TRANSPORT MANAGEMENT TECHNOLOGIES AND PERFORMANCE OF THIRD PARTY LOGISTICS PROVIDERS IN KENYA

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DECLARATION

I declare that this research project is my original work and has never been submitted to any other University for assessment or award of degree.

Signed…… Date……

ADISA VELMER KILIRU

(D61/81107/2015)

This research project has been submitted with my authority as the university supervisor.

Signature…… Date……

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I would like to thank my Almighty God for enabling me to successfully complete this course.

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DEDICATION

I dedicate this project to my family for their immense support, tireless prayers and encouraging me to complete the study. God bless them abundantly.

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ABBREVIATIONS AND ACRONYMS

AVL	Automatic Vehicle Location
CAGR	Compound Annual Growth Rate
ERP	Enterprise Resource Planning
GPS	Global Positioning Satellites
IT	Information Technology
ITS	Intelligent Transport Systems
JKIA	Jomo Kenyatta International Airport
LPI	Logistics Performance Index
ROI	Return on Investment
SCOR	Supply Chain Operations Reference
SPSS	Statistical Package for Social Sciences

ABSTRACT

The aim of this study was to establish the link between transport management technologies and performance of third party logistics (3PL) providers in Kenya. The study was guided by two specific objectives; to identify the extent to which transport management technologies are adopted by 3PL Providers in Kenya and establish the effect of transport management technologies on performance of 3PL Providers in Kenya. The study adopted cross sectional survey research design. The population of the study comprised of 1,121 logistics companies operating in Kenya and the target population were logistics officers in each of the firms. Stratified random sampling procedure was adopted to identify the sample for the study. These strata were based on Nairobi, Mombasa and other regions. The expected sample size for the study was 340 respondents but actual sample size was 191 respondents. The study relied on primary data collection which was done using a questionnaire. The questionnaire was administered through phone and email techniques due to the geographical location of the targeted organizations. Descriptive and correlation analysis was done to analyse the data using SPSS. The findings show 53.0 % of logistic firms were in Nairobi, 30.2 % in Mombasa and 16.8 % in other major towns such as Nakuru, Eldoret and Kisumu. Fifty seven percent were male respondents and female accounted for 43.4 %. The results revealed that 31.8 % were 26-35 years, 30.2% were 36-45 years, 16.3 % were 18-25 years, 14.7 % were 46-55 years, and 0.7 % were 56 and above. Forty four percent of firms had been in operation between 2-5 years and 12.4 % had operated for less than 2 years. The findings revealed that GPS was the most used IT tool with 55.8 % indicating that their firms used GPS to a very great extent followed by Bar-coding technology and Warehouse Management Systems. The results indicated that improved communication was the most significant effect of transport management technologies followed by reduced costs of operation and improved productivity. The study concluded that GPS was the most adopted transport management information technology among 3PL providers in Kenya and improved communication as the greatest effect of adopting transport management technologies. The study concludes that there was a positive and significant relationship between intelligent transport systems, telecommunication and information technology and performance of 3PL service providers. Based on the findings, the study recommends that 3PL providers in Kenya should evaluate their information technologies strategies to identify which transport management technologies are most crucial to their operations. Such an evaluation would enable 3PL providers to invest in transport management technologies that lead to maximum optimization of their operations, and that 3PL providers should invest in transport management technologies that provide available, accessible, and timely information in every stage of the supply chain. This would contribute to improved performance of the firm in an industry that relies on information and communication with clients.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Transportation has over the years become more important especially when it comes to its role in Kenyan logistical operations. Organizations are seeing transportation management being influenced more each day by technological advancements available, and where they are not able to adopt these technologies internally, they opt to outsource from outside service providers that are more competent to deliver these advancements in an efficient and effective manner. The importance of addressing these issues that concern technology and the capabilities of logistics firms to incorporate the available technologies enables the maximization of efficiencies and effectiveness of these Kenyan logistics firms (Kherbash and Mocan, 2015).

Transportation in third-party logistics operations covers about a third of the whole amount of costs in transportation systems that are normally put in place and they greatly affect the performance of logistics systems that work concurrently with them (Sreenivas and Srinivas, 2007). The main objective of firms is to improve their performance that can be achieved through improvements in the competitive strategies for respective business areas of the firms (Pearce & Robinson, 2011). In today's competitive environment there is an urgent need to control logistics costs and thus through the measurement of performance of logistics firms it has proven to be a successful tool in achieving a firm's objectives.

Yang (2014) defined Third Party Logistics (3PL) as organizations offering single or multiple logistics services and activities for usage by its customers on a contractual basis. The services offered by third party logistics include freight forwarders and courier companies that integrate and offer sub-contracted logistics and transportation services, from simple logistical activities to advanced logistical solutions (Council of Supply Chain Management Professionals, 2013). 3PL service providers' obligations are different depending on the degree of involvement and the number of outsourced logistics services.

3PL service providers are very important when it comes to productivity, reducing costs, and making profits as well as improving the quality of service to their clients and therefore they form a significant component of the supply chain management by outsourcing one or more logistical functions to 3PLs. (Vishal, Nitin, Satiish, & Nishant, 2013). The concerns and aims of 3PL outsourcing are reducing delivery times, increasing flexibility, loss of direct customers, depending on service providers, reducing costs and concentrating on core competencies. According to Christopher (2011), Logistics management is a process of managing in a tactical and deliberate manner the procurement, movement, storage of materials, parts and finished inventory together with the information flows involved through the company and its marketing channels.

1.1.1 Transport Management Technologies

Technology has always been the driving force behind transportation industry. People have always sought for ways of transporting goods faster and more economically. With the arrival of internet, transportation management systems have highly advanced and increased efficiency and effectiveness. Therefore, organizations have to choose the right technology for different logistic services which are crucial to business to achieve competitive advantage in the market.

There are several transport management technologies that are used in the transport and logistics sectors. Zhong and Zhou (2011) study mentioned transport management technologies among logistic companies to include: global positioning system (GPS), electronic data interchange (EDI), and enterprise resource planning (ERP) systems. Bhandari (2012) cited bar coding, Radio Frequency Tags (RFTs), RFID (radio frequency identification), Automated Inventory tracking system (AITS), and Distribution Requirement planning (DRP) as some of the technologies used by 3PLs. Vivaldini, Pires, and de Souza (2012) mentioned several fleet management and supply chain technologies including: Vendor Managed Inventory (VMI), Automatic Vehicle Location (AVL), Geographical Information Systems (GIS), ERPs (Enterprise Resource Planning), and Control Total Fleet (CTF).

Technology enables strategic opportunities for the organizations to create and improve on their competitive advantage in different functional areas of management which includes supply chain management and logistics. The critical success factors rely on the selection and determination of the appropriate technologies for an application, management and culture policies, and availability of proper organizational infrastructure. In logistics, automation, communication, and information technologies have had an impact on data gathering, transmission and analysis, increased speed of identification with a high level of reliability and accuracy. Technology is being used as means to improve business performance and competitiveness; it plays a significant role in the success of the supply chain by increasing efficiency and effectiveness of the logistics system (Odero, Reeves and Chokerah, 2016).

1.1.2 Performance of Third Party (3PL) Providers in Kenya

Wilding and Juriado (2004) identified delivery timeliness and accuracy, order fill rates and inventory turns as some performance measurements of 3PL providers. Dominguesa, Reisa, and Macário (2015) categorized 3PL performance measurements into three groups: the activities dimension (e.g. transport, warehousing, and customer service), the decision level dimension (operational, tactical and strategic) and the different actors' dimension (e.g. carriers, 3PL and consolidation centers).

