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**E-logistics implementation among logistics
service providers in Kenya**

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P56/61449/2016

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A project report submitted in partial fulfillment of the requirements for the award of Master
of Science in Information Systems of the University of Nairobi.

October 2016

Declaration

I declare that this project report is my original work except where due references are cited. To the best of my knowledge, this it has not been submitted for any other award in any University. Data from other sources has been acknowledged.

Sign _____ Date _____

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This project report has been submitted in partial fulfilment of the requirement of the Master of Science Degree in Information Systems of the University of Nairobi with my approval as the University supervisor.

Sign _____

Date: _____

MR. CHRISTOPHER MOTURI

Dedication

I dedicate my research project to my family and friends. A special appreciation to my loving parents, Peter and Laxa for their support during my studies at the University.

Acknowledgement

I would like to thank the Almighty God for keeping me in good health as well as providence of school fees and other provisions for developing this project. I would like to express my sincere gratitude to my supervisor Mr. Christopher Moturi for his valuable support in my graduate studies and in the research project. His guidance helped me all the time of my research and in the writing of this report. I would also like to thank Prof. Peter Waiganjo, Dr. Daniel Orwa and Dr. Samuel Ruhiu for their valuable input in improving the content of this research. Last but not least, I would like to thank my parents and siblings for their support and blessings in my formative years.

Abstract

New business technologies have been in use for a number of years now with nearly every sector involved in selling or products and services implementing technology as part of their processes where customers are able to interact with sellers online. Technology has been used as competitive tool to gain competitive edge against competition and in most instances redesigning the sales process. With these developments, efficiency in service delivery has been key in pushing many organisations towards implementation of computer systems. E-logistics where logistics service providers implement various logistics systems is one of the technologies implemented towards improving service delivery. In Kenya, there has been slow uptake of e-logistics by logistics companies particularly on the side of customer business interaction. In most instances, this interaction is manual with payment and customers have to visit or contact these companies by phone or email to get services. The purpose of this research was to understand factors affecting implementation of e-logistics by logistics service providers in Kenya. This research was guided by TOE model in identifying factors determining e-logistics implementation by logistics companies. Our research design was cross functional survey on logistics firms in Kenya with an aim of identifying the factors that may influence or inhibit implementation of e-logistics systems by logistics companies and also come up with a working logistics system prototype. The study samples 23 logistics companies active in business in Nairobi. The results revealed that very few logistics firms have implemented logistics systems. On the side of customer interactions, existing systems lacked payment modules on service request. A working logistics system prototype was developed complete with a payment module which can be implemented by any logistics company. This research concludes a need for logistics companies to further understand the importance of e-logistics and how it can shape their operations towards improving service delivery. Important areas to note are need for staff training on new technologies.

Key Word

Logistics, E-logistics, Logistics Service Providers, TOE

List of abbreviations

CSS - Cascading Style Sheets

DFD - Data Flow Diagram

DOI - diffusion on innovation

EDI – Electronic Data Interchange

ERD – Entity Relationship Diagram

ICT – Information Communication Technology

IOSs - Inter-Organizational Systems

IT – Information Technology

OOD - Object Oriented Design

SCM – Supply Chain Management

TAM - technology acceptance model

TOE – technology, organization, and environment

TPB - Theory of Planned Behaviour

UTAUT - Unified Theory of Acceptance and Use of Technology

UI – User Interface

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CHAPTER ONE

INTRODUCTION

1.1 Overview

This chapter gives background information on logistics and gives an overview of e-logistics. The chapter also explains the research problem, the research objectives, study justifications and study limitations.

1.2 Background

According to Vitasek (2013) logistics is the aspect of planning, implementing and control of efficient and effective movement of goods and services and associated information from one place to another in order to meet consumer requirements. The dynamism in markets and competition in service and product provision has forced many businesses to look for innovative ways of delivering to their customers and revolutionizing the way business is done (Tiid et al., (2001). With continuous improvements and innovation of new technologies, technology has become important in the service industry driving growth and a major competition tool (Metcalf & Miles, 2000).

Most companies involved in sale of products and services where there is consumer interaction, have introduced Information Communication and Technology (ICT) into their operations tapping into the many advantages of engaging customer over the great World Wide Web. Many Logistics companies in Kenya however have not realized the need to employ technology in their operations and haven't implemented information and communication technologies and aligned their strategies with the changes in technology.

Lack of proper technology in place has led to most companies experiencing problems hindering their growth and expansion. Other problems and difficulties experienced by organizations in logistics business are poor service delivery, reporting and notification, administration headaches and escalating overheads (Brown, 2006). Many logistics companies do not have notification systems in place to notify their clients about the status of their deliveries. For instance, whenever shipping with most logistics companies, tracking is not available and often delivery details are delivered manually through available channels of communication where else there is a chance of providing that information in a real time manner. With the current operations in most logistics companies across the country, it is very difficult to manage manual records and monitor delivery effectively. This is particularly serious where the logistics company operates from multiple offices across the country. Some

of the challenges faced by logistics service providers include, managing the parcel records, in terms of duplication of data entered in to the system, difficulty in monitoring the riders, messengers, drivers and delivery activities and locations because of the myriads of variables involved such as delays traffic, lack of parking, difficulties in identifying customer location and waiting time for shipment pick up as well as effects of motor vehicle breakdowns (Peter, 2003). These challenges have been extended to customers where they have to call or visit these logistics companies whenever they have an item to be moved. Most customers often have to abandon their normal activities and create time to visit or call these companies. This research was aimed at finding out the factors affecting implementation of e-logistics by logistics services providers in Kenya with a survey of logistics companies within Nairobi and come with an e-logistics prototype which can be implemented by logistics companies therefore taking logistics service to the customers door step.

1.3 Problem statement

In Kenya, customers seeking the services of a logistics company have to call or visit, receive a quote and decide whether to use the service or not. While there has been increased access to internet and technology implementation by various sectors, the logistics industry has been slow in this uptake and customers have to call or visit to receive service while there is a chance of processing all this remotely. This research project was aimed at establishing if there are any e-logistics logistics applications in Kenya which are currently in use and also suggest a working logistics e-logistics prototype which can be used to enable customers transact with logistics companies from their homes or offices.

1.4 Research outcomes and justification of the study

The main research outcome for this project was a working e-logistics application prototype which can be adopted by logistics companies and individuals interested in coming up with logistics companies. In addition to this, this research activity did generate information which was useful to the following:

Through this study, certain e-logistics problems facing logistics companies were identified; the researcher did go an extra mile and came up with possible solutions to the problems.

This created insights into problems facing logistics companies forcing them not to implement logistics systems and suggested solutions to some of them. The e-logistics prototype generated here can also be advanced further and adopted to offer e-logistics services.

This research creates additional source of literature review and those researchers who would wish to proceed with the research may do so or those who would wish to consult it can have a chance.

This research gives application developers insights into e-logistics penetration among logistics companies and gives them needed information to develop advanced e-logistics applications for logistics.

1.5 Objectives of this research

- a) To determine the factors those affect the implementation of e-logistics by various logistics companies in Kenya.
- b) Determine level e-logistics implementation by logistics service providers.
- c) To demonstrate the role of e-logistics in supporting business consumer interactions.
- d) Develop an e-logistics prototype for logistics companies which exhibit all functionalities of an e-logistics system.

1.6 Overview of questions and areas of study

1. What are the factors affecting implementation of e-logistics?
1. What are the organisational and environmental drivers and inhibitors and of e-logistics implementation?
2. What e-logistics platforms are currently in use?
3. What are the challenges facing e-logistics platforms in use at the moment?
4. What are available technologies for development and implementation of e-logistics platforms?

1.7 Assumptions and limitations of the research

This research assumed that it is the desire of every logistics company to have an e-logistics platform which can be used to sell logistics services to customers. The research also assumed a sizeable number of customers would want a company which has an e-logistics platform where they can contact business without necessarily visiting the company facility or calling. In addition to the above, this research assumed there is a functional information technology department in every logistics company which can handle e-logistics among other technology related services.

There are various limitations to this research and mostly on the area of generalization of the research outcome. This is because various logistics companies have different focus areas with different clientele. Generalizing the outcomes based on survey on a number may be a limitation.

1.8 Definition of terms

E-logistics – E-logistics in this research project shall refer to electronic logistics.

Logistics – shall refer to the movement of items from one place to another. It's the core function of companies targeted by this research.

CHAPTER TWO

LITERATURE SURVEY

2.0 Introduction

This chapter looks at past studies on e-logistics on the area of implementation with a particularly factors affecting its implementation. It also looks at theories and models of adoption of computer systems and lastly the requirements for developing an e-logistics system

2.1 Electronic Logistics

Computer Systems have been evolving since 1950s with new technologies and practices being embedded leading to new developments. (Crosstie, 2012). Business processes have since grown from manual to electronic with e-logistics taking a huge chunk by converting many business processes and practices from manual to electronic. To gain a competitive advantage in business, e-logistics has been adopted by many companies and particularly logistics companies in gaining a competitive edge. Logistics companies are therefore increasing implementation of e-logistics in providing efficient services to customers.

According to Joseph, Laura and Srinivas (2004), e-logistics is used interchangeably with internet enabled logistics or e-business where it supports the delivery of goods and services through utilisation of Information Communication Technology (ICT) as part of the business activities and in execution of various logistics activities (Daly and Gui, 2003).

Historically, the use of e-business systems began around early 1960s with systems such as as materials requirements planning (MRP) as well as inventory managements systems (IMS) and distributed resource planning systems among others. (Wang, Y., & Pettit, S. (Eds.). (2016). these were functional based systems and continued to evolve in 1970s but as independent systems not communicating with one another (Wang, Y., & Pettit, S. (Eds.). (2016). There has been continues development as shown in the table below.

Evolutionary Stages	1960s	1970s	1980s	1990s	2000s	2010+
Typical E-Logistics Systems	Accounts receivable, inventory management and control	Transport planning application; MRPI	TMS, WMS, MRP II	ERP, DSS, CRM	ERP II, internet-based ELM or e-logistics network	Internet-based community systems, mobile apps
Emergent IT Trends	Stand-alone applications	Siloed functional applications	Applications portfolios	Integrated systems	Service-oriented architecture and web-based services	Multi-scale ecologies, cloud computing, Web 2.0, mobile and social media
Integration Focus	Functional	Functional	Functional	Internal end-to-end integration in a company	External integration, extended value chain	Multi-enterprise, collaborative value network
Business Applications	Transaction automation	Business function automation	Desktop and workgroup automation	Enterprise-wide automation	Industrial system automation	Cross-industry automation, loosely coupled flexible configuration
Supporting Computer Technology	Mainframe computers	Minicomputers	Personal computers and local area networks	Enterprise-wide computing	Internet and web platform	Internet and web, mobile platforms

Figure 1: Historical developments of e-logistics.

Source: Wang, Y., & Pettit, S. (Eds.). (2016)

Due to the rising levels of competition in both local and international markets coupled by utilization of effective competitive advantage areas, many companies have shaped technological changes with innovation becoming part of running businesses as part of improving competitiveness. This has revolutionized the interaction and operations between companies and customers. (Tidd et al., 2001). For a long time, Information Communication and Technology (ICT) is seen as driver to efficiency in both manufacturing and service offering sectors. Recently, information communication technology has taken greater appreciation and advantage in many sectors leading to growth by giving organizations critical competitive leverage with regards to customer interactions (Metcalf and Miles, 2000). Innovation works on acceptance of such innovations and is strongly part of high output in companies (Cainelli et al., 2004).

According to Kelly (1998), information communication technology has impacted companies and their areas of operations leading to formation of “network economy”. This has driven effective productivity in firms operations thereby accelerating innovation and adding great value to companies (Porter and Millar, 1985). This has been witnessed in logistics where ICT impacts this companies at all levels of operation whether internal or external.

2.3 E-logistics Benefits

Companies normally see e-logistics as an extra channel for running business through reduction of costs, as an avenue for improving service delivery a totally new area or doing business with potential of creating huge business gains. (Gibbs et al., 2004). Delone and McLean (2002) have advised the importance of e-logistics as an area where Internet transactions benefits save customers time and move in acquiring goods and services.

According to Ramanathan et al (2012), e-logistics reduces cost of marketing and marketing research by facilitating collection analysis and dissemination of important information to customers through e-logistics channels and information technology channels in general. For instance, a marketing manager can utilise e-logistics effectively by generating and storing data on purchasing patterns of consumers and the capability of to gather important information from analysis and using such information to create award winning business processes. (Ramanathan et al., 2012).

Other advantages of e-logistics to organisations include capability to trade in the international market with limited resources as suggested by Longenecker et al (2013). Companies which would have otherwise been unable to reach international markets due to lack of resources are given opportunity to trade in such markets by ICT.

E-logistics gives businesses an opportunity to reach customers almost anywhere anytime. Savrul and Kılıç (2011) adds that besides reducing operating costs and increased production, e-logistics gives the firms an opportunity to reach open new market areas.

2.4 E-logistics challenges

E-logistics is faced by various challenges such as issues of trust by customers with information, lack of market readiness as well as technology standardization which appear to be hindering the adoption of information technology. (Dai & Kaufmann, 2002). Some of the challenges are summarised below:

Lack of technical knowledge in development and maintaining of e-logistics systems and inadequate telecommunications bandwidth and ever changing softwares for developing such systems has been a great challenge across many firms forcing them out of the many advantages of Information Communication and Technology (ICT) advantages in general (Longenecker et al., 2011).

According to Kim et al. (2009), trust issues have always come into play whenever customers are interacting with companies. In most instances, crucial information such as personal phone numbers may be required and some customers may not be willing to share such information. This is a drawback as many customers would rather get services without sharing such information.

E-logistics is capable of linking different cultures across the globe where customers, companies as well as countries are interacting. Unfortunately, adoption of this platform among other technology platforms is affected by the readiness of such markets to utilize them. For instance, Molla and Licker (2005) have advised that in third world countries on a developing scale, effective implementation of e-logistics strategy in a company is largely dependent on e-readiness at strategic, environmental and organizational contexts of such companies. Reduced level of technology distribution in an economy can also inhibit the level of e-logistics knowledge, an attribute often taken by policy makers in developed countries.

E-logistics implementation

Companies and particularly logistics service providers should be able to understand drivers of e-logistics implementation which are translated to objectives in line with the company's goal and objectives. Drivers of e-logistics implementation are in line with the reasons for the company to implement e-logistics. The drivers of implementation can be reactive or seem to be proactive depending on the company's strategy. Some organizations are involved in e-logistics because their sector is active online (Stockdale & Standing, 2004). A number of small and medium enterprises follow their customer interactions through web transactions in order to retain and enhance business interactions.

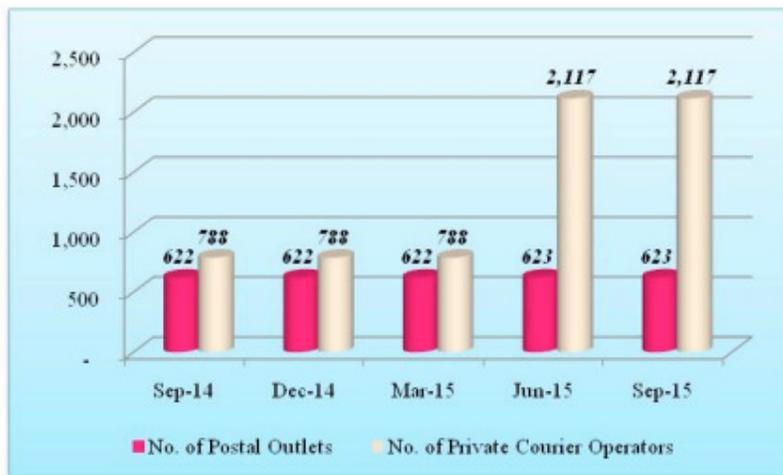
2.7 Logistics industry in Kenya

Most logistics companies in Kenya however have not realized the need to employ technology in their delivery operations. Most logistics service providers have not aligned their strategies with the changes in information communication technology.

Lack of proper technology in place has led to most companies experiencing problems hindering their growth and expansion. Other problems and difficulties experienced by organizations in logistics business are poor delivery, reporting and notification, Administration headaches and escalating Overheads. Brown, (2006) Logistics companies do not have notification systems in place to notify their clients about the status of their deliveries. With the current operations in most logistics companies across the country, it is very difficult to manage manual records and monitor employees effectively.

The logistics industry in Kenya is growing very fast and is attracting more and more investors. The logistics industry contributes a lot to the economy of the country and the key players in this market include the Postal Corporation of Kenya, international logistics companies, local logistics companies, Security firms and bus companies.

Below is a summary of logistics and courier companies operating in Kenya according to CAK (Communications Authority of Kenya) the main regulator.



Source: CA, Operators' Returns,

Figure 2: Courier data, CA 2015

2.8 E-logistics systems development

According to Zhang (2010), an e-logistics system is web based and comprises of three layers namely UIlayer, a business logic layer and Database layer. Various technologies and tools are used as outlined below:

WAMP I

The WAMP is a web development Platform used in development of web based applications. Its multi tiered enterprise application supporting programming, database and business logic tiers. It's used to develop dynamic websites, websites or separate programs (Guan, 2011).

MySQL

MySQL is a relational database management system normally liked due to its efficiency and stability in supporting applications and databases. It supports various web applications by such as C, C++, PHP and JAVA among others by providing an application programming interface.

PHP

PHP is a Hypertext Pre-processor webpage programming language usable in development of dynamic web sites a key component of e-logistics applications. During development, PHP code is normally included in html source file with PHP tags and processed by a web server to provide the backend operations.

2.9 Review of Technology adoption models and frameworks

In order to enhance the competitiveness of many firms, ICT is considered a major driving force. ICT innovations in different industries have played a key role in improving productivity and increasing efficiency. In our research we therefore sought to establish the determinants of information technology adoption by reviewing some of the adoption frameworks and theoretical models. We specifically reviewed various theories on technology implementation at the firm level with the technology in Logistics companies in mind. We looked at DOI, TOE and adopted this two theories because many studies on technology adoption at organisation level are based on these theories (Chong *et al.* 2009).

In our theoretical foundation we reviewed TPB by Ajzen (1991), UTAUT by Venkatesh et al. (2003), TAM by Davis (1986), DOI (Rogers 1995) and TOE framework by Tornatzky and Fleischer (1990). For the purposes and scope of our study we however fully expounded on only the DOI and TOE framework. This is based on the fact that they are the look at technology implementation at the organisational level.

2.9.1. Diffusion on Innovation theory-DOI

DOI theory addresses the issue on how, why while at the same time looking at the rate that new thoughts and innovation extent through various economies at the individual and organisational levels. DOI theory describes innovations as being passed via definite Medias

within set social systems (Rogers 1995). In DOI individuals appear as possessing varying levels of acceptance to absorb new developments thus the portion of the population implementing the innovations is approximately normally distributed over time (Rogers 1995). If you break into segments of normal distribution the result is a division of individuals into five groups of innovativeness (from earliest to latest adopters): innovators, early adopters, early majority, late majority, laggards (Rogers 1995). This becomes even more complex in organization with a number of individuals supporting and others opposing the innovation or new idea yet both play a vital role in innovation decisions.

According to Rogers (1995), applying DOI model theory at company level, innovativeness may be equated to such independent variables as individual (leader) characteristics, internal firm structural attributes, and external attributes of the organization as shown in the figure below. Individual attributes define the leader approach or attitude toward change. On the other hand internal attributes of the firms structure comprises observations. According to Rogers (1995) whereby: “centralization is the extent to which power and control in a system are more in the hands of few individuals”; “complexity is the extent to which a firm staff have a high level of knowhow and understanding”; “formalization is the extent to where a firm encourages its members’ following guidelines and regulations”; “interconnectedness is the extent to which the units in a cultural setting are linked by interpersonal networks”; “firms slack is the degree to which uncommitted resources are available to a firm”; “size is the number of employees of the firm”. External characteristics of organizational talk about the system openness.

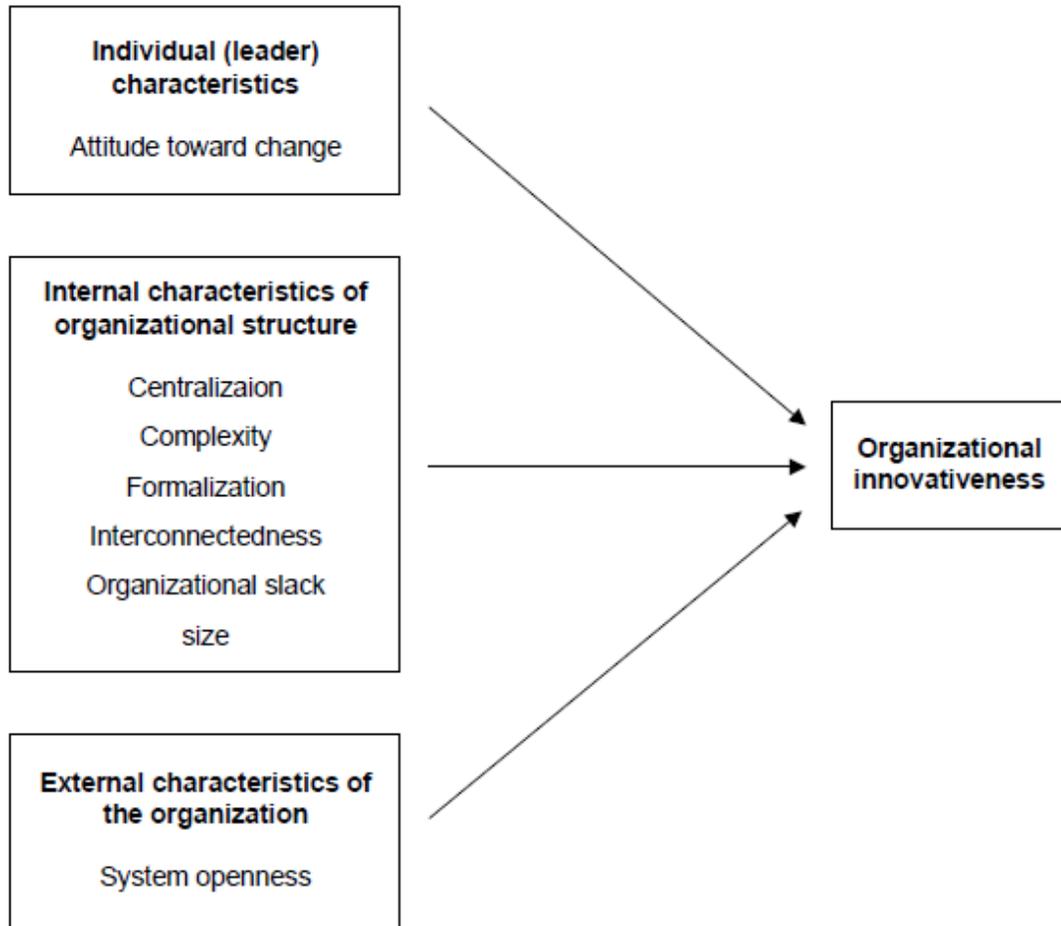


Figure 3: Diffusion of innovations (Rogers 1995)

Over many years of DOI application to technology research, the theory has been used and implemented in certain ways as shown below.

Table 1: Past research based on DOI

IT Adoption	Author(s)
Material requirements planning (MRP)	(Cooper and Zmud 1990)
IS adoption (uses at least one major software application: accounting; inventory control; sales; purchasing; personnel and payroll; CAD/CAM; EDI; MRP), and extent of IS (number of personal computers and the number of software applications)	(Thong 1999)
Intranet	(Eder and Igbaria 2001)
Web site	(Beatty <i>et al.</i> 2001)
Enterprise resource planning (ERP)	(Bradford and Florin 2003)
E-procurement	(Li 2008)
E-business	(Zhu <i>et al.</i> 2006a)
E-business	(Hsu <i>et al.</i> 2006)

In the same regard this theory can also implemented in automation of logistics companies.

2.9.2 Technology, organization, and environment framework (TOE Framework)

TOE framework was development in 1990 (Tornatzky and Fleischer, 1990). This framework shows three aspects of an enterprise's context that impact the rate by which it embraces and adopts a technological innovation. These aspects are organizational, technological and environmental as shown in the figure below. Organizational content refers to descriptive measures about the organization such as scope, size, and managerial structure. Technological context comprises a description of both the external and internal technologies related to the firm which include current practices and equipment internal to the firm (Starbuck 1976), in addition to the set of available technologies external to the firm (Thompson 1967, Khandwalla 1970, Hage 1980). Environmental context refers to the arena in which a firm runs its business which includes industry, competitors, and dealings with the regulatory authorities (Tornatzky and Fleischer 1990).

