This is to inform you that SU-IERC has reviewed and **approved** your above research proposal. Your application approval number is **SU-IERC0896/20**. The approval period is **21st October 2020 to 20th October 2021**.

This approval is subject to compliance with the following requirements:

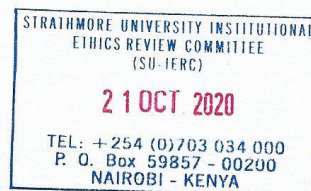
- i. Only approved documents including (informed consents, study instruments, MTA) will be used
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-IERC.
- iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-IERC within 72 hours of notification
- iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-IERC within 72 hours
- v. Clearance for export of biological specimens must be obtained from relevant institutions.
- vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- vii. Submission of an executive summary report within 90 days upon completion of the study to SU-IERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) <https://oris.nacosti.go.ke> and also obtain other clearances needed.

Yours sincerely,


Dr Virginia Gichuru,
Secretary; SU-IERC

Cc: Prof Fred Were,
Chairperson; SU-IERC



Ole Sangale Rd, Madaraka Estate. PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email info@strathmore.edu www.strathmore.edu

Appendix V: List of Logistics and Transport Firms

1. Jaspar Logistics
2. Shujaa Delivery
3. Prime Logistics
4. Urgent Cargo Handling
5. Dannafrica Logistics
6. Famio Services
7. Victoria Int Logistics
8. Intergrid Business Solutions
9. Crystal Freight Logistics
10. Masterpiece Couriers
11. Mercurial Interlink
12. Taifa Cargo
13. Expeditors
14. Unimark Freighters
15. Coronet Cargo
16. Neosealand Regional Logistics
17. Narokline
18. Equitorial Freight
19. Transmeridian Logistics
20. Tropical Sky Cargo
21. Intime Freight
22. Delta Cargo
23. Chomel Freights
24. Oceanic Cargo
25. Ukwala Forwarders
26. Waki Freighters
27. Globeflight Logistics
28. Treasure Cargo
29. Freightshore Agencies
30. Woodrich Servicesmerald Freight
31. Dennka Logistics
32. Dynamic Freights
33. One Touch Cargo
34. Bixo Digital Cargo
35. Prime Freight
36. Kifalmemovers
37. Longrock Ltd
38. Green Logistics
39. Skyland Logistics
40. Getboda
41. Deci Movers
42. Kentex Cargo
43. Blessings Parcels
44. Cargo Elegance
45. Center4logistics
46. Safe-Tech Logistics
47. Express Global
48. Taitanic Logistics
49. Karibia Logistics
50. Aeromarie Logistics
51. Kisa Logistics
52. Comrades Global Logistics
53. Nellioins Allied Services
54. First World Freighters
55. Cargo Direct Shipping
56. Gallon Logistics
57. Supersonic Forwarders
58. Jaspa Logistics
59. Bahari Forwarders
60. Beach Lines Logistics

- | | |
|--------------------------------------|-----------------------------------------|
| 61. Conventional Cargo | 91. Hebatullah Brothers |
| 62. Cornerstone Cargo | 92. Menyo Sacco Parcels |
| 63. Corrugated Sheet Cargo | 93. 2nk Parcel Services |
| 64. Damco Logistics | 94. Kettno Couriers |
| 65. Global Freight | 95. Western Express Couriers |
| 66. Kensco Business Solutions | 96. Pioneer Logistics |
| 67. Speedex Logistics | 97. Bolt Speed Cargo |
| 68. Regional Enterprises | 98. Jipe Moyo Services |
| 69. Muranga Forwarders | 99. Garvins Courier Services |
| 70. Alpha Logistics | 100. Runex Courier |
| 71. Alpha Impex Logistics | 101. Rush Nairobi |
| 72. Bluepearl Log | 102. Wiseway Logistics |
| 73. Bellstar Logistics | 103. Crane Logistics |
| 74. Bob Morgan Services | 104. Pwani Cellular |
| 75. Buyers Logistics | 105. Spawnx Logistics |
| 76. Business Logistics | 106. Drift Logistics |
| 77. Cargo Direct Logistics | 107. Tradewise Logistics |
| 78. Chariot Logistics | 108. Dynamex Logistics |
| 79. Convex Commercial Cargo | 109. Aduol Logistics |
| 80. Jaconinos Logistics | 110. Fastwaves Logistics |
| 81. Continental Logistics | 111. Ankester Logistics |
| 82. Gliner Logistics | 112. Agility Logistics |
| 83. Spear Logistics | 113. Magnate Logistics Ltd |
| 84. Sopa Cargo Services | 114. Kamtix Cargo Limited |
| 85. Turning Point Freight Ltd | 115. Kenmont Logistics Limited |
| 86. Superquick Freighters Ltd. | 116. Kenrevy Cargo Logistics |
| 87. Kadmus Freight Logistics Limited | 117. Kentan Connections Limited |
| 88. Homeland Freight Ltd | 118. Kiamba Clearing and Forwarding Ltd |
| 89. Gliner Logistics Limited | 119. Leena Apparels Ltd |
| 90. Famo Forwarders Limited | |