Understanding the different components of logistics that are associated with transport performances can assist Kenyan firms to identify areas that need improvement and areas that drive up their competitive advantages. Performance indicators of logistics firms involve time, costs and complexity of moving goods from one area to another. Additionally, the operational costs like port charges, clearing and forwarding charges, freight costs and inefficiency costs greatly affect the performances of logistics firms operating in Kenya (East Africa Logistics Performance Survey, 2014).

According to World Bank (2016), Kenya is ranked world number 42 out of 160 countries in relation to logistics performance. It is additionally second in Africa behind South Africa in terms of logistics performance. This logistics performance is measured using the Logistics

Performance Index (LPI), which is a survey of operations providing feedback on measurements that deal with Logistics friendliness of countries. The Kenyan LPI score is 3.33 out of a maximum score of 5.

1.1.3 Third Party Logistics (3PL) Providers in Kenya

According to the Trade and Development Council (2002), the transport industry in Kenya is made up of air transportation, sea transportation, traditional freight forwarding, and 3PL providers. According to Njambi and Katuse (2013), the significance of 3PL is that it provides a quicker and cheaper mode for companies to deliver their products across the country and beyond. Companies are aware that 3PLs provide an opportunity for an increased competitive advantage. Through their unique position and evolving capabilities, 3PLs can be seen as strategic players in supply chain management as opposed to mere vendors of a given organization.

The transport industry is the major contributor to the Kenyan economy, due largely to Kenya's excellent harbor, its strategic location and export trade. The Kenya Ministry of Transportation (2003-2004), indicated an intention of promoting Kenya as an operations center and as a multi-model trade management center. The aim of the government was to improve Kenya's position as Africa's major logistics and transportation hub by enabling the development of an express cargo terminal of Jomo Kenyatta International Airport (JKIA) and a logistics center and building a logistics park on Mombasa Island. The government was also engaged in upgrading current infrastructure to allow a smooth flow of cargo between mainland Africa and Kenya.

According to Hertz and Alfredsson (2003), the different types of 3PLs can be grouped according to the different characteristics associated with these providers. Firstly, there are transportation based 3PLs, these are providers that specialize in offering of transportation services to respective customers. Secondly, there are warehouse or distribution based 3PLs, these concentrate on storage and distribution of goods from warehouses to a variety of

customers. Thirdly, there are forwarder based 3PLs providers, these are very independent and act as middlemen with forwarder roles (Vishwanath, Srinivasa, & Anuradha, 2016).

Additionally, there are shippers or management based 3PLs providers, they focus on the management of the shipping process from start to finish. Furthermore, there are financial based 3PLs, these provide auditing and freight payment, cost control and accounting, tracing, tracking, inventory management, booking, and monitoring tools. Lastly, there are information-based 3PLs which specialize on offering of services that range from internet based services to electronic operations of logistics and transportation services (Robinson, 2014).

Kenya has been making considerable gains over the past two years on a development agenda that is developed to strengthen the country's position as a leading regional transport and logistics Centre for the East Africa region. This is however hindered by an infrastructure deficit which, according to the World Bank's Kenya Public Expenditure Review (2015), is expected to require annual spending of up to 400 billion Kenya shillings over the next decade. Kenya's plan to be one of the leading regional transport and logistics Centre in East Africa is supported by increases in government spending, foreign donations and vital participation by the private sector. In its 2015 report, the World Bank indicated that the increased levels of spending on infrastructure meant Kenya was heading in the right direction, in relation to realizing its growth potential.

1.2 Research Problem

The logistics industry in Kenya is generally a competitive industry and having any slight advantage over the competitors goes a long way to performing better operationally and financially (Gacuru & Kabure, 2015). Relevant technology adoption is one of the key approaches to creating that competitive advantage by logistics firms operating in Kenya. However, technology adoption in transport management is faced with a lot of problems like outdated technologies, inflexible technologies and poor strategies for technology adoption. Logistics management especially in the transport sector is dependent on how efficient, reliable and economical the processes, systems and human resources are managed (Mogeni

& Kiarie, 2016). Having the latest technologies and innovations in the management of all these factors goes a long way to have optimal operational conditions for the business and organization as a whole.

Taylor, Tseng and Yue (2005), researched on the role that transportation plays in the logistics chain, they discussed that without well-developed transportation systems, logistics could not efficiently reduce operation costs and promote the growth of service quality. Kherbash and Mocan (2015), reviewed how globalization is affected by the logistics and transport sector, in their findings they stated that transport greatly supports international economic relations and is crucial in forming transport networks for goods. They concluded that globalization favors immensely advanced transport and logistics networks that have been already established. They however did not consider the technological impact that can affect the logistics and transport sector and as result also affect globalization.

According to Tipping and Kauschke (2016), the transport and logistics industry is currently experiencing a lot of change both locally and globally. Some of these changes are the incremental customer expectations in individual and corporate businesses, where customers are expecting to receive goods faster, in a flexible manner and at very low delivery costs. The threat of new entrants to the industry is another change, where some of the customers who were being serviced by these logistics firms have started their own logistics companies and as result become direct competitors. The three in their research also failed to look at the important role technology could play in increasing the performance of the logistics chain.

Nduta (2012), conducted a research on developing sustainable competitive advantages in Signion Freight Limited. She concluded that IT management systems are key competitive advantages that need to be developed for purposes of sustainability in Signion. According to Jela (2013), the adoption of supply chain technology improves efficiency and effectiveness of operations of the manufacturing firms in Kenya. She deduced that supply chain technology improved the efficiency of the manufacturing firms' operations but had very little effect on the firms' effectiveness. She limited her research to only manufacturing firms and in her recommendations, she proposed the research to be advanced further to other organizations

that can include transport and logistics firms. Moreover, Gacuru and Kabure (2015), researched on factors affecting efficiency in logistics performances of trading and distribution firms based in Jomo Kenyatta International Airport (JKIA). She found out that information technology (IT), level of competitive advantage and business-to-business relationship are some of the factors affecting the efficiency of logistics performances.

From the above studies, there is less evidence of research on transport management technologies in relation to performance of 3PL providers in Kenya and hence the need to fill this gap. This study seeks to answer the following questions. What is the extent to which transport management technologies are adopted by 3PL Providers in Kenya? And what impact do these technologies have on the performance of 3PL Providers in Kenya?

1.3 Objectives of the Study

The objectives of this study were categorized into two;

i. To establish the extent to which transport management technologies are adopted by 3PL Providers in Kenya.

ii. To determine the effect of transport management technologies on performance of 3PL Providers in Kenya.

1.4 Value of the Study

The study will enable Kenyan Logistics companies to experience higher customer retention by providing technology options that best meet the customers' demands as adoption of technologies by these companies can assure customers that their demands are met in the most efficient and effective manner. Also, this research will enable the increase of sales volume because of the customer retention and even acquisition of new clients. This study can be used to ensure that transportation routes with maximum number of customers are used therefore saving on transportation costs like fuel costs. This is because identifying the types of technologies available to these Kenyan firms enables them to identify which technologies are

best suited for their organization and how best these technologies map out their transport routes for maximum efficiency and effectiveness (Leonards, 2016).

Umney (2014), identifies that logistics firms, are usually faced with increased demand for efficient processes along the supply chain. Carrying out a research on the availability of technologies currently adopted by these firms together with the effect these technologies have on their business is important as it will help with the integration of all the relevant processes involved in logistics, from procurement processes to fulfillment processes in a very efficient and effective manner.

The research will enable favorable regulation of policies and procedures in relation to the Kenyan logistics industry that will favor the growth, adoption and incorporation of technologies related to transport logistics that will result in the driving up of the competitive advantages of these firms'. The stakeholders in this industry like the managing directors and chief executive officers, will find value in this research since they will be able to identify which technologies are most relevant in the requirements to improve their companies' performance measures that will enable them to operate both in the most efficient and effective management.

The findings of the study will also be useful to scholars and academicians as a source of reference. Additionally it will contribute to logistics as a body of knowledge by providing more awareness into the adoption of transport management technologies.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter discusses the role of transport technology in relation to performance, the different transport technologies available in transport management and logistics, the challenges and implications of adoption of these technologies by the various logistics firms in Kenya, the scientific management concepts of transport technologies and performance management of logistics firms in Kenya, and finally, the conceptual framework for the study.

2.2 Transport Management Technologies in 3PL Providers

Logistics is a very important aspect to any organization whether operating in as a local or an international company. Logistics operations are mostly involved with production and distribution processes, incorporating the various technologies involved in logistics ensure that optimization of these processes is possible and it generally results in promotion of efficiency and competitiveness of the organizations that operate in this industry (Sreenivas and Srinivas, 2007). Technology application in logistics management, especially transport management is geared towards decreasing the complexity of facilitating the physical movement of goods (Griffis, Goldsby, Cooper, and Closs, 2007). This technology integration in transport logistics management is also applied with the purpose of improving logistics capabilities while at the same time reducing costs.

The use of different technological tools available in transport logistics by an organization, is because of the need to make the operations involved in transport logistics more efficient. There is always an incremental demand for innovative solutions to transport logistics management problems like; the need for a variety of technological options when it comes to transport management but the options required are to be available with minimal funding (Mizuta, Swindler, Jacobson and Kucienda, 2013). The various technologies that are adopted are aimed at improving transport systems management and cost-effectiveness thus resulting in greater productivity and performance in relation to levels of effectiveness, efficiency and flexibility.

According to Kevin Jossep (2017), transport management technologies are evolutions that involve the adoption and usage of technical innovations and best practices that are associated with logistical activities including transport management to correct inefficiencies and problems encountered in this industry. The different types of technologies normally associated with transport management are broadly categorized into three; namely, Telecommunication and Information Technologies, Intelligent Transport Systems and lastly Emerging Technologies. Technology is one of the four drivers of change in transport management including changes in customer behavior, changes in work practices and increasing or decreasing workloads, thus it is important to investigate descriptively how exactly technology plays a role in transport management.

2.2.1 Intelligent Transport Systems

Intelligent Transport Systems (ITS) involve the combining and assimilation of technological information into the management of different operational activities involved in transportation, with the main objective of increasing performance like efficiency, capacity, safety, cost, environmental impact and flexibility (Amoroso, Marfia, Roccetti, and Palazzi, 2014). The intelligent transport systems comprise of machines, functions and other aiding tools that serve the purpose of identification, generation, processing, transmission, communication, monitoring and presentation of relevant information to all parties involved in the transport management operations.

Intelligent Transport systems are grouped into two categories; those found in vehicles, they include such systems like communication systems and those found in the infrastructure and transportation modes, they include dynamic signals and infraction control systems (Cortes, Serna and Gomez, 2013). Generally, there are various types or categories of intelligent transport systems.

Firstly, Global Position System (GPS), this is a navigation system that employs radio waves whether in the sea, land or air to determine the exact location, velocity and time of anything in the world. It can be used in every transportation mode. In Kenyan logistics firms, it is

mostly used for vehicle tracking, identification and location. Signion group (2016) and DHL Kenya (2017) boast of employing the latest tracking systems using GPS, in their fleet management and operations especially in their freight transport departments.

Secondly, Automatic Vehicle Location (AVL), is a transport technology that is responsible for tracking vehicles and sending back feedback information concerning the location and status of the vehicle to a central establishment, which results in better fleet management and vehicle dispatching. The different types of devices associated with this technology are: Dead reckoning and Beacon tags, which calculate the distance travelled by a vehicle according to the number of wheel revolutions counted or by use of micro-waves and infrared (Deakin and Kim, 2001).

Lastly, Smart Cards, these are electronic cards that have silicon chips embedded in them for the transmission and receiving of data. Its application in transport management is on vehicle identification, payments that include; tolls, fares and fees. Their main benefit is that they limit the need to handle physical money and give the users the ability to carry out complex payment structures unlike cash-collections. Due to their ability to be applied globally or universally they bring about greater accessibility for logistics firms that operate in more than one region (Deakin and Kim, 2001).

2.2.2 Telecommunication and Information Technologies

Telecommunication and information technology involves the use of electronics, computers and software to convert, protect, process, store, recover, transmit and communicate any relevant information (Laudon and Laudon, 2007). Additionally, it is concerned with improving of human and organizations problem-solving skills through use of technologically based designed processes and systems that improve the effectiveness and efficiency of information in operational, tactical and strategic scenarios (Capgemini, 2014).

The application of telecommunication and information technology in transportation management can be seen in the usage of cellular phones that have GPS systems for purposes of assisting in travelling, fleet management involving; car tracking, driver management that

is associated with directing and finding best alternative routes for these drivers. The benefits of using telecommunication and information technology in transport management is that; it greatly aids in recovery of stolen vehicles, increase personal safety of the employees involved, reduces insurance costs, unnecessary overtimes and lastly increases customer satisfaction (Cooper and Schindler, 2013).

2.2.3 Emerging Technologies

Vehicles that use alternative fuels for ground transportation are one of these emerging technologies associated with transport management. The ever-increasing environmental awareness obligations by the world brought about by the energy crisis and environmental damages by fuel emissions has brought about the need for logistics firms to seek alternative fuel and vehicles that have the least damage on the environment. Examples of these alternative fuel are use of hydrogen fuels instead of the normal gasoline fuel used and use of electric cars that have zero vehicle emissions. The technology is still relatively limited though, but more and more companies are slowly shifting to more eco-friendly fleet management operations (Deakin and Kim, 2001).

Technological advancements in logistics firms especially those dealing majorly with transport management has been on the rise and it is important to briefly look at some of these advancements and their operational impact in the respective logistics firms. Mobile technological advancements are one of the fastest growing innovations globally right now. The use of built-in cameras, wireless internet, Global Positioning Satellites (GPS) connectivity, voice recognition software and downloadable barcodes are some of the technologies used by mobile operators especially in freight transportation. Additionally, the phones could be used by logistics workers to carry out vehicle inspections, image capturing of non-conformance work activities and even be used to obtain digital manifests. The great benefits of using these mobile technologies is that it brings about greater efficiency in work operations, it further drives or increases the competitive advantages of companies that adopt these technologies and lastly it improves communication between the different departments of the organization (Welford, 2016).

The use of the latest transport optimization and logistics planning systems is another type of technology used in logistics businesses, which results in having the ability to better control a lot of the features that are present in the order fulfillment process. Some of the systems being discussed are systems like multi-channel order integration or incorporation, capacity management, customer communication, consignment tracking and lastly continuous route optimization (Salter, 2016).

Another technological innovation is the use of cloud-based systems. While in the old software solutions in logistics management, the immediate and concurrent utilization of various applications is the general way to combine various applications to one workflow, cloud-based systems apply a different way to their usage, they join the various applications in one work-flow and as a result allow the usage of these applications without boundaries and can be viewed as one. Take for example, a combined process between inventory management systems and Enterprise Resource Planning (ERP) systems, these two can be used as one service and without changing the application (Daalhuisen, 2016). The advantage of using cloud based systems is that the logistics firms become more agile and increase in intricacy and dependability of networks is possible.

Other technologies that are shaping the logistics companies' operations and business directions are smart-card technologies that increase feasibility and convenience of pricing their variety of services offered in these types of companies and advanced traffic management systems that result in increased road capacities and improvement of safety on the roads. Lastly, automation technologies like service process orders in both passenger and freight transport (Deakin and Kim, 2001).

2.3 Performance of Third-Party Logistics Service Providers in Transport Management

Logistics companies, especially those that deal with transport management in Kenya face some challenges that inhibit their performance. Firstly, the challenge of poor transport infrastructure really deters the growth of many African logistics markets. Specifically, when dealing with road and rail links between economic hubs. The cost of transporting goods in Africa alone is on average 2 or even sometimes 3 times higher than in developed countries

like United States of America and Europe. Additionally, transport costs involved represent about 50-75% of the retail price of goods. Adopting technology like use of cargo drones which are small unmanned flying modes of transport or use of wireless technology which will be because of discarding fixed-line networks could help reduce these costs (Knight-Frank, 2016).

Secondly, Logistics companies are normally characterized by having inflexible management systems that do not necessarily support small scale or individual businesses. This is because the systems normally developed are best suited to cater for corporate businesses that have advanced networks. Furthermore, there is not a lot or adequate funding for investment in researches that involve transport systems. We are continuously experiencing longer supply chains and as a result higher levels of operational flexibility are required each year. Also, other challenges like third party carrier compliance, inefficient operations systems and congestion of carriers in one system needs to be addressed (Fawkes, 2014).

De-regulation of internal logistics markets is another key issue facing this industry, which forces logistics firms to re-think their logistics strategies in terms of moving away from the nationwide approach to a more diverse and new cross-border international structure. Lastly, the issue of availability of suitable management and labour is paramount in the logistics industry, where proper understanding of the integral nature of logistics is an important skill for a manager in this sector to have since they oversee oriented and intricate networks (Rushton, Croucher, and Baker, 2010).

Transport activity in Kenya is expanding correspondingly with infrastructure spending. In 2014, the Kenya National Bureau of Statistics (KNBS) in 2014, reported a growth of 5 % in the storage and transport sector, up from 1.22 % in 2013. There was an increase in the total amount of freight traffic on rail by 24.3 % to 1.5 metric tonnes in 2014 from 1.2 metric tonnes in 2013. East Africa relatively has some of the highest cargo transport prices in the world. This is because the region has relied heavily on trucking to move cargo around. Railway transportation, though much cheaper, only covers 10% of the region’s transport market this is due to low operating capacity, poor maintenance, under-investment and high

fuel prices. At present, 70% of Kenya's imports end up in Nairobi, incurring higher transport costs and journey times from the port of Mombasa as well as inconveniencing businesses and pushing up prices for consumers. Kenya has become aware of the need to bring services closer to customers, that is why for example, they have introduced the idea of dry ports and flagships projects like the Standard gauge railway to address these issues (The Report: Kenya 2016). In Kenya, approximately 95% of Kenya's cargo travels by road with the average journey from Mombasa to Nairobi taking around 25 hours (African Development Bank-Kenya Country Strategy Paper 2014-18).

There are specific emerging quantitative and qualitative indicators of logistics performances that are broadly based on cost, time and complexity of trade transactions. When investigating the time measure or indicator, it is generally looked from the marine, surface or air transportation and the key metrics associated with time are dwell times involved and order-cycle times. In the case of cost measures, it is also based on whether one is looking at marine transport, surface transport or air transport and the most common performance metric is freight cost. Lastly, on the complexity of trade transactions indicator; the metrics involved are the number of documents required per trade transaction, the number of signatures involved per transaction and the number of times a consignment is typically inspected (East African Logistics Performance Survey, 2015).

Additionally, the supply chain operations references model metrics (SCOR) looks at customer satisfaction or service quality as another performance indicator, where the metrics involved are the number of new or lost customers the organization has obtained at a period. These discussed indicators and metrics can be researched on by analyzing the organizations involved in respect to their historical data, budgets, established standards or even benchmarking to see how the technologies associated with transport and logistics have impacted these performance measures.

2.4 Transport Management Technologies and Performance of 3PL Providers

Logistics companies may sometimes differ in terms of the variety of services that they offer but for every logistics company they generally share fundamentally the same core-mandate, which is to deliver or facilitate services that deal with warehousing, distribution and transportation of goods in the supply chain with the purpose of assisting organizations manage these flows in the supply chain in an efficient and effective manner that results in low operational costs and maximization of organizations profits (Kelchner, 2008). An example of logistics companies could be the ones that deal with freight and passenger transportation, custom brokers or middlemen that are involved with importation and exportation of goods.

Through the incorporation and integration of advanced technologies discussed above, the transport industry has achieved some important productivity gains like; the use of more efficient warehouse management systems, vehicle and load optimization systems among others. These technologies have made firms to be conscious and anticipate forthcoming technological changes and thus enable firms to plan and account for these changes in a way that best fits their organization goals and objectives. Because of their planning it has enabled these logistics firms not to be caught unawares or surprised by these technological changes (Rushton, Croucher, and Baker, 2010).

It is also important to look at progenies that do not favor the development and adoption of desired new technologies. These are those bottlenecks that slow down the adoption and integration of new technologies. These bottlenecks are investigated along the lines of economic, social and environmental dimensions that will enable decision-makers after their strength, weaknesses, opportunities and threats assessments to come up with better, cheaper and faster transportation services in their operations that result in increments of customer service satisfaction and streamlined supply chains that are based on these technologies (Deakin and Kim, 2001).

The technologies in transport and logistics are applicable in many ways in the industry, firstly, they can be applied to pricing where an analytical approach to how pricing is done is achieved through the integration of new technologies to make better use of available capacity and create rigid processes that handle in a more efficient manner buyer conformance to the volume-price equation. Secondly, these technologies can be applied to equipment and asset management where the automation of processes due to new technologies results in optimal equipment positioning and lowering of asset management expenses (Silvey, 2007).

Another application is network optimization, where analysis of customers' demands together with trade forecasts is done to optimally make use of network routing. Customer relationship management can also be applied using the various technologies in transport and logistics where streamlining of customer segmentation is achieved using advanced processes brought about by these technologies where a more specialized degree of services is offered that is set to objectively target better responses to customers demand. Furthermore, document processing and human capital management is simplified, made flexible and errors are reduced to automation of majority of processes involved in the transport and logistics management operations (Robinson, IBM, 2007).

2.5 Conceptual Framework

This conceptual framework looks at the independent variables that are the different types of technologies associated to transport logistics management and tries to draw a relationship of how they affect the dependent variables which are transport logistics performance measures: time, cost, complexity of transactions and customer satisfaction.

Independent Variables **Dependent Variables**

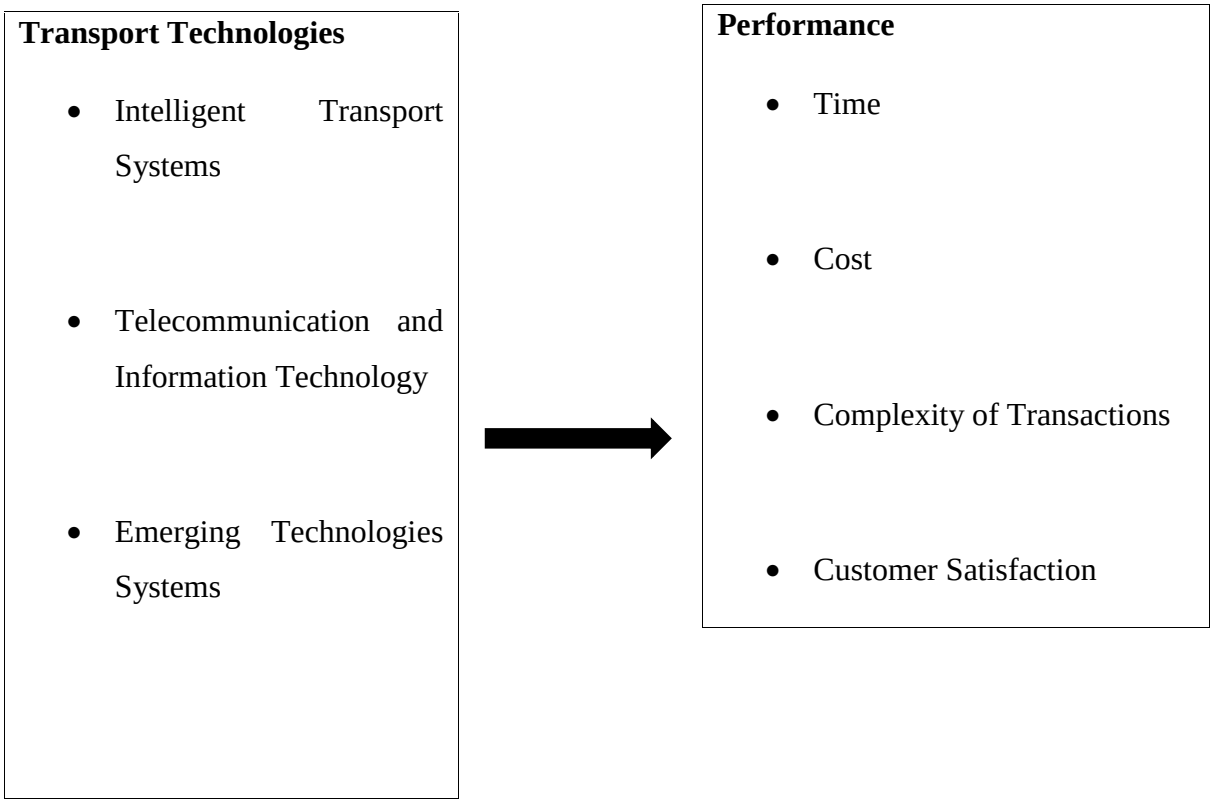

Figure 2.1: Conceptual framework

Source: Research Data (2017)

2.6 Summary of Literature Review

This chapter discusses the different types of technologies that are available for transport management in logistics firms and they are mainly categorized into three; intelligent transport systems, telecommunication and information technology and lastly new technologies. It also discusses the benefits or results of incorporating these technologies into logistics firms' processes and operations. Lastly, this chapter highlights the different performance measures that can be applied to measure the impact of technology adoption by logistics firms in Kenya, some of these performance measures include; time, costs, complexity of trade transactions and customer satisfaction.

Olga (2013), investigated the logistics processes in supply chain management, information technology in management of these processes and the use of information technology in the transportation logistics segment, where she concentrated on key factors in information technology that affected the efficiency of transport logistics segment. She found out that IT is very integral to the management of logistics processes and concluded that each transport logistics organization should at least incorporate to a certain degree information technology in their operations. She however limited her research on only IT and no other forms of transport technologies available.

Closs, Goldsby and Clinton (1997), conducted a research on Information technology influences on world class logistics capability, where their objective was to investigate the relationship between logistics information system capabilities and logistics competence. Their findings were that there was a very strong relationship to how IT was used and the world class firms' performance in terms of logistical competency. They however limited their research to only world class logistics firms and not any other.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the overall methodology that will be used to carry out this study. It outlines the research design, the target population under consideration, the sample size and sampling techniques, the data collection methods and instruments and lastly data analysis techniques and presentation for the respective objectives of the study involved.

3.2 Research Design

The research design used was a cross-sectional survey. This means that quantitative data was collected at a specific point in time to meet the objectives of the study.

3.3 Population of the Study

The population of the study comprises a total of 1,121 logistics companies operating in Kenya (Kenya Business List Directory, 2017). The industry can be grouped into regions of operations where the main regions are Mombasa having a total of 267 logistics companies, Nairobi having a total of 742 logistics companies and others that do not operate in any of regions mentioned previously having a total of 112 logistics companies (Kenya Business List Directory, 2017).

3.4 Sampling Technique and Sample Size

The study adopted the stratified random sampling technique where companies in each of the 3 strata were randomly sampled according to the 3 sub-groups and thus having a collective sample size of 340 logistics firms operating in Kenya. Stratified random sampling was used because of lack of homogeneity in the population and it provides a high statistical efficiency (Saunders, Lewis and Thornhill, 2009).

According to Mugenda and Mugenda (2013), when the study population is less than 10, 000, a sample size of between 10 % - 30% is a good representation of the target population. The researcher therefore took 30% of each of the target population in each of the regions. Table 3.1 shows the sample size of the study as 340 respondents.

Table 3.1: Sample size

Strata	Population Size	Percentage	Sample Size
Nairobi	742	30	223
Mombasa	267	30	80
Other Regions	112	30	37
Total	**1,121**		**340**

Source: Kenya business List Directory, 2017

3.5 Data Collection

Primary data collection was used and was collected by use of a close-ended questionnaire as the data collection instrument. The primary data was collected to answer the research questions raised. Primary data is used for this study because this type of data is associated with its ease to control errors than secondary data (Meadows, 2003). Also primary data is closer to original information than secondary data (Cooper and Schindler, 2014). The close-ended questionnaire was used because it is easier to code, record and analyze the data collected (Meadows, 2003). Additionally, it is much easier, efficient and specific for the participant to communicate with the respondents when using a close-ended questionnaire (Kothari, 2004).

The questionnaire had three sections. Section one captured the background information of the 3PL Providers and respondents. Section two consisted of objective one data and section three captured information on objective two. The questionnaires were administered via email and phone calls due to the geographical locations of targeted companies and also due to the limited time that the researcher had to gather the information. The respondents were logistics officers of the sampled logistics firms. The respondents were selected because of their knowledge of the required information.

3.6 Data Analysis

Data analysis is the process of transforming raw data into meaningful information that can be easily understood. The first step of the data analysis process was checking the completeness

and accuracy of the information from the questionnaires. The second step was coding the information that was not precoded before data collection. These codes were then entered into the Statistical Package for the Social Sciences (SPSS) which was used for analysis.

The study therefore used descriptive statistics to analyse the data. The descriptive statistical measures used were to determine the center, spread and shape of distributions to assist in data description. These were frequencies, percentages, mean and standard deviation. The study also used correlation analysis to measure the relationship between the independent variables on the dependent variables. The data was presented in tables and the researcher's own interpretation.

CHAPTER FOUR: RESULTS, DATA ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter presents the analysis, results, and discussion of the results of the study. The chapter is in sections that include the study response rate, background information, transport management technologies adopted by 3PL providers in Kenya and effect of transport technologies on performance of 3PL Providers in Kenya.

4.2 Response rate

Table 4.1 shows the response rate of the study. The researcher was able to administer 340 questionnaires. The returned questionnaires were 231 where 40 were incomplete and 191 questionnaires were used for analysis. The response rate for the study was therefore 68.0 %. The incomplete questionnaires were due to phone calls that were interrupted. Nulty (2008) suggested that a response rate of above 50 % for email and telephone surveys as adequate.

Table 4.1: Response rate

Categories	Frequency	Percent
Questionnaires administered	340	100.0
Returned Questionnaires	231	67.9
Incomplete questionnaires	40	17.3
Questionnaires used in analysis	191	

4.3 Background Information

The study sought to gather background information of the logistic firms and the study participants. This section presents this information and includes the location of the firm, gender, and age of respondents and the number of years that the firm has been in operation.

4.3.1 Company location

The study findings show that 53.0 % of logistic firms were in Nairobi, 30.2 % were in Mombasa and 16.8 % were in other parts of Kenya as shown in Table 4.2. Majority of

logistics companies in Kenya have their headquarters in Nairobi and operations are controlled from Nairobi. These findings also agree with the second largest number of companies having their headquarters in Mombasa which is the main entry point in Kenya.

Table 4.2: Location of 3PL firms

Location	Frequency	Percent
Mombasa	101	53.0
Nairobi	58	30.2
Other	32	16.8
Total	**191**	**100.0**

Source: Research Data (2017)

4.3.2 Gender of respondents

Table 4.3 shows that 56.6 % of study participants were male compared to female who accounted for 43.4 % of the study sample. There was not much difference between the gender of logistic officers as this is a profession that offers equal opportunities for both male and female.

Table 4.3: Gender of study participants

Location	Frequency	Percent
Male	108	56.6
Female	83	43.4
Total	**191**	**100.0**

Source: Research Data (2017)

4.3.3 Age of respondents

In terms of their age categories, the results revealed that 31.8 % were aged 26-35, 30.2% were 36-45 years, 16.3 % were 18-25 years, 14.7 % were 46-55 years and 0.7 % were aged 56 and above as indicated in Table 4.4. The findings reveal that most (44.9%) of the

respondents were aged between 26 and 45 years. This is the most productive group in the nation in terms of employability.

Table 4.4: Age of study participants

Location	Frequency	Percent
18-25	31	16.3
26-35	61	31.8
36-45	58	30.2
46-55	28	14.7
56 and above	13	0.7
Total	**191**	**100.0**

Source: Research Data (2017)

4.3.4 Years in operation

The research was interested in finding out the number of years that the sampled firms had been in operation. Figure 4.5 indicates that 44.2 % of firms had been in operation between 2-5 years and 12.4 % were in operation for less than 2 years.

Table 4.5: Years in operation of 3PL firms

Location	Frequency	Percent
Below 2 years	34	17.8
Between 2-5 years	58	30.2
Over 5 years	99	52.0
Total	**191**	**100.0**

Source: Research Data (2017)

4.4 Transport management technologies adopted by 3PL providers in Kenya

The first objective of the study was to determine the transport management technologies adopted by 3PL providers in Kenya. The researcher presented 12 types of management

technologies to the respondents and was required to indicate which they adopted most in their organization. Table 4.6 shows the mean and standard deviation of these responses.

The findings show that the most adopted transport management technology was Global position system (GPS), this was followed by bar-coding technology, Warehouse Management Systems. Further findings show that CCTV systems, extranets, Intranets and Internet, Smart Card Technology Automatic Vehicle Location, Cloud-based Systems and Enterprise resource planning, Vehicle Alternative Fuels e.g. hydrogen fuels, and Radio frequency identification systems.

Table 4.6: Transport management technologies adopted by 3PL firms in Kenya

Transport technologies	Very Small extent	Small Extent	Some Extent	Great Extent	Very Great Extent	Mean	Std. Dev.
Global Position System (GPS)	3.6%	5.8%	16.7%	18.1%	55.8%	4.17	1.124
Automatic Vehicle Location (AVL)	8.7%	11.6%	9.4%	40.6%	29.7%	3.74	1.216
Smart Card Technology	2.2%	16.3%	16.3%	32.6%	32.6%	3.77	1.140
Cellular Phones/Mobile Technology							
Vehicle Alternative Fuels e.g. hydrogen fuels	14.1%	5.4%	21.7%	33.7%	25.0%	3.50	1.313
Cloud-based Systems	9.4%	11.6%	13.0%	34.8%	31.2%	3.67	1.286
Enterprise resource planning (ERP)							
Extranets, Intranets and Internet	10.9%	25.4%	12.3%	31.9%	19.6%	3.86	1.175
Warehouse Management Systems (TMS),	3.3%	8.7%	19.6%	28.3%	40.2%	3.93	1.117
Radio frequency identification systems (RFID)	3.3%	16.3%	31.5%	27.2%	21.7%	3.48	1.104
CCTV Systems	4.4%	8.7%	20.7%	35.9%	30.4%	3.92	1.988
Bar-coding technology	5.8%	8.0%	13.0%	22.5%	50.7%	4.04	1.220

Source: Research Data (2017)

4.5 Effect of transport technologies on performance of 3PL providers in Kenya

The second objective of the study was to investigate the effect of transport technologies on performance of 3PL providers in Kenya. The study presented 11 perceived effects of transport management technologies among 3PL providers. The findings show that the highest ranked item was improved communication with a mean score of 4.88 and standard deviation of 0.994. The second highest ranked item was reduction in costs (M=4.42; SD=1.060) followed by improved productivity (M=4.36; SD=1.085) as shown in Table 4.7. Further findings show optimal operational performance of the firm, reduced idle labour, better coordination and integration of information flow and activities within and/or between firm boundaries, increased flexibility, improvement of firm capabilities that enable your firm to outperform its competitors, and increased flexibility.

Table 4.7: Effect of transport technologies adoption on performance of 3PL firms

Effect of transport technologies	Very Small extent	Small Extent	Some Extent	Great Extent	Very Great Extent	Mean	Std. Dev.
Improvement of firm capabilities that enable your firm to outperform its competitors	3.3%	8.7%	19.6%	28.3%	40.2%	3.93	1.117
Lead to an optimal operational performance of the firm	4.3%	7.6%	7.6%	39.1%	41.3%	4.05	1.093
Reduction in costs	7.6 %	26.2%	20.7%	33.7%	12.0%	4.42	1.060
Improved productivity	17.4%	16.3%	12.0%	23.0%	30.4%	4.36	1.085
Wastage reduction							
Reduced idle labour	5.4%	3.3%	19.6%	30.4%	40.3%	4.01	1.969
Reduced order cycle/delivery times	4.4%	8.7%	20.7%	35.9%	30.4%	3.92	1.988
Increased flexibility	7.7%	1.1%	30.4%	21.7%	39.1%	3.84	1.189
Increased reliability	9.9%	17.7%	21.5%	30.5%	20.4%	3.33	1.261
Improved communication	5.5%	16.3%	16.3%	27.2%	33.7%	4.88	0.994
Led to better coordination and integration of information flow and activities within and/or between firm boundaries	4.3%	4.3%	15.2%	44.6%	31.5%	3.95	1.020

Source: Research Data (2017)

4.6 Correlation analysis

The study conducted a correlation analysis to determine the association between the independent variables and dependent variable. Table 4.8 shows the correlation results which indicate that there was a positive and significant relationship between intelligent transport systems ($r = 0.259$, $p = 0.001$), telecommunication and information technology ($r = 0.577$, $p = 0.000$). The results revealed that there was a positive but insignificant relationship between emerging technologies systems ($r = 0.054$, $p = 0.066$) as shown in Table 4.8. The correlation results indicate that telecommunication & information technologies had a moderate relationship with performance of 3PL service providers. The results revealed that emerging technologies had no significant relationship on performance of 3PL service providers. This suggests that an increase in intelligent transport systems, and tele-communication & information technologies there is a similar increase in performance of 3PL service providers.

Table 4.8: Correlation coefficients

		Intelligent Transport Systems	**Tele-communication & Information Technology**	**Emerging Technologies Systems**	**Performance**
Intelligent Transport Systems	Pearson Correlation	1			
	Sig. (2-tailed)				
Tele-communication and Information Technology	Pearson Correlation	.053	1		
	Sig. (2-tailed)	.571			
Emerging Technologies Systems	Pearson Correlation	.143	.278	1	
	Sig. (2-tailed)	.367	.274		
Performance	Pearson Correlation	.259	.577	.054	1
	Sig. (2-tailed)	.001	.000	.066	
	N	191	191	191	191

Source: Survey (2017)

4.7 Discussion of Findings

The section discusses findings of the study with respect to empirical studies in order to link theory and study findings. This section is presented in line with the study research questions and contrasted with the literature review and theories adopted for this research. The main finding of the research objectives was discussed.

4.7.1 Transport management technologies adopted by 3PL firms in Kenya

The findings revealed that GPS was the most used type of management information technology among 3PL firms. These findings agree with Dhayanidhi, Azad and Narashiman (2011) study on the use of 3PL services which found that GPS was a popular form of technology in India. Similarly, Pokharel (2005) research in Singapore indicated that majority of 3PL firms were relying on GPS technology. This is supported by Ugwu and Okoroji (2014) research in the United States. The adoption of GPS can help suppliers to plan their replenishment and delivery schedules to meet the customers' demands in a timely manner (Zhang & Okoroafo, 2015). Li (2014) research revealed that GPS use enhanced performance of warehousing and distribution services.

The GPS was the most popular information technology adopted by logistic firms as a GPS is especially helpful and important in logistical and transportation activities that are integral components in any Supply Chain system (Bwari, Getuno, & Kiarie, 2016). The popularity of the GPS is because it is a mobile terminal which is widely used and equipped in vehicles of commercial logistics service providers. The use of GPS has not only been pertinent in logistic companies but also has been used in ambulances, parcel delivery, and urban and forest planning. Wanke (2012) study on GPS use among logistic companies in developing countries identified three main areas where its use would have a significant impact. Generate real-time product tracking information, provide flexible and optimized delivery guidance, and reduce redundant manual operations.

The findings indicated that bar-coding technology and Warehouse Management Systems were also a common management information technology among 3PL firms. This is evident from past studies on IT adoption and performance of logistic firms in Nairobi. Macharia, Iravo, Tirimba and Ombui (2015) study revealed that logistics firms adopted IT applications in warehouse management and bar-codes were used to make it possible to access more precise information on the stock. Murage (2011) study on commercial electricity supply chain management practices in Kenya also revealed the use of bar-coding among 3PL firms.

The findings show that there were some transport technologies that were not adopted by 3PL service providers to a great extent. These included the Automatic Vehicle Location (AVL), Vehicle Alternative Fuels and Radio frequency identification systems (RFID). Some of these systems and technologies are expensive to implement in an organization which has not established itself in the sector. Some of the organizations in the sample were Small and Medium Enterprises (SMEs) and did not have adequate resources to implement modern and emerging technologies used in the logistics sector. Zhong and Zhou (2011) argued that, developing economies, due to a myriad of technological and financial constraints, essential infrastructures are either still in the planning phase or missing, which makes the solutions problematic to attain in a small period of time and thus can't fulfil the immediate needs from the consumers.

4.7.2 Effect of transport technologies on performance of 3PL providers in Kenya

The most significant effect of management information technologies was improved communication for logistics firms. This finding agrees with Gilaninia et al. (2011) survey of information technologies in logistics information which found that management information technologies provided firms with real-time communication which allows 3PL firms to make scheduled plans to adjust to the dynamic routing and scheduling systems when trucks are on the road. Adebambo and Adebayo (2011) found evidence that adoption of management information technologies enabled logistic firms' easy accessibility to communication and information in delivering their products and services which are significant drivers for attaining and sustaining competitive advantage either nationally or internationally.

Cost reduction was also found to be a result of adopting management information technologies for logistics firms in Kenya. This finding supports earlier findings by Bhandari (2012) results that logistics firms that invested in the latest information technologies available in the market were able to reduce their overall costs. Macharia et al. (2015) found that adoption of information technologies in logistics can contribute to a reduction in insurance costs and administrative costs which contributed to overall productivity.

The correlation results indicated that information communication technologies were the most effective on performance of 3PL service providers. This finding is attributed to the use and reliance of ICT in todays' organizations and 3PL service providers are no exception to this. Omwayi (2015) study on factors influencing outsourcing of logistics services in container freight stations in Kenya was the adoption and use of ICTs in their operations. The results showed that emerging technologies had no effect on performance of 3PL service providers. This view is supported by Macharia et al. (2015) observation that despite adoption of information technology in logistic firms, not all the objectives were achieved and experienced by users. It is highly discouraging to see that, many emerging technologies adopted were not working to standard thereby causing more harm than good to potential investors, shareholders, and other users and traders.

CHAPTER FIVE: SUMMARY, CONCLUSION AND DISCUSSION RECOMMENDATIONS

5.1 Introduction

The chapter is presented in several sections that include: a summary of findings, conclusion, discussion, recommendations and areas for further research which are presented in terms of the study research objectives.

5.2 Summary of findings

The aim of this study was to undertake an investigation into transport management technologies and performance of 3PL providers in Kenya. The study was guided by two specific objectives: To identify the extent to which transport management technologies are adopted by 3PL Providers in Kenya and establish the effect of transport technologies on performance of 3PL Providers in Kenya. The study adopted a cross sectional survey research design. The target population of the study was 1,121 logistic companies in Kenya. Stratified random sampling was adopted to sample the population. These strata were geographical areas where 3PL firms operate; Nairobi, Mombasa and other regions. The sample size of the study was 340 respondents. The questionnaire was used to collect the primary data. The questionnaires were administered using email and phone call technique. The study was able to get back and analyse 191 questionnaires. The data analysis tools were frequencies, percentages, mean and standard deviation. The Statistical Package for Social Sciences (SPSS) was used for analysis.

The study sought to find out the management technologies that 3PL firms adopted in their operations. The findings revealed that GPS was the most used IT tool with 55.8 % indicating that their firms used GPS to a very great extent. The motivation for using GPS is mostly influenced by the need for 3PL companies to improve Just in Time (JIT) delivery along their supply chain. Using GPS in 3PL operations can help firms be able to make adequate schedules for delivery and replenishment of their stock. The GPS system allows 3PL providers to track the delivery of goods in real-time. This transport management technology

is important for 3PL providers in Kenya given that most goods are transported primarily by road and GPS technology allows providers to give feedback to customers on the delivery status.

The second objective of the study was to determine the effect of management information technologies on performance of 3PL firms in Kenya. The findings show that the highest ranked item was improved communication with a mean score of 4.88 and standard deviation of 0.994. The results showed that 27.2 % indicated a great extent and 33.7% indicating that there was improved communication in their firm with the adoption of information technologies. 3PL firms are engaged in providing logistics support in the supply chain and timely information to each process and phase of a supply chain is important to achieve JIT deliveries. The performance of 3PL firms relies on effective and efficient communications between the different stages of a supply chain because a breakdown of communication leads to delays in delivery which affects overall performance of the firm.

5.3 Conclusion

The first objective of the study was to determine the transport management technologies adopted by 3PL providers in Kenya. The study identified several management information technologies that are common among 3PL providers globally. The findings showed that GPS was used to a great extent among 3PL providers in Kenya. The study therefore concludes that GPS is the most adopted management information technology among 3PL providers in Kenya. Several scholars (Vasiliauskas & Jakubauskas, 2007; Zhang & Okoroafo, 2015) have cited the importance of the GPS in fleet management among 3PL service providers by applying such information to the optimization of travel routes and freight arrival times.

The second objective of the study was to establish the effect of transport management technologies. There were several effects on performance of 3PL providers by adopting transport management technologies. The study results revealed that improved communication was the most significant indicator of performance for 3PL providers' adoption of transport management technologies. The study therefore concludes that adoption of transport

management technologies contributed to the communication performance of 3PL providers in Kenya.

This conclusion corroborates Ayantoyinbo (2015) study which concluded that adoption of ICTs in 3PL service providers enhanced information exchange in real time improving the ability of planning transport and logistics activities and the level of customer service. The conceptual model of the study had postulated a positive effect of intelligent transport systems, telecommunication & information technology, and emerging technologies systems on performance of 3PL service providers. The conceptual model was confirmed as far as intelligent transport systems, telecommunication & information technology were concerned. However, emerging technologies did not have an effect on the performance of 3PL service providers. This finding was attributed to lack of infrastructure, cost of modern technologies, and capacity of staff to use global emerging technologies in the logistics industry. The financial and resource capability was also found to affect the adoption of emerging technologies in the context of a developing country like Kenya.

5.4 Limitations of the Study

There were several limitations that the researcher faced in conducting this study. One of the limitations was accessing the target population. The researcher would have conducted self-administration of questionnaires. However, the location of some of the 3PL firms did not allow for this. The researcher overcame these challenges by email and phone call administration of the questionnaires. Phone calls were occasionally interrupted and this affected the data collection process which led to having some of the questionnaires having incomplete responses and this lowered the study response rate.

5.5 Recommendations

The study makes the following recommendations based on the study findings;

1. The study recommends that 3PL providers in Kenya should evaluate their information technologies strategies to identify which transport management technologies are most crucial to their operations. Such an evaluation would enable 3PL providers to invest

in transport management technologies that lead to maximum optimization of their operations.

2. The study recommends that 3PL providers should invest in transport management technologies that provide available, accessible, and timely information in every stage of the supply chain. This would contribute to improved performance of the firm in an industry that relies on information and communication with clients.

3. The study found evidence of emerging technologies that are transforming the global logistic industry. These include IOT enhancements, RFID technologies, and integration. The study recommends that 3PL providers should invest into cloud integration systems so as to have information accessibility from any location and also as a backup strategy given continued investments in ICTs.

5.6 Areas for further research

This study focused on identifying the different transport management technologies adopted by 3PL providers in Kenya. There is need, however, to conduct research on the integration of transport management information technologies in 3PL firms to understand how combination of these systems contributes to the performance of 3PL firms. This study targeted all 3PL providers in Kenya. There is need, however, to undertake a similar study by differentiating the different services and sectors that 3PL providers are engaged in. This study would establish which transport management technologies were useful to specific 3PL providers' services.

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APPENDICES

APPENDIX 1: Letter of Authority from the University

UNIVERSITY OF NAIROBI
SCHOOL OF BUSINESS

Telephone: 020-2059162
Telegrams: "Varsity", Nairobi
Telex: 22095 Varsity

P.O. Box 30197
Nairobi, Kenya

DATE 02/11/17

TO WHOM IT MAY CONCERN

The bearer of this letter VELMER ADUSA KILIRU

Registration No. D61/81107/2015

is a bona fide continuing student in the Master of Business Administration (MBA) degree program in this University.

He/she is required to submit as part of his/her coursework assessment a research project report on a management problem. We would like the students to do their projects on real problems affecting firms in Kenya. We would, therefore, appreciate your assistance to enable him/her collect data in your organization.

The results of the report will be used solely for academic purposes and a copy of the same will be availed to the interviewed organizations on request.

Thank you.

UNIVERSITY OF NAIROBI
SCHOOL OF BUSINESS
02 NOV 2017
P.O. Box 30197 - 00100, NAIROBI

PATRICK NYABUTO
SENIOR ADMINISTRATIVE ASSISTANT
SCHOOL OF BUSINESS

APPENDIX 2: Research Questionnaire

I am conducting a research on "transport management technologies and performance of third party logistics (3PL) providers in Kenya". This study is being carried out in partial fulfillment of the requirements for the award of the Degree of Master of Business Administration, School of Business the University of Nairobi.

Kindly answer the following questions:

Section A: (Profile of the respondent and respondent's firm)

General Information

1. Name of the firm……
2. Location:
   Nairobi ( )
   Mombasa ( )
   Other ( )
3. Gender:
   Male ( )
   Female ( )
4. What age group are you in?
   18-25 ( )
   26-35 ( )
   36-45 ( )
   46-55 ( )
   56 and above ( )
5. How long has your firm been operating in the Kenyan market?
   Below 2 years ( )

Between 2-5 years ( )

Over 5 Years ( )

Section B (Objective I): Types of transport management technologies adopted

6. In the list provided below, kindly indicate by ticking (√) the extent to which the following transport management technologies are used by your firm. (1) **Very Small Extent**, (2) **Small Extent** (3) **Some Extent,** (4) **Great extent** (5) **Very great Extent** (√)

Extent of adoption / **Transport technologies**	**Very Small extent**	**Small Extent**	**Some Extent**	**Great Extent**	**Very Great Extent**
Global Position System (GPS)					
Automatic Vehicle Location (AVL)					
Smart Card Technology					
Cellular Phones/ Mobile Technology					
Vehicle Alternative Fuels e.g. hydrogen fuels					
Cloud-based Systems					
Enterprise resource planning (ERP)					
Extranets, Intranets and Internet					
Warehouse Management Systems (TMS),					
Radio frequency identification systems (RFID)					
CCTV Systems					
Bar-coding technology					

7. Indicate other transport management technologies used by 3PL Providers

a) ……

b) ……

c)……

d)……..

Section C (Objective II): Effect of transport technologies on performance of third party logistics providers in Kenya

8. In the section listed below, kindly indicate the extent to which you agree with the statements provided below, have improved the performance of your firm's operations where (1) **Very Small Extent**, (2) **Small Extent** (3) **Some Extent,** (4) **Great extent** (5) **Very great Extent** (√) as appropriate.

Extent on performance / **Transport technologies**	**Very Small extent**	**Small Extent**	**Some Extent**	**Great Extent**	**Very Great Extent**
Improvement of firm capabilities that enable your firm to outperform its competitors					
Lead to an optimal operational performance of the firm					
Reduction in costs					
Improved productivity					
Wastage reduction					
Reduced idle labour					
Reduced order cycle/delivery times					
Increased flexibility					

Increased reliability					
Improved communication					
Led to better coordination and integration of information flow and activities within and/or between firm boundaries					

9. Suggest other ways of improving performance of 3PL Providers

a) ……

b) ……..

c) ……

d) ……..

Thank You for Your Cooperation