INTELLIGENT FLEET MANAGEMENT SYSTEMS, INFORMATION COMMUNICATION TECHNOLOGY AND OPERATIONAL PERFORMANCE OF TRANSPORT COMPANIES IN MOMBASA COUNTY, KENYA

BY

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DECLARATION

Declaration by the student

This research project report is my original work and has not been presented for the award of a degree in any other university.

Signature: é é é é é é é é é é é . Date: é é é é é é é é

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D61/77249/2015

Declaration by the supervisor

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

Signed é é é é é é é é é é é é é . Date é é é é é é é é é .

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DEDICATION

To my family and special dedication to my late grandfather Ali and my guardians Mr. Ali Omar Kai and Mr. Said Omar Muhdhar bin Sayyid Ahmad Saggaf. May God bless you all.

ACKNOWLEDGEMENTS

Many thanks to almighty Allah for this humble opportunity, health and wisdom to be where I am today, a journey that started with single mile. Am forever grateful for whatever he has bestowed me with and those he hasn't for better reasons known by him.It has been of great pleasure to be accompanied this journey by guardian and supervisor Mr. Mwanyota Job who has been instrumental in my journey from inception to submission for his commitment and constant guidance to him I am forever indebted. To my family whom I have denied them their rights for quiet sometimes but their understanding has been immeasurable, I say thank you especially to my daughter Fatimah Abdillah. To the respondent your value has been added to this project report and many will benefit from the same.

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LIST OF ABBREVIATIONS ACRONYMS

ANOVA : Analysis of Variance

DSS : Decision support system

EU : European Union

FMS : Fleet management system

GDP : Gross Domestic Product

GPS : Global Positioning System

ICT : Information Communication Technology

IFMS : Intelligent fleet management system

ITS : Intelligent Transportation Systems

KPLC : Kenya Power & Lighting Company

KSC : Kenya Shippers Council

MIS : Management Information Systems

MMR : Moderated Multiple Regression Analysis

MSC : Mumias Sugar Company

NCTTCA : Northern Corridor Transit Transport Coordination Authority

RBV : Resource Based View

SD : Standard Deviation

SCM : Supply Chain Management

UNCTAD : United Nations Conference on Trade and Development

VIF : Variance of Inflation Factor

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ABSTRACT

Transport companies are faced with the pressure to be reliable, deliver faster and offer affordable services through cost effectiveness. The study objective is to form an opinion on the impact of IFMS on the operational performance of transport companies and to determine the moderating effect of ICT on the correlation between IFMS and operational performance in transport companies in Mombasa County; Kenya. The study embraced a descriptive cross-sectional survey design. The study targeted all transport companies in Mombasa County. Closed questionnaire were used to collect primary data for the study. The collected data was cleaned, validated, uniformity and edited for accuracy, consistency and complete data ends. To find out the effect of IFMS on the operational performance of transport companies in Mombasa County, a regression model was used. The study concluded that there is a direct relationship between vehicle finance and maintenance and operational performance of the companies. This means that an improved vehicle finance and maintenance practices would lead to high level of operational performance. The study also concludes that adoption of vehicle telematics does not reliably predict operational performance. Regarding the moderating effect of ICT, the study concluded that adoption of ICT strongly and positively influences the relationship between operational performance and vehicle finance and maintenance, vehicle telematics and driver and fuel management. This means that ICT adoption is significant in IFMS. The findings of this study commends that systems that allow timely and free movement of information between internal structures, individuals and departments should be put into place. This will allow actual flow of information between the organization and key stakeholders. The study also commends the management of fleet and employees trained on best available practices so as to avoid failures in the system and consequently wastage of resources.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

The current business dynamics demand entrepreneurs to focus their efforts in maintaining operations that run like a well-oiled machine (Giathi & Karanja, 2016). They must increase product performance in terms of information services, flexibility, reaction speed, and delivery strategy (Giathi & Karanja, 2016). For this particular reason, companies are mostly being obliged to review their central processes using other methods. Intelligent Fleet Management Systems (IFMS) have proved to be a critical component of oiling the supply chain since they manage the transport function throughout the supply chain. Schorpp (2011) posit that IFMS improves operational performance through minimization of vehicle and fuel costs and while improving safety. Lancioni, Smith and Oliva (2000) further assert that the use of IFMS improves operational management through increased safety in traffic, decrease of incidents, smaller emission of harmful gases, reductions of fuel costs as well as vehicles and accidentsô damages. An IFMS if improved using information communication technology (ICT) helps in actual monitoring vehicle location, velocity and field data, to ensure difficulties are detected in delivery execution and the minimization of operational costs (Crainic & Laporte, 2000).

The study was guided by the technology diffusion, Resource-Based View (RBV)and replacement theories. The basis of the RBV theory is that for companies to succeed, their future combativeness will depend on the exclusive development of idiosyncratic capabilities, which are mostly intangible in nature. Strategy as a nucleus should be described by the firmôs unique means (Rumelt, 1984). Technology diffusion theory emphasizes on the process by which innovations are embrace over time (Gregor

&Jones, 1999). Its proposal is that innovations should be communicated through specific channels over time among the fleet managers for application (Apperson & Wikstrom, 1997). Finally, replacement theory considers that the reliability of operations must take into account operational conditions. This involves evaluating the operational data gained during the operation of the object. In the field of operation of road vehicles, it is possible to evaluate records of failures, maintenance, repairs and operational costs to assess the need for fleet replacement (Knutelská, 2010).

In Kenya, transport companies must face the new challenges requiring constant tracking, cost savings while guaranteeing timely delivery and having backup plans for any anticipated problem. There are also heightened security concerns. This has caused focus on IFMS to cut on operational costs and better manage their vehicle fleets (Nelson, 2000). The bulk of the transport companies are based in Mombasa County is due to the strategic positioning of the Kenya Ports Authority (KPA). Transport and logistics firms in Mombasa County face a number of challenges. According to Razzaque and Chang (1998) these challenges are common to all developing countries and emerging markets. He posits that they are characterized by obsolete systems of; manufacturing, distribution,infrastructure, inefficient third-party transportation and supply. Further, the challenges include supplyunpredictabilityand demand uncertainties coupled with long production cycle times leading to overstocking. There is also insufficientstorage facilities, obsolete technology and scarce datacost that tends to make decision makingproblemworse.

In Kenya, there have been witnessed cases of political unsteadiness,national discord, red tape,lesser investment of funds, andinefficient structures as the mainstumbling blocks to logistics development of (Rodnikov, 1994). Therefore,the

improvementinlogistics performance is an important policy objective for these firms (Roth, Cattani & Froehle, 2008). Therefore,technology is presenting answers to the commercialand operational challenges faced in Kenya;theft of fleet, fuel usage or loss of goods in transit (Okuttah, 2009). Middlemenin the transport sectors have discoveredusefulness inthese systems especially for the managementofmotor vehicleswith the rising cases of fuel theft and fuel doctoring in the market.

1.1.1 Intelligent Fleet Management System

An IFMS is a business level, online software enterprise level application (EAS) that joins department and locations to manage the routinelogistical functionalities of an organization (Chang and Lee, 2007). The software is customizedwith flow of work to administer the daily routines and provides various management information system (MIS) reports for a sound decision making and control.It creates infinitefunctions for all users to classify, run, interact, convey, design, peruse, store, cultivate andinterface. It also provides highlyuser