120.	Mary David Investments Limited	150.	Dkm Logisitics
121.	Mid Ocean Limited	151.	Worldtrade Freight
122.	Limutti Holdings Limited	152.	Jada Express
123.	Molo Freighters Ltd	153.	Nurex Cargo
124.	Rolling Cargo Limited	154.	Frank And Geoffrey Cargo
125.	Pejon Freight Movers Ltd	155.	Iko Delivery Services
126.	Planfreight Ltd	156.	Phil Logistics
127.	Regal Freighters	157.	Wellborn Errands And Couriers
128.	Sealine Logistics Ltd	158.	Neema Logistics
129.	Riam Logistics Ltd	159.	Destiny Cargo Handlers
130.	Eyelink Cargo	160.	Al Micdad Parcels
131.	Mainstreet Logistics	161.	Borabu Logistics
132.	Quatrixx Ltd	162.	Camdel Import And Export
133.	Princeddrive Logistics	163.	Alujuo Enterprises
134.	Asimus Logistics	164.	Damco Logistics
135.	Dorian Holdings	165.	Beacon Movers Ltd
136.	Truckers Kenya	166.	Titan Impex
137.	Asimus Solutions	167.	Hakika Transport
138.	Longroad Logistics	168.	Starex Global
139.	Arames Service Center	169.	Hakika Transport
140.	Sunrice Logistics	170.	Transmeridian Logistics
141.	Prime Freight Global	171.	Duke Express
142.	Emerald Freight	172.	Richens Logistics
143.	Sky Logistics	173.	Sheffird Cargo
144.	Mintaberg Services	174.	Framic Cargo Agencies
145.	Care Logistics	175.	Uneek Freight
146.	Jm King'ori Logistics	176.	Chaves Freight
147.	Blessing Parcel Services	177.	Western Logistics
148.	Issy Logistics	178.	Regent Freight
149.	Marks Enterprises	179.	Freight Forwarders

180.	Removal Goods Services	210.	Logistics 365
181.	Highland Forwarders	211.	Mex Logistics
182.	Hillebrand Kenya	212.	Cien Logistics
183.	Rising Freight	213.	Decan Freight
184.	Globeflight Kenya	214.	Glinter Logistics
185.	Techfreight	215.	Adroit Logistics
186.	Bosco Group Of Companies	216.	Dainer Global Logistics
187.	Cyberpost Logistics	217.	Daruro Air Travel
188.	Gisenya Logistics And Freight	218.	Sniles Cargo
189.	Gemwill International	219.	Netcore Transporters
190.	Main Freighters	220.	Jopuko Logistics
191.	Golden Guluf Forwarders	221.	Forrester Forwarders
192.	Comet Freight	222.	Lukyson Logistics
193.	Conventional Cargo	223.	Ultimate Logistics
194.	Liken Freight	224.	Upperhill Logistics
195.	Treasure Cargo Services	225.	Winnita Logistics
196.	Destiny Conveyors	226.	Starex Logistics
197.	Chemi-Labs Ltd	227.	Runex Courier Services
198.	Hacienda Logistics	228.	Makiwan Logistics
199.	Euni-Links Logistics	229.	Emirates Shipping
200.	Erin-West Logistics	230.	Diamond Shipping
201.	Airswiss Logistics	231.	Bax Logistics
202.	Delacom Services	232.	Impact Procurement
203.	Freight Agencies	233.	Sharama Movers Logistics
204.	Digital Cargo Handlers	234.	Amko Logistics
205.	Air Sea Cargo	235.	Dallasco Investment
206.	Mololine Services Limited	236.	Alibaba Logistics
207.	Lowin Logistics	237.	Newrising Transporters
208.	Indus Logistics	238.	Eldoret Shuttle Logistics
209.	China Logistics	239.	Dynamic Freight Movers

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|------|-------------------------------|------|-------------------------------|
| 240. | Triple Touch Express | 258. | Mambo Express Courier Limited |
| 241. | Kitale Shuttle | 259. | 247 Courier Services |
| 242. | Six Continents Logistics | 260. | Amana Courier Services |
| 243. | Transline Classic | | |
| 244. | Bima Freight | | |
| 245. | Agility Logistics | | |
| 246. | Allpoints Logistics | | |
| 247. | Bluewave Logistics | | |
| 248. | Novel Parcels | | |
| 249. | Superstar Parcels | | |
| 250. | Roy Parcels | | |
| 251. | One Touch Cargo | | |
| 252. | Sedo Logistics | | |
| 253. | Boldline Shipping | | |
| 254. | Flying Horse Logistics | | |
| 255. | Jihan Freighters | | |
| 256. | Leonard Logistics | | |
| 257. | Fastdrop Errands And Services | | |