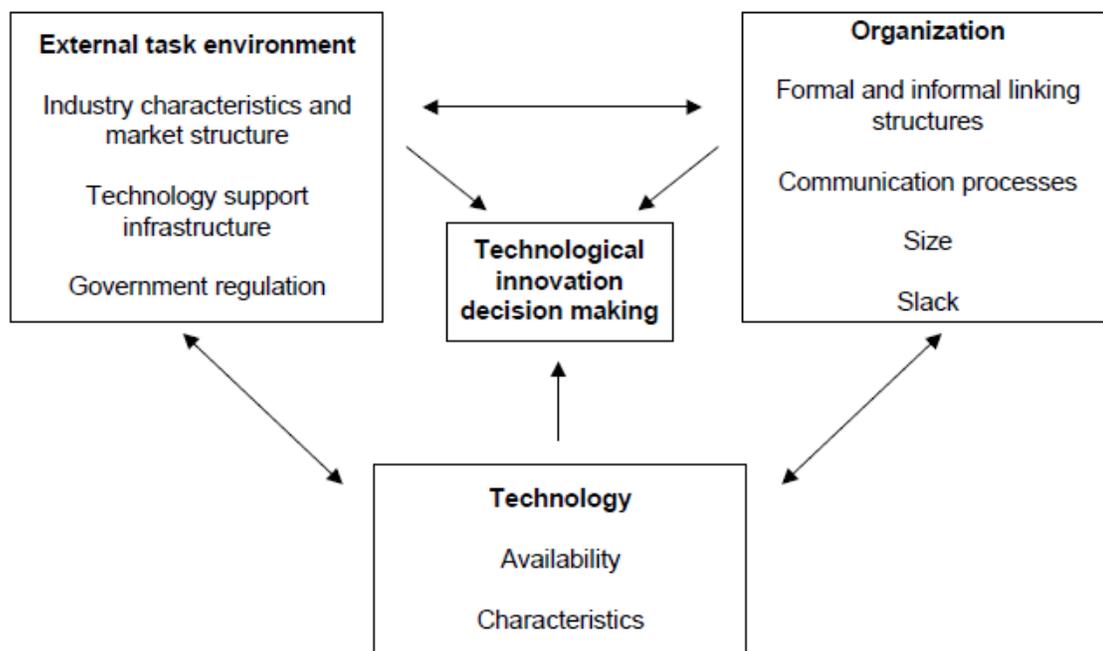


Figure 4: Technology, organization, and environment framework (Tornatzky and Fleischer 1990)

The TOE framework shows a useful analytical framework that can be utilised for studying the implementation and assimilation of different types of IT innovation including adoption of e-logistics logistic systems in by logistics companies. TOE framework is consistent with the DOI theory, in which Rogers (1995) emphasized individual characteristics, and both the

internal and external characteristics of the firm, as drivers for firms' innovativeness. These are same to the technology and organization context of the TOE framework, but the TOE framework includes the environment context. The environment context presents both opportunities and constraints for technological innovation. The TOE framework makes Rogers' innovation diffusion theory better able to explain intra-firm innovation diffusion (Hsu et al. 2006). The next Section analyses the studies leading to our choice of adopting TOE framework in this research.

2.9.3 Theories in support of TOE Framework

2.9.3.1 Institutional theory

Institutional theory says that an organisational environment is important in determining firm's structure and actions (Scott and Christensen 1995, Scott 2001). According to the institutional theory, "firm's decisions are not driven purely by rational goals of efficiency, but also by social and cultural factors and concerns for legitimacy". According to this theory firms are moved by cultures, structures, and routines and operate at various levels. The theory adds that companies become more identical due to isomorphic pressures and pressures for legitimacy (DiMaggio and Powell 1983). The result is that companies in the same field tend to become homologous with time, as competition and customer pressures inspire them to copy market leaders. The institutional theory thus adds to the environmental context of the TOE framework external pressures, which include pressure from competitors and pressure exerted by trading parties.

2.9.3.2 Iacovou et al. (1995) model

Iacovou et al. (1995) analysed inter-organizational systems (IOSs) attributes that affect firms to implement IT developments in the context of EDI implementation. Their framework explains technology implementation based on three factors namely known benefits, organizational preparedness and external forces as shown in the figure below. An apparent benefit is a different attributes from the TOE framework, whereas organizational readiness is a combination of the technology and organization context of the TOE framework. IT resources are therefore be equated to technology context and a financial resource is similar to organizational context. The external pressure in the Iacovou et al. (1995) model adds the trading parties to the external task environmental context of the TOE framework as a critical role of IOSs adoptions.

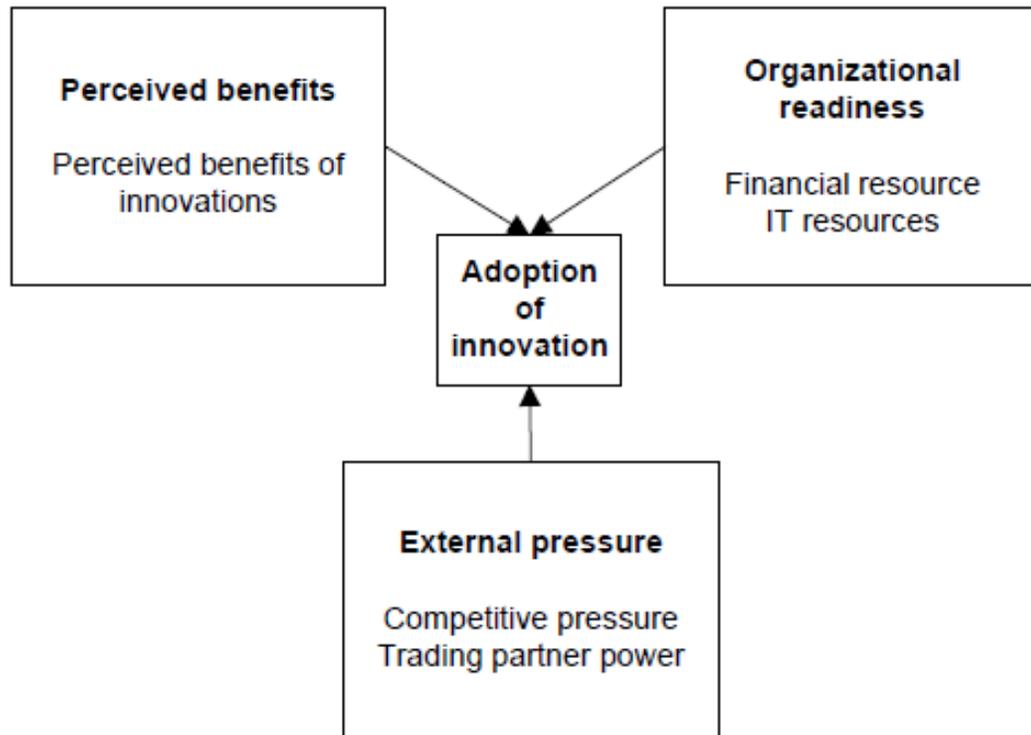


Figure 5: Iacovou et al. (1995) model

2.10 Conclusions

Our study focused on studies on literature on information technology implementation models at company level with many researches being done from the TOE framework and DOI theory. Our preferred choice for implementing the Parcel Masters Logistics System prototype is however the TOE model framework because it encompasses the environmental context (which is not part of DOI model theory), making it superior and capable of explaining intra-firm innovation implementation. Additionally, TOE framework has a consistent empirical support, solid consistent empirical theoretical basis, and the potential of application to information technology adoption.

CHAPTER 3

RESEARCH METHODOLOGY

3.0 Overview

This chapter covers the methodology utilized in carrying out the research. It comprises of the research design, target population, sample size, sampling techniques, research instruments, data collection, data analysis and prototype development.

3.1 Research Design

Qualitative research that is explanatory in nature has been deemed appropriate as the main research objective for this research paper was assessing e-logistics implementation by logistics companies thereby explaining clearly the reason behind its implementation. The research targeted 30 logistics companies' active in business.

In this research activity questions were carefully developed and designed to fit logistics companies - the people who usually utilise these services and E-logistics system or are charged with determining whether e-logistics should be in use. Design for the questionnaire was done as per below:

Gender – This allowed us understand which gender prefers e-logistics; **Age group**, which gave us age group where E-logistics is implemented and why as well and the relationship that exists among these groups; and by

E-logistics platforms - This enabled us to have a clearer view if users have interacted with e-logistics systems and technologies before.

3.2.1 Data gathering and sources

Data was gathered through a questionnaire which was sent to key decision makers in logistics companies and divided into various sections. Questionnaires have been effectively utilised in qualitative research. Kinuthia (2014) notes that questionnaire is an efficient objective oriented option and a quicker means to get information. They also noted that questionnaire is an effective means of picking information coming from a big population. Because of limited resources and time, we did utilise the questionnaire as a means of data collection. The research questionnaire was divided into six sections and was distributed to various staff members in logistics companies in Nairobi. Open ended and closed questions were used in this questionnaire.

- a. Profile under demographic data section.

- b. Guide to which section to proceed with.
- c. Matrix to determine implementation of e-logistics systems
- d. Inhibitory factors to implementation.
- e. Knowledge on e-logistics system development softwares.

3.2.2 Population sampling

In this research project, a total of 30 logistics companies operating in Nairobi were selected with key respondents being staff in commercial and information technology departments in such companies. The 30 logistics companies comprised of logistics service providers in the courier industry actively available in business. Data on this companies was extracted by picking data currently available from courier companies regulator; Communications authority of Kenya. Staffs in these companies were contacted by phone and a questionnaire forwarded to them for filling. This was done to ensure the objectivity and confidentiality of this activity is well cascaded to the respondents to avert any fears.

3.2.3 Data Analysis and Justification

Completed questionnaires forms were checked for uniformity and completeness before commencing the data analysis process. The data collected from the respondents was then coded for easier analysis and responses grouped in themes for specificity in classification and clarity in reporting. Data was entered into SPSS clearly showing the coded information shared by respondents for further analysis. From this analysis, data was described by use of measures like the mode, median, frequency and mean to analyze the nature and the profile of logistics companies which formed the study.

4.4. Prototype development

The last objectives of this research project was development of e-logistics prototype.

4.4.1 Use case diagrams

The e-logistics prototype shall be accessible online and shall give users shipping rates by entering shipment origin country, destination country and shipping weight. Third party country operations shall not be allowed where shipper or receiver is not the payer. The prototype works on basis that shipper or receiver is payer.

A customer enters origin country, destination country and shipment weight where the system generates a service quote. If customer is in agreement with quote generated, they shall

proceed to declare shipment details, shipper details and receive details. The system shall then push the customer to a payment module supported by Pesapal. As soon as payment details are received, a receipt shall be generated and an email message forwarded to the logistics company to arrange completion of this service.

Use case diagram for administrator and customer

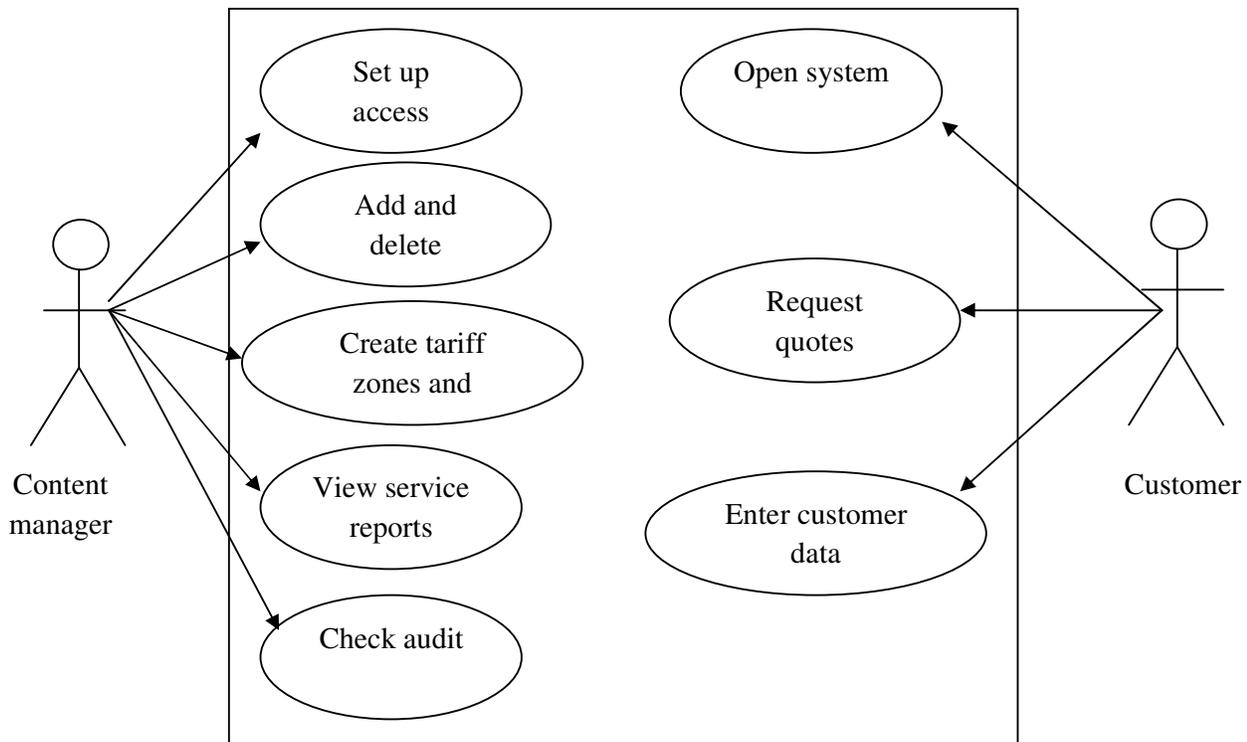


Figure 6: use case diagram

4.4.4 System design tools and methodology

This prototype was developed using Object Oriented Design (OOD) methodology. It involved identification of functional requirements from which use case artefacts were developed. Thereafter the dynamic and static behaviour of the system was analyzed and modelled. The modelling of static behaviours was done through identification of objects and classes which are represented using case diagrams. The dynamic aspects of the system were modelled using sequence, interactive, state diagrams and collaboration diagrams.

4.4.5 System design model

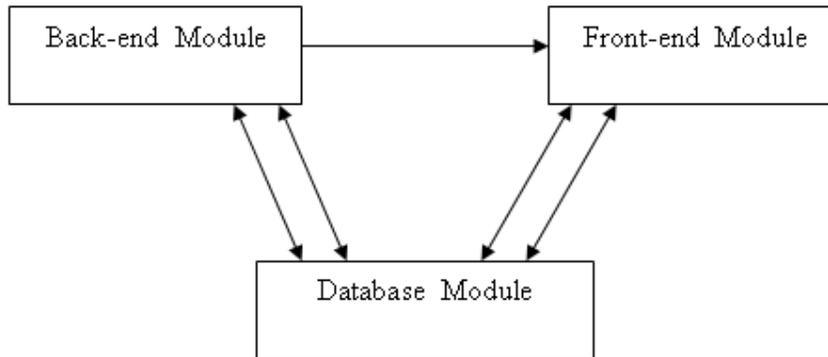


Figure 7: System design model

4.4.6 Front end system components

The front end module interacts with customers and fetches parcel details, shipper and receiver details and then generates a quote for the desired service. The module also directs the customer to the Pesapal payment module for payment processing and generates a receipt after successful completion of the service.

4.4.7 Backend system components.

The backend module shall be used to define products and services for logistics. The same shall also be used for updates. It shall comprise of products category management which includes add, delete, update and shall cover prices for different destinations against weights.

4.4.8 System design and methodology

The development of this prototype comprises of three-tier architecture. This includes a user interface layer to send requests to a business layer through a unified interface. The business layer does database operations after processing based embedded logic rule and then encapsulate the information which is sent back from the database into class format and presented to the user interface layer. This makes the user interface layer unknown the database, the user interface layer is used to run the interface to the business layer. Case diagrams have been used for visual modelling to show system description, visualization and documentation.

4.4.9 Analysis of system requirements

To ensure we fulfil the objectives of this system, requirements analysis were carried out to ensure maximum productivity. There was focus on the tasks of the system to ensure that the system meets customer and organizational needs.

To ensure requirements analysis is carried out properly, requirements engineering was employed which is a major process for providing the ways for establishing customer and user preferences, understanding specific wants, feasibility assessment and explaining the best possible solution. It comprises of seven tasks namely inception, elicitation, elaboration, negotiation, specification, validation, and management. These activities occur at the same time and all are utilised to the wants of the project. At project start the administrators find out basic knowledge of the problem, the users who desire a solution and the type of solution that is expected. The process comprises of finding vision and scope of the project. During requirement elicitation, tasks are carried out to develop the goals for the system, activities to be done, how the system or product fits into the wants of the company and how the system is to be utilised. Requirements gathering combine parts of problem solving, elaboration, negotiation and specification. Requirements analysis deals with understanding of basic requirements established of the system during the inception, elicitation and negotiation tasks. System requirements are based on their roles and can be grouped into functions which explain system roles or services and non-functional requirements which show system properties and constraints (e.g. reliability, response time and storage requirements). Requirements elicitation is done using interview, questionnaires, observation, document analysis, studying similar companies and systems as well as prototyping. This research concerns with business requirements that will be used in designing user requirements and the business rules that will be included in the use-case document, brief descriptions are provided for the three as follows:

(a) Organisational requirements

They show high-level objectives of the firm or consumer who requests the system. They show why the firm is adopting the system (the objectives the organization hopes to achieve).

(b) User requirements

It shows user goals or tasks that the users must be able to carry out with the system.

- (c) Business rules: These are operations in the firm that affect the system, which include organisational policies, policy regulations, market standards, business practices, and computational processes.

4.5.0 System Development Methodology

The e-logistics application prototype was created using waterfall system development life cycle which comprises of steps followed by developers. This was organized based on research outcomes which shall depicted the user and customer requirements and provided an application prototype suitable for implementation. This application development methodology was adopted because of its procedural nature which captures all user requirements, consideration for key issues before design and its capability to ensure controls through creation of proper documentation which can help other developers in advancing the application.

4.5.1 System Development Life Cycle Stages:

The waterfall system development lifecycle comprises of the following steps:

- 1. Conceptual Planning:** It's the first stage where need to have an application is identified. A feasibility study is done; roles and responsibilities are assigned to various parties.
- 2. Planning and Requirements Definition:** This involves definition of resources required for the project and validation of functional, training and support functions.
- 3. Design:** This is where the deliverables of stage two are converted into preliminary and comprehensive designs and functional requirements for the system are identified.
- 4. Development and Testing:** At this stage, the system is developed based on specifications and tested for optimal performance to ensure it meets its indented function.
- 5. Implementation:** This is where the system is put into utilization and adopted as part of the processes for the organization. It's here where manual work is automated and users trained on how to utilize the system
- 6. Operations and Maintenance:** This is a phase where the application is fully operational and it continues serving. Breakdowns are handled here. This is the phase in which the system becomes operational.
- 7. Disposition:** This is the final stage of the system and normally where the system useful time is over. The system is normally shut down and replaced with another.

4.5.2 Requirements gathering tools

Requirements elicitation was done using interviews which are common with data gathering as well questionnaires. Observation and document analysis of similar e-logistics systems was

done. This process has been utilized in numerous occasions and ensures systems development meet requirements.

4.4.2 Data movement within the system

Data movement within the system is demonstrated using a Data Flow Diagram (DFD) to show how data flows within the system. This is done using the following dataflow components:

- a) External entities which show the start of data as input to the prototype. They are shown using.
- b) Data stores that represent stores of data within the system for instance system files or databases. An open-ended box shows data, which shows store data at rest or a data store.
- c) Processes which are shown activities in which data is processed by being stored or retrieved or transferred in some way. Circles stand for a process that converts data into information.
- d) Data flow shows the movement of data from one part to the other. An arrow (→) identifies movement, i.e. data in motion. Data flows are generally shown as one-way only.

4.4.3 Data Flow diagram for using the system

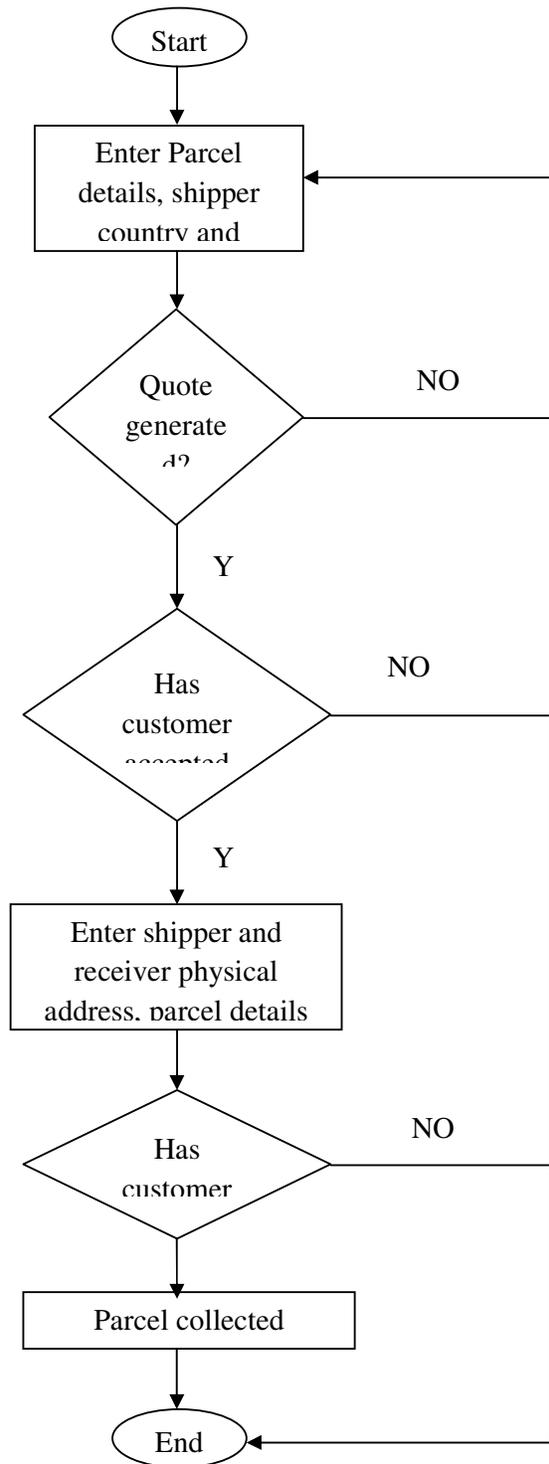


Figure 8: Dataflow diagram

4.5.3 Context diagram

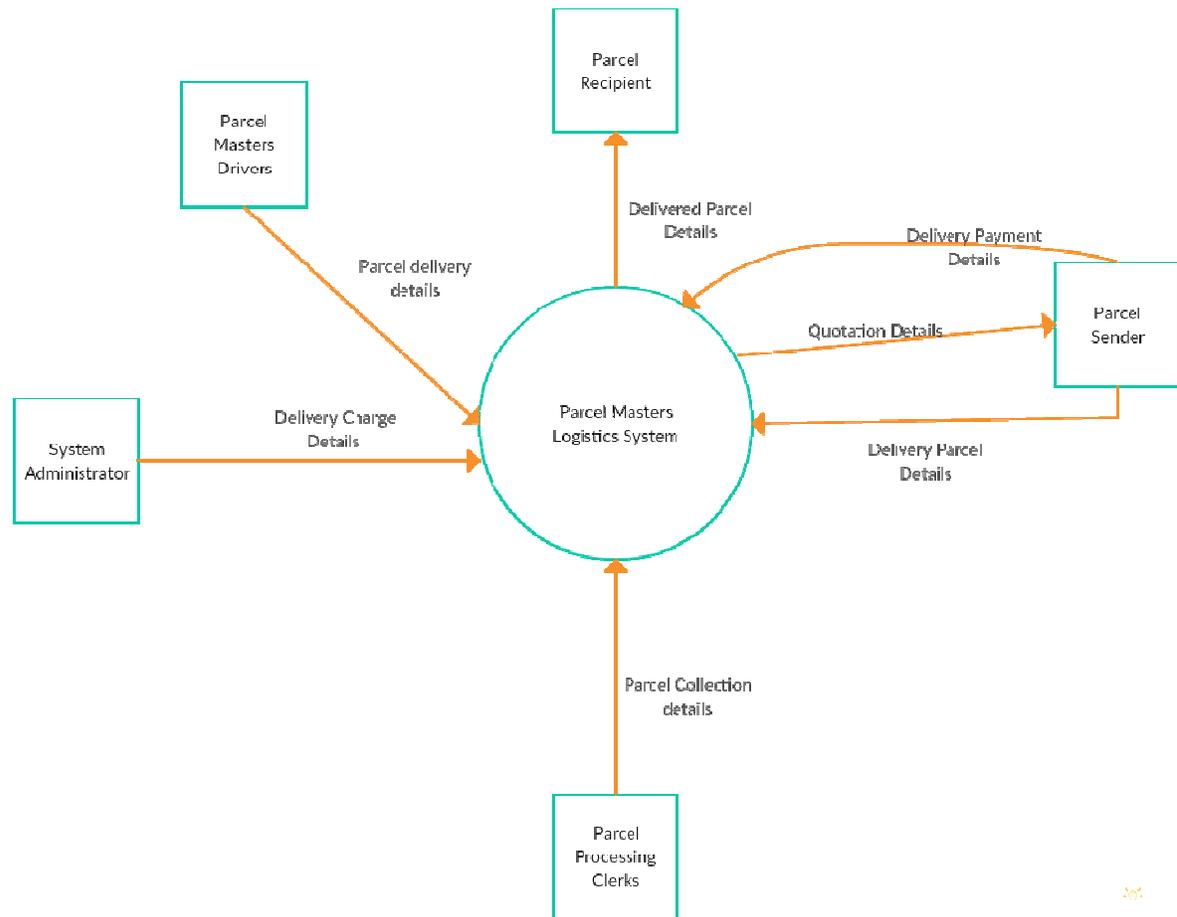


Figure 9: Context Diagram

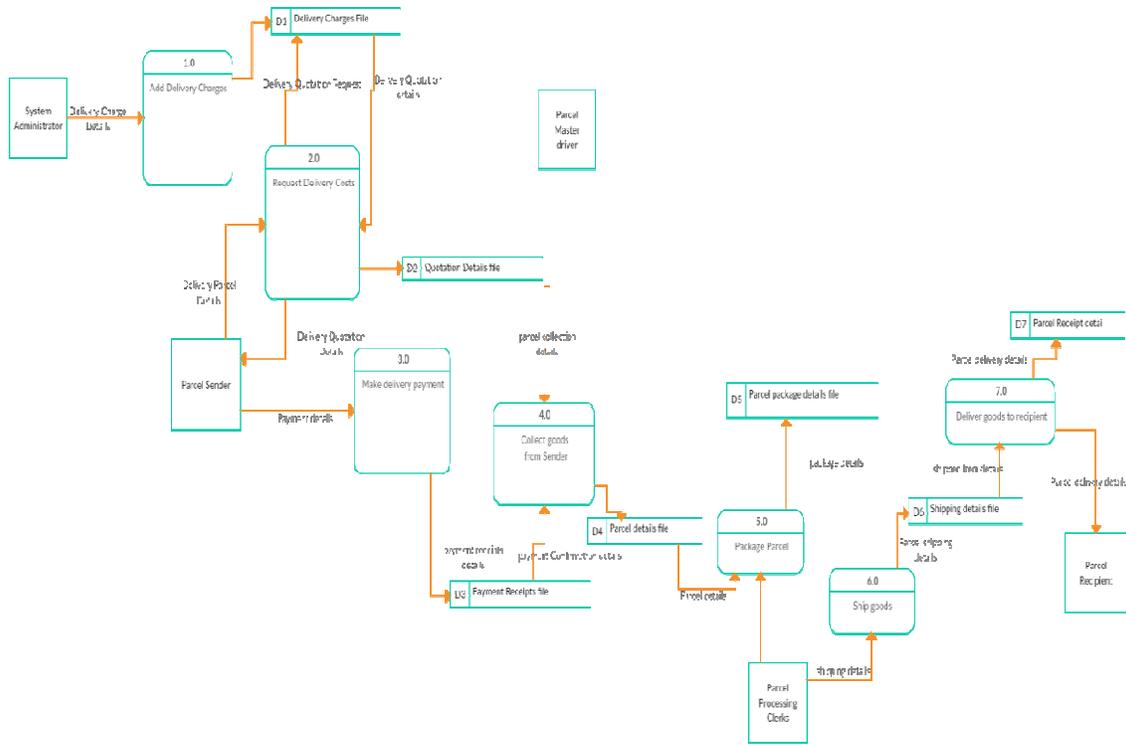


Figure 10: Level 0 Diagram showing the decomposition of the Context Diagram

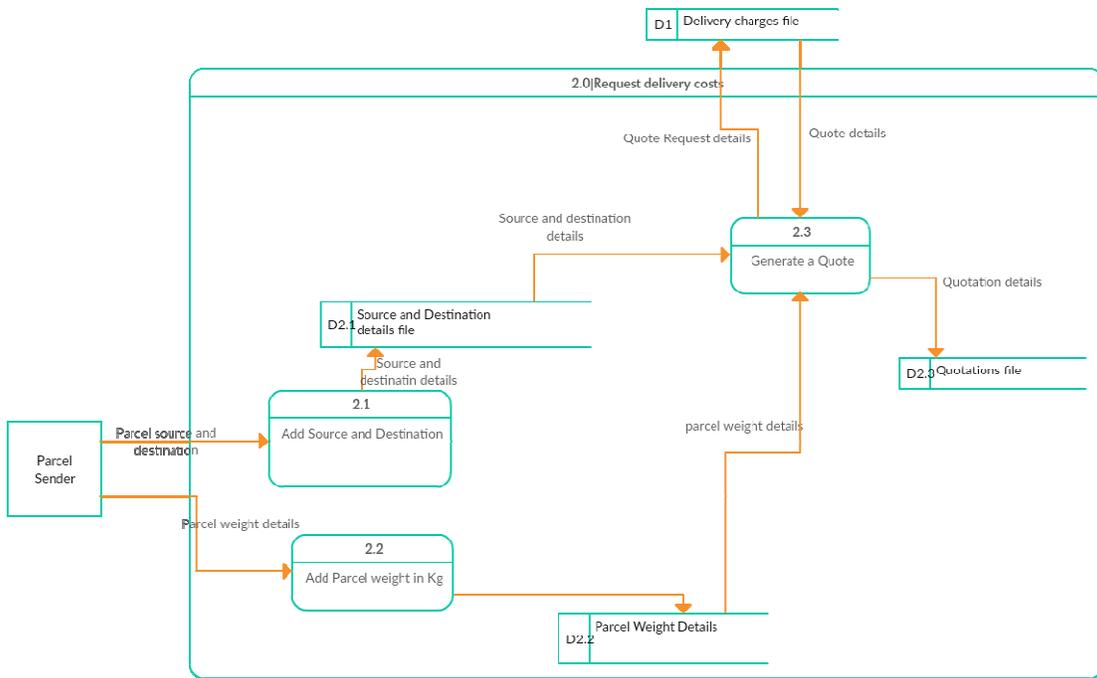


Figure 11: Level 1 Diagram showing the decomposition of process 2.0 of level 0 diagram

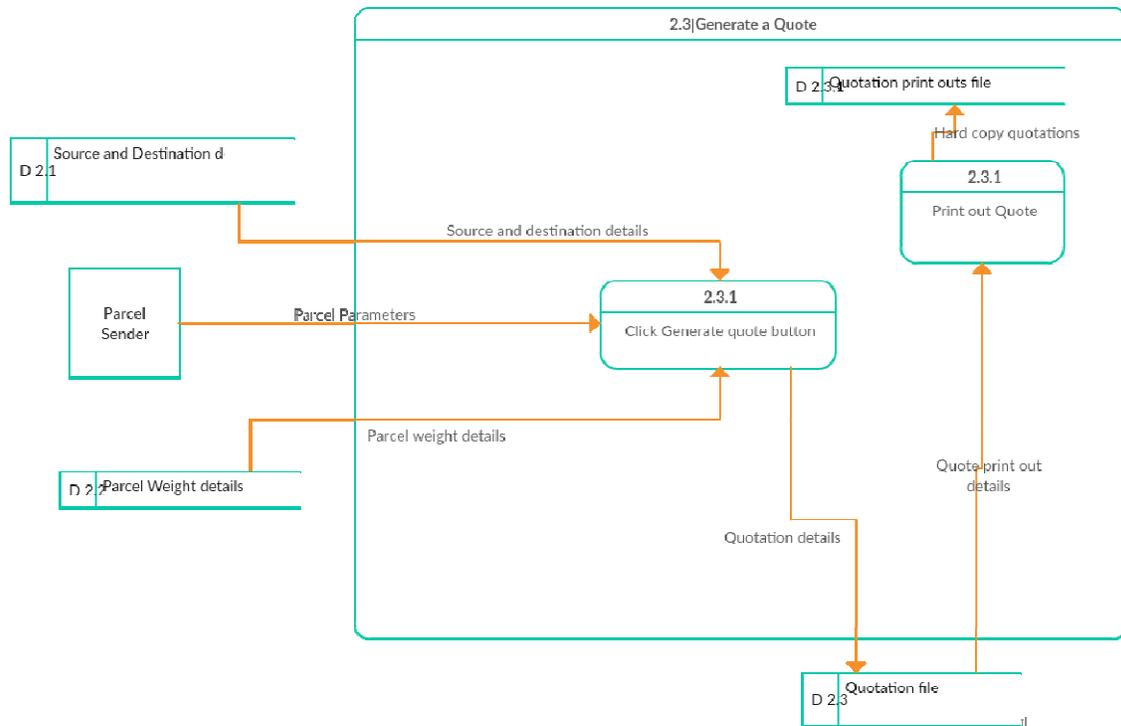


Figure 12: Level 2 Diagram Showing The Decomposition Of Process 2.3 Of Level 1 Diagram

4.5.6 Database design

This was represented using entity relationship diagrams. The role of an ER was to capture the conceptual model of the data to be managed in a database in regard to what there is and how it is connected. Entity relationship diagrams normally comprise of three distinct components but all interconnected as per below:

- Entity- refers to an object, a place, a person or class. This is presented using a rectangle shape.
- Attribute- it is used to demonstrate a property or characteristic of an entity. For instance, Name, mobile number, email etc can be associated with a mobile phone user in this system. They are presented with an eclipse.
- A Relationship shows relations between various entities and is represented by a diamond shape.

4.5.7 System testing methodologies

After completion, the system was tested as follows:

Sub testing – This was carried on the user module, back end module and the database to ensure it was working well.

Program testing – It was carried out to ensure the system generates correct quotes based on shipment weight and destination.

Acceptance testing – Acceptance testing was carried out by giving selected individuals of various companies an opportunity to interact with the prototype.

4.5.8 Database Management System

The database was developed putting into consideration issues with security and integrity of data. To avoid data redundancies, we implemented a primary key and created relationships between entities by use of foreign keys. MySQL version 5.0 database management system was utilized to design the database. MySQL holds huge sizes of data and responds fast to queries; it's good in control of security, concurrency and its open source database software.

4.5.9 Interface Design Technologies

The front end and backend module were developed using PHP5 to provide a link between the backend and front end modules access to the databases. PHP5 provides an integrated development environment easy to utilize with basic knowledge of Hypertext Markup language knowledge and its support for object oriented designs.

HTML

HTML refers to Hypertext markup language and was used to create tables, forms and form objects for interacting with the database by running functionalities such as querying, deleting and manipulation of data.

Adobe fireworks and Cascading Style Sheets (CSS)

An adobe firework is a graphics design tool. It was used to develop the templates for the front end and back end modules. Cascading Style Sheets (CSS) was used to develop layout and presentation.

JavaScript

JavaScript was used to create dynamic and interactive web pages for user interactions with form items which included fields, buttons, text areas and selection lists and hyper text.

System security and access control

To ensure secure access of the system and protect it from attacks, an access matrix was created where users access the system based on rights. The customers have normal read and query generation capability while the administrator has modification capability. The system also keeps an audit trail.

System back up

The prototype is hosted in a remote service with access controlled through password. There is a scheduled daily back up of the system kept at a remote facility.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.0 Introduction

This chapter provides findings of the research activity as outlined previously. Data analysed here was collected via online questionnaires as it was convenient for most of the respondents. Information was gathered from staff members of various logistics companies operating from Nairobi. The findings of this chapter include frequencies, means, standard deviations analyses which have been interpreted.

4.1 Results

4.1.1 Testing and evaluation of the questionnaire

Before the questionnaire was released to the actual respondents, it was tested through five friends and they responded full. On actual survey, the questionnaires were checked and it was confirmed respondents had answered the questions fully.

4.1.2 Analysis of response rate

Out of a population of around 2,000 logistics companies operating in Kenya, we identified 35 active logistics companies and out of this we 23 respondents replied to our questionnaire fully giving us a response rate of 65.71%. Respondents were introduced to the survey through an introductory letter from the university explaining the reasons behind the survey. Most of the respondents were known to the researcher and contact achieved through email, visits, personal interactions, telephone calls and visits to client premises. The summary of response is shown in table 4.1.

4.1.3 Demographics

This part analyses various classification of staff members surveyed in this research.

4.1.4 Organisational Operational Focus

The survey looked at companies area of operational focus categorised in to local logistics, international logistics or both and the outcome was as per table 4.2. It was noted that a big number of logistics companies in Kenya were operating both locally and in the international arena as well.

Table 2: Operation Area of the Organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Local	2	8.7	8.7	8.7
	International	1	4.3	4.3	13.0
	Both	20	87.0	87.0	100.0
	Total	23	100.0	100.0	

4.1.5 Categorisation of logistics companies by implementation of logistics e-logistics

To understand logistics companies in Kenya and their area of operation, logistics companies were categorised to domestic only, international only and both. This was aimed at identifying if implementation of logistics e-logistics system could be driven by their area of focus. From our findings, 40.9% had no intention of implementing a logistics e-logistics system and this was the majority of the respondents. 27.3% had already implemented an e-logistics logistics system while 31.8% planned to implement in the future. This indicated that a number e-logistics was not fully in use and there was manual work going on especially on the area of customer interactions and payments.

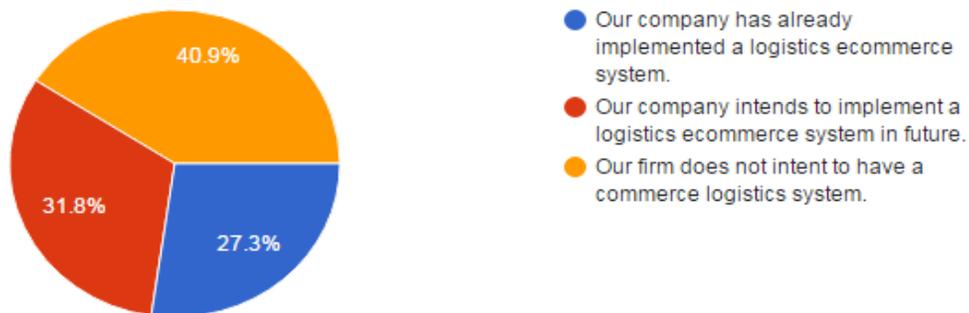


Figure 13: Distribution by e-logistics implementation

4.1.6 Distribution by age bracket of staff who responded to survey

The researcher did survey various staff members age to understand if age could be a contributing factor. Most of the staff surveyed were aged between 30 and 39 years of age. Technologies changes were deemed as a contributing factor to implementation of e-logistics with where a company could shy away from implementation due to lack of knowledge.

Table 3: Age of the Respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0-19 years	1	4.3	4.3	4.3
20-29 Years	6	26.1	26.1	30.4
30-39 years	10	43.5	43.5	73.9
40-49 Years	6	26.1	26.1	100.0
Total	23	100.0	100.0	

4.1.7 Distribution by department

The survey did look at individuals in various departments and most of those surveyed were in the technological section of the company. It was noted that there was slow uptake of e-logistics by companies with lean information technology departments.

Table 4: Distribution by department

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Operations Department	7	30.4	30.4	30.4
IT Department	10	43.5	43.5	73.9
Commercial Department	3	13.0	13.0	87.0
Management Department	1	4.3	4.3	91.3
Finance Department	2	8.7	8.7	100.0
Total	23	100.0	100.0	

4.1.8 Distribution by revenue turnover

Revenue turnover is a key factor in determining if a company can implement an e-logistics system by allocating finances to meet costs of running the same. There was even distribution of companies' revenue turnover across with companies with low revenue turnover not implementing e-logistics systems. Revenue turnover was key with companies with low revenue turnovers not implementing e-logistics systems particularly due to lack of skill and budget for the same.

Table 5: Revenue Turn Over

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Less than 500 000	1	4.3	4.3	4.3
500 001 - 1000 000	7	30.4	30.4	34.8
1000 001 - 5000 000	11	47.8	47.8	82.6
10 000 000 and Above	4	17.4	17.4	100.0
Total	23	100.0	100.0	

4.1.9 Distribution by level of education

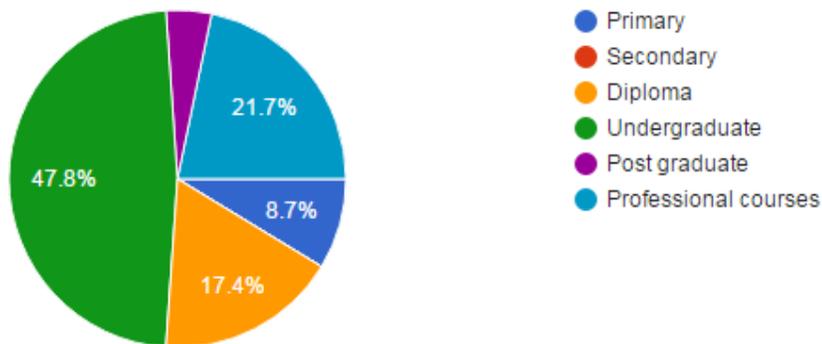


Figure 14: Distribution by level of education

Out of the surveyed respondents, nearly all of them had an understanding on e-logistics systems with most of them having attained the level of undergraduate. It was however noted that companies with low level educated staff had not taken up e-logistics as part of their operations.

4.1.10 Distribution by number of years in operation

Table 6: Operational Duration

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than a Year	1	4.3	4.3	4.3
	1 - 5 Years	4	17.4	17.4	21.7
	6 - 10 Years	8	34.8	34.8	56.5
	11 - 15 Years	5	21.7	21.7	78.3
	16 - 20 Years	1	4.3	4.3	82.6
	21 and Above	4	17.4	17.4	100.0
	Total	23	100.0	100.0	

From the companies surveyed, years of operation were evenly distributed across with 18.2% having been in operation for over 21years. Majority of the companies surveyed had been in operation between 5 to 10 years. Companies which had been in operation for long contributed more to e-logistics uptake with companies which have moved in to business recently in the initial stages of planning e-logistics implementation.

4.1.11 Distribution by number of employees

Table 7: Number of Employees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-50 Employees	17	73.9	73.9	73.9
	51 - 100 Employees	2	8.7	8.7	82.6
	101 - 200 Employees	1	4.3	4.3	87.0
	201 and Above	3	13.0	13.0	100.0
	Total	23	100.0	100.0	

Out the companies surveyed, majority were small medium enterprises with employees less than 50 in number which formed 72.7% of all customers surveyed. Companies with low employees' numbers had not implemented e-logistics systems compared to companies which had been in business for an extended period.

4.3.10 Distribution by implementation of logistics e-logistics systems

Out of the companies surveyed, only 26.1% had implemented a logistics e-logistics system while 34.8% had planned to implement in the future while 39.1% did not plan to implement. None of the companies which had implemented an e-logistics system were running some form of payments on the system therefore clients had to pay on the side to get services. Implementation of e-logistics systems was mostly driven by management perception as well as revenue turnover, number of employees and skill.

Table 8: e-logistics Description of the Organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	e-logistics Implemented	6	26.1	26.1	26.1
	Future Implementation of e-logistics	8	34.8	34.8	60.9
	No planned Implementation	9	39.1	39.1	100.0
	Total	23	100.0	100.0	

4.3.11 Reasons for e-logistics implementation

Out of the 26.1% who had already implemented the system, we did find out reasons for implementation and below were our findings. 50% implemented due to process change request while 33.3% implemented due to competitor activities and 16.7% implemented due to internal needs.

Table 9: Implementing factors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Competition	2	8.7	33.3	33.3
	Business Process Re-engineering	3	13.0	50.0	83.3
	Internal staff request	1	4.3	16.7	100.0
	Total	6	26.1	100.0	

4.3.12 Reasons for planned implementation in future

Table 10: Future Implementation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5 Years	5	21.7	55.6	55.6
	6-10 years	4	17.4	44.4	100.0
	Total	9	39.1	100.0	
Missing	System	14	60.9		
Total		23	100.0		

Future Implementation

Out of the 34.8% who planned to implement the system in future, 44.4% saw technological changes as a challenge posing need to wait while 44.4% did not budget for a logistics e-logistics system and 11.1% lacked the technical knowledge to handle e-logistics systems.

Table 11: Reasons for future implementation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Financial	4	17.4	44.4	44.4
	Technological changes	4	17.4	44.4	88.9
	Lack of Man Power	1	4.3	11.1	100.0
	Total	9	39.1	100.0	
Missing	System	14	60.9		
Total		23	100.0		

4.2 Prototype: Parcel Masters Logistics Ecommerce system

This prototype was developed to how e-logistics can be used to handle most of logistics' processes on the side of customer and business interaction.

Login

Log-in to the Parcel Masters Logistics system using the Administrator

account that you created. Type the url of the system into the browser as follows <http://localhost/Parcelmasters>

The screen below will load



Figure 15: Login screen

Key in the correct username and password as assigned and then the following landing page will come upon successful login

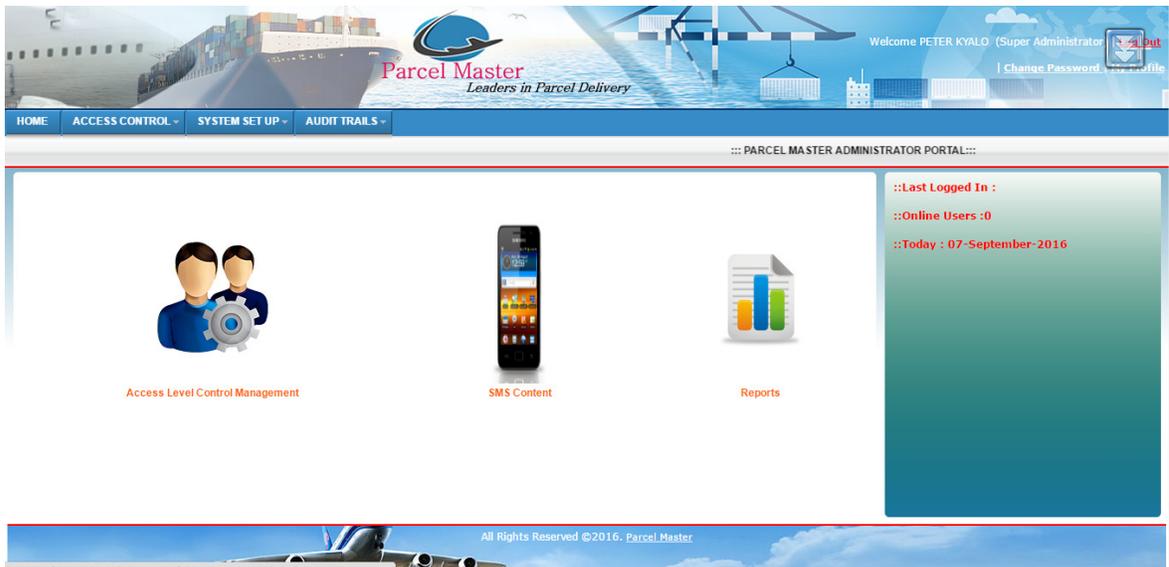
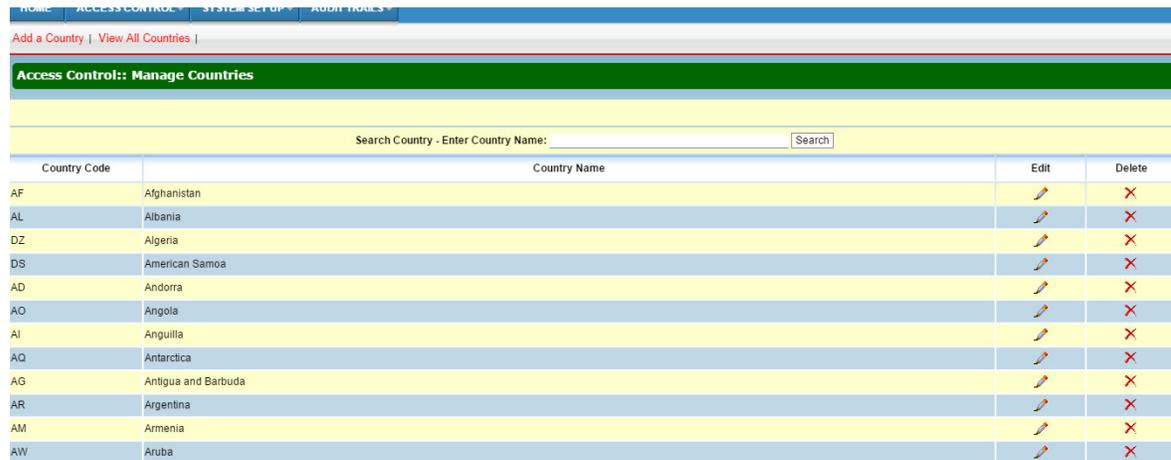


Figure 16: Landing Page

Manage countries

The core business of parcel masters is to transport parcels from one country to another. It is therefore important that all countries are managed in the system. To add/delete/edit/view countries go to the top menu then SYSTEM SET UP->Manage Countries the screen below will appear with the existing countries

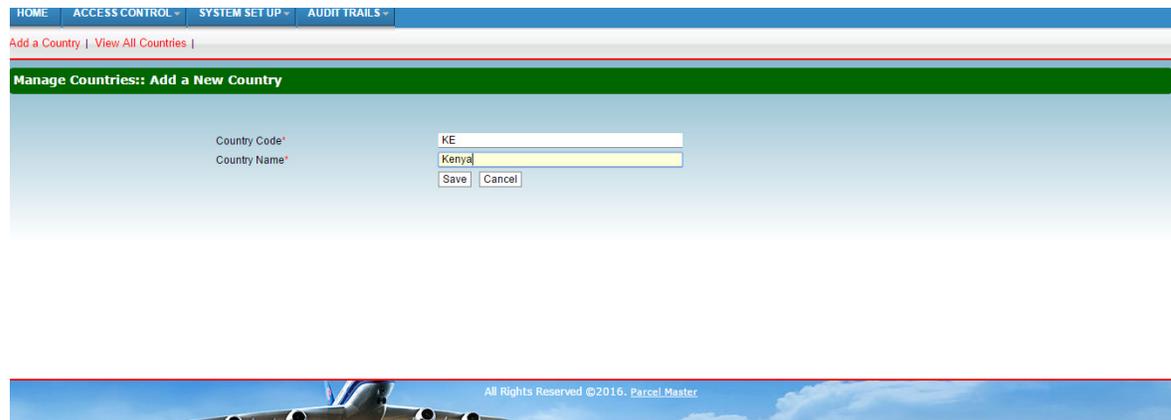


Country Code	Country Name	Edit	Delete
AF	Afghanistan		
AL	Albania		
DZ	Algeria		
DS	American Samoa		
AD	Andorra		
AO	Angola		
AI	Anguilla		
AQ	Antarctica		
AG	Antigua and Barbuda		
AR	Argentina		
AM	Armenia		
AW	Aruba		

Figure 17: Countries screen

From the list grid you can use the respective icons to delete or edit a country.

To add a new country from the sub menu above the grid click on “Add a Country”



Country Code*

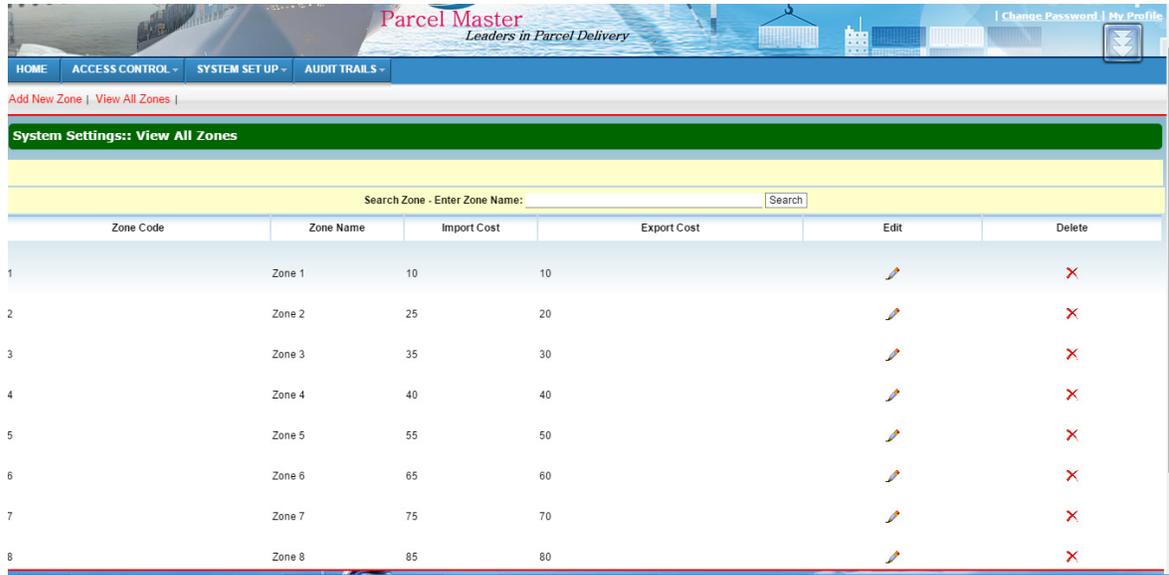
Country Name*

All Rights Reserved ©2016. Parcel_Master

Figure 18: Adding new country

Manage Tariff Zones

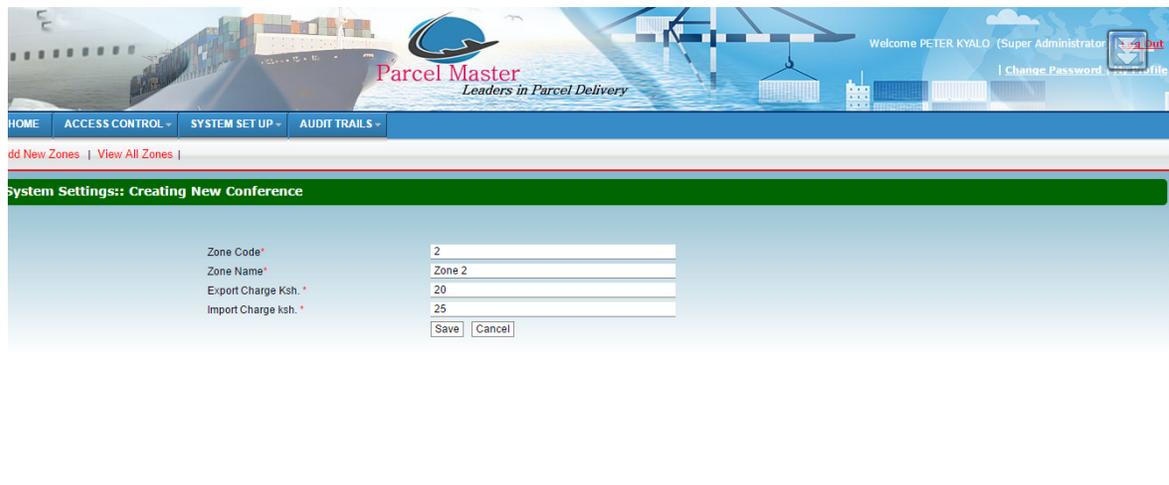
Transfer of parcels from one country to another is charged. For purposes of charging these countries are grouped into what is called Tariff zones. Incoming and outgoing transfers are charged differently. The figure below shows Tariff zones.



Zone Code	Zone Name	Import Cost	Export Cost	Edit	Delete
1	Zone 1	10	10		
2	Zone 2	25	20		
3	Zone 3	35	30		
4	Zone 4	40	40		
5	Zone 5	55	50		
6	Zone 6	65	60		
7	Zone 7	75	70		
8	Zone 8	85	80		

Figure 19: Managing tariff zones

To add new Tariff Zones click on the “Add New Zone” link above the grid displaying existing tariffs.



Zone Code*

Zone Name*

Export Charge Ksh. *

Import Charge ksh. *

Figure 20: Adding new tariff

Adding Countries to a Zone

To associate a country to a zone goes to SYSTEM SET UP-> Add Country to Zone. The screen below will appear. All you need is to select a zone and then check all the countries you want to belong to that zone and then click on the save button.

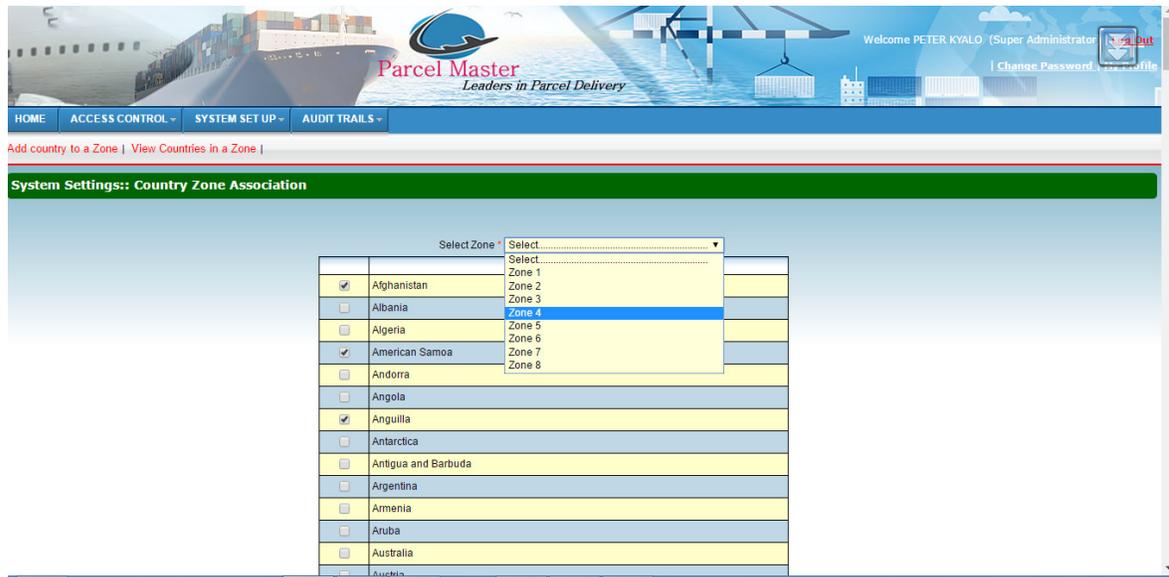


Figure 21: Adding countries to a zone

Requesting a Quote and Paying for Delivery

This system has a front end which is modelled as a website. It forms the interaction point between parcel masters and their clients. The front end is available on the link <http://www.parcelmasters.co.ke/>

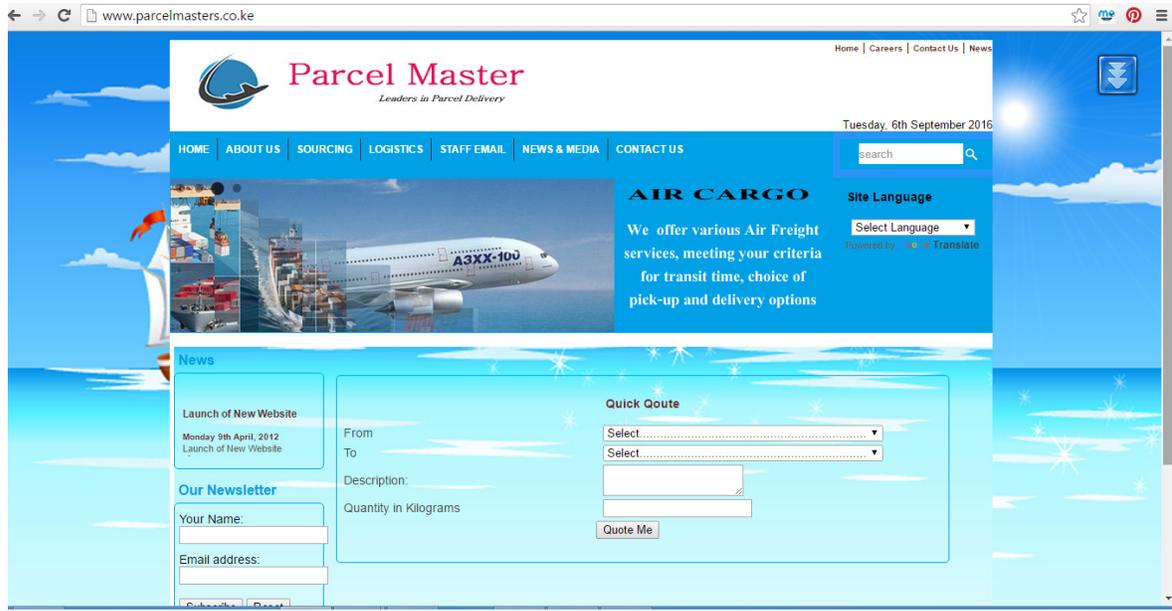


Figure 22: Customer home screen

Requesting a Quote

To request a quote fill in the form on front page and click on the button Quote Me

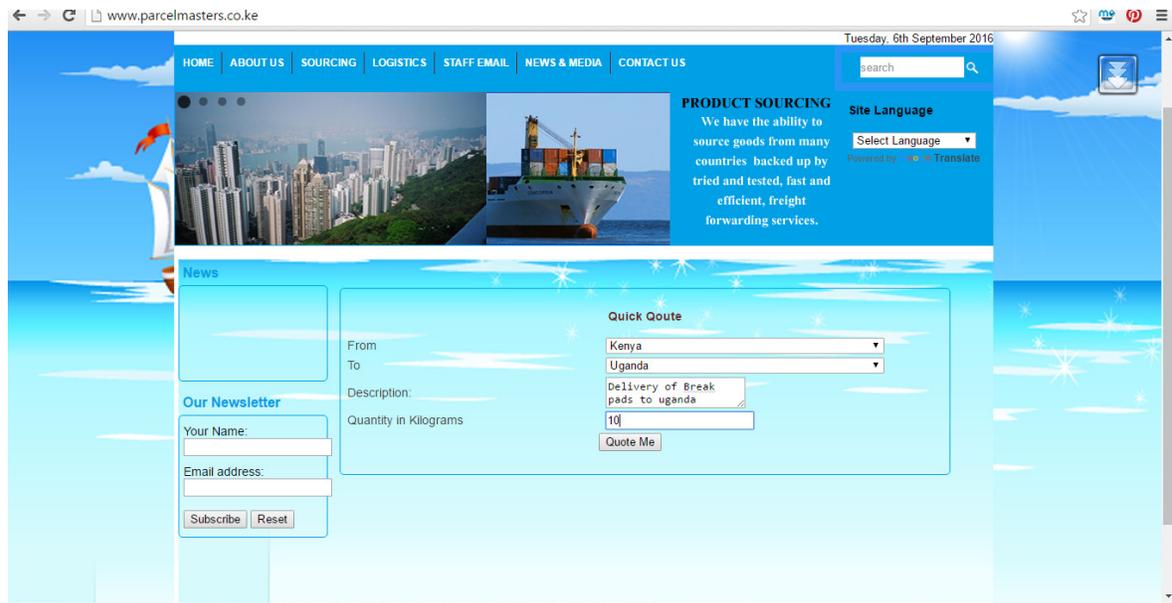


Figure 23: Requesting for a quote

Once you request a quote the screen below comes. Proceed to fill the remaining part of the form if you want to pay for the service

www.parcelmasters.co.ke

forwarding services.

News
Monday 9th April, 2012
Launch of New Website
View more »

Our Newsletter
Your Name:
Email address:
Subscribe Reset

Quick Quote
Amount: (in Kshs) 100
Vat 16% 16
Total Amount 116
Consignment Weight 10
Consignment Description : delivery of a parcel to uganda
Consignment Value in Ksh. : 10000
Delivery Instructions : Delivery of a parcel of 10kg t
Reference: 14732186212016

Sender Details
Sender First Name: MORRIS
Sender Last Name: MUSYOKI
Sender Email Address: mormorris@gmail.com
Mobile/Tel No : 0734657234
Company Address 2345
Office No 4
Floor No 2nd floor
Road/Street Kijabe street
City Nairobi
Country Kenya

Recipient Details
Full Names :

Figure 24: Filling delivery details

Paying for Delivery

Once you have added delivery details click on “Make Payment” button so that you can be redirected to the payment portal. At the payment portal many options are given and you can proceed to pay with your preferred channel

pesaPal will charge Ksh. 116.00 to your Visa card. PesaPal does not store your card details.

Customer Card Billing Details

Country: Kenya

Phone Number: +254

Name: MORRIS MUSYOKI

Email: mormorris@gmail.com

Address:

City/Town:

State/Region:

Zip/Postal Code:

Complete

100% secure payments processed by PesaPal and secured by Verisign SSL. In order to protect your card from unauthorised use, PesaPal may request further proof of card ownership.

pesapal Norton

Figure 25: Payment options screen

Checking for Delivery Requests

Once a delivery has been paid for by the client it can be located and found at the administration portal under SYSTEM SET UP-> Delivery Requests as shown in the figure below

3647	MORRIS MUSYOKI	Delivery of a parcel of 10kg to Zone 1:	10kg	100	16	116		Print	
3647	Morris Mutiya	Delivery of a parcel of 1kg to Zone 5:	0kg	50	8	58		Print	
3647	Morris Mutiya	Delivery of a parcel of 1kg to Zone 2:	1kg	20	3	23		Print	

Figure 26: Collection requests

Viewing Payments at Merchant Portal

The integrator Pesapal has a portal where payments can be tracked see the figure below

The screenshot shows the Pesapal merchant dashboard. The top navigation bar includes 'PERSONAL' and 'BUSINESS' tabs, a location dropdown for 'Kenya', and a 'Logout My Account' button. The main content area is divided into several sections:

- MY ACCOUNT:** A sidebar menu with options like 'My Dashboard', 'Edit Account', 'Transactions', 'Payment Options', 'Withdraw Funds', 'Invoices', 'Simple Selling', and 'PIN Settings'.
- Parcel Masters:** A section with the heading 'We've Assembled some links to get you going' and links for 'Check Transaction history', 'Withdraw money from your account', and 'Create an invoice'.
- Current Balance:** Displays 'Your PesaPal™ balance available for withdrawal is: **Ksh. 190.68**' with a 'Withdraw Funds' button.
- Export Transactions:** A section with a 'View:' dropdown set to 'Last 7 days' and a 'Date Range:' section with dates '2016-08-30' and '2016-09-06'. It includes icons for Excel and PDF exports.
- Invoices due in the next 30 days:** A section stating 'You have no invoices that are due.'
- Showing all transactions:** A section with a 'Transactions (6)' button.

Figure 27: Payment merchant screen

4.3 Discussions

This research indicates that the overall level of technology expenditure particularly on computer systems in comparison with overall organizational budget is low. The research noted that there is low rate of Information Technology and Communication (ICT) investment as a low number of surveyed firms has a structured innovation development arrangements. This discovery is based on direction taken by many firms in to implementation of e-logistics where there is no known budgetary allocation or the companies have a low revenue turnover. Haug et al. (2011) advised that those organizations which have adopted planned initiatives to improve customer service delivery improvements tend to use technology as per of this improvement. In this context, companies with a long term view of using technology as leverage in competitiveness need to invest more in their technology departments.

On the other side, the research noted that a number of companies especially those operating locally do not appreciate what new technologies can do to improve on their business delivery arrangements and technology is not seen as crucial.

Firms focused on the growth of business in both local and international businesses have a higher level of e-logistics implementation strategies aimed at enhancing the firm's ability to offer services both locally and internationally. Lack of technical knowledge or low level of education in the staff and also decision makers is a major constraint both on e-logistics implementation. Managers of logistics service providers must devote more resources to staff training so as to embrace e-logistics uptake. With regards to barriers of e-logistics implementation, high costs and lack of sufficient staff investments in learning new technologies and lack of knowledge of the ICT advantages was found to be barriers of e-logistics implementation.

CHAPTER 5

CONCLUSION AND SUGGESTIONS FOR FURTHER RESEARCH

5.1 Achievements

Objective 1: To determine the factors that influences the implementation of e-logistics by various logistics companies in Kenya.

From this research, we noted that various factors come into play at different levels affecting the manner in which information technology and particularly e-logistics systems are adopted. Lack of knowledge on how to develop and run such systems, budgetary constrains associated with cost of development, implementing and maintaining such systems contributed by a huge margin forcing many of the companies surveyed to run systems manually.

Objective 2: Determine level e-logistics implementation by logistics service providers.

We noted that there low level of e-logistics implementation and implementation was skewed towards companies in the international market where they move goods and services across countries. We however noted that none of these companies had an active online payment portal where customers could directly complete a purchase.

Objective 3: To demonstrate the critical role of e-logistics can play in supporting business operations.

Most of the surveyed staff and particularly those on operational side showed great interest in e-logistics where several services such as quotes and payments could be automated. This would reduce delays in response to customers and improve on service delivery. Overall, there would be increased customer satisfaction which could translate to increased sales and a great competition tool.

Objective 4: Develop an e-logistics prototype for logistics companies which exhibit all functionalities of an e-logistics system.

Out of the available systems surveyed, none could generate an instant quote or provide means of payment. As one of the objectives of this research, we developed a prototype (<http://www.parcelmasters.co.ke/>) and ran it through a number of users who accepted it after finding it useful in running some of their business processes.

5.2 Conclusion

The results presented in this research point out issues of interest to decision makers in logistics service providers and innovators in both hardware and software technologies. For instance this research demonstrates the strategic importance e-logistics in improving service delivery. Results show that firms working on the growth of their product portfolio including service delivery base show an aggressive rate of technological implementation. The implication is that e-logistics is important in expansion and the diversification of product portfolio.

Limitations

The research was exploratory by design which means that there are some limitations. For instance, the selected sample size for the questionnaire was small and a larger sample could be more effective. In addition to this, data related to technology expenditure is not easy to get. Systems costs are often part of wider and bigger organizational costs and not easy to tell exactly which expense is budgeted for information technology. This research studies logistics companies in Nairobi only and findings were meant to apply to all logistics companies in Kenya posing a challenge too.

5.3 Further Research

A number of areas have been identified which may require extensive studies. For instance this research is based on the current e-logistics implementation practices and but it does not go further to look at technologies used in implementation of e-logistics and comparison of the same. By carrying out research which incorporates customers and the companies as well, the impact of information technology implementation and particularly e-logistics can be traced and its effects studied in length. Such information would also be crucial in policy making and recommendations to both government and the private sector too as it incorporates customer opinions too.

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APPENDIX 1: INTRODUCTORY LETTER



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30 June 2016

TO WHOM IT MAY CONCERN:

RE: MORRIS MUSYOKI MUTISYA (P56/61449/2013)

The above named is a student in the MSc in Information Systems of the University of Nairobi. As part of the requirements of the programme the student is required to undertake a research project and write a report. Her project is entitled: An Assessment of e-Commerce Implementation by Logistics Companies in Kenya.

The study will involve obtaining relevant information from the management team and ICT offers on the usage of ec-commerce in logistics.

Your institution has been identified as a source of data required for this project. I am therefore requesting that you assist the student obtain the required information. Your assistance will be highly appreciated.

A handwritten signature in black ink, appearing to read 'Christopher A. Moturi'.

CHRISTOPHER A. MOTURI
DEPUTY DIRECTOR
SCHOOL OF COMPUTING AND INFORMATICS

APPENDIX 2: QUESTIONNAIRE

E-logistics implementation among logistics service providers in Kenya

This questionnaire is targeted to information technology, commerce and management sections of logistics companies operating in Nairobi or any staff with the capacity of making decisions on implementation of e-logistics in offering logistics services. The questionnaire should take around 10 minutes and is easy to answer.

SECTION A

Demographic data

1. What is your age bracket?
 - a. 0 – 19 years []
 - b. 20 – 29 years []
 - c. 30- 39 years []
 - d. 40 – 49 years []
 - e. 50 years and above []

2. What is your department?
 - a. Operations []
 - b. Information Technology []
 - c. Commercial []
 - d. Management []
 - e. Finance []

3. What is your highest level of education
 - a. Primary []
 - b. Secondary []
 - c. Degree []
 - d. Masters []
 - e. PhD []
 - f. Professional qualifications in IT []
 - g. Other – Please specify

4. Which of the following best describes your organization
 - a. Local logistics company (Domestic) []
 - b. International Logistics Company []
 - c. Both []

5. What is the annual estimated annual revenue for your organization in Kenyan shillings
 - a. Less than 500,000.00
 - b. 500,001 to 1,000,000.00

- c. 1,000,001 to 5,000,000.00
 - d. 5,000,001.00 to 10,000,000.00
 - e. Over 10,000,001.00
 - f. Unknown
6. What is your firms information technology but as a percentage of revenue?
- a. Less than 5%
 - b. 5 – 10%
 - c. 10 – 20%
 - d. Unknown
7. How long has the company been operational
- a. Less than one year
 - b. 1 – 5 years
 - c. 6 – 10 years
 - d. 11- 15 years
 - e. 16- 20 years
 - f. Over 21 years
8. How many employees does the company have?
- a. 0 – 50
 - b. 50 -100
 - c. 100 – 200
 - d. 201 – 300
 - e. 301 and above

SECTION B

This section is aimed at directing you to other sections. Please select the appropriate answer and proceed as instructed further down.

9. Select the option which best describes your company
- a. Our company has already implemented a logistics ecommerce system.
 - b. Our company intends to implement a logistics ecommerce system in future.
 - c. Our firm does not intent to have a commerce logistics system.

If your answer to question 9 (a) is true proceed to section C

If your answer to question 9 (b) is true proceed to section D

If your answer to question 9 (c) is true proceed to section E

SECTION C

Answer this section if you selected (a) in question 9 of section B

10. Which of the following was a key factor which influenced decision to implement a logistics ecommerce system

- a. Competition activity []
- b. Customer request []
- c. Business process change request []
- d. Internal staff request (marketing, commercial, customer service) []
- e. Other (please specify)

11. On a scale from 1 (strongly disagree) to 5 (strongly agree) rate to what extent you would agree or disagree with the following views regarding implementation of logistics ecommerce system for your organization.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The ecommerce platform enables our customers request for services easily.					
Ecommerce system improves an organisations visibility to customers					
Ecommerce system increases profitability by increasing sales					
Ecommerce system allows greater customer interaction					
There is enough security in interacting with customers through the ecommerce system					
Top management fully supports the utilization of the ecommerce system					
The top management is aware of the benefits of utilizing logistics system					
Many of our competitors have implemented ecommerce systems.					
Our competitors who have implemented ecommerce systems are benefiting greatly					
Our competitors who have implemented ecommerce systems are perceived favourable by customers.					

SECTION D

Answer this section if you selected b in question 9 of section B

12. If your firm intends to implement a logistics ecommerce system in the future, how soon do you think your company will implement the system?

- a. Less than 5 years

- b. 6 – 10 years
- c. 10 – 20 years
- d. I do not know

13. Why does your company intent to implement an ecommerce system in the future?

- a. Financial capability.
- b. Technological charges necessitating need to wait.
- c. Lack of manpower to manage the system.
- d. Other (Please specify)

SECTION E

Answer this section if you selected (c) in question 9 of section B

14. If your company does not intent to implement an ecommerce system, on a scale from 1 (strongly disagree) to 5 (strongly agree) rate to what extent you would agree or disagree with the following views regarding implementation of logistics ecommerce system for your organization.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Ecommerce system is an unnecessary cost to our company					
An ecommerce system will expose our company information					
We do not have the necessary skill to implement an ecommerce system					
Our management does not understand the impact of an ecommerce system to our business operations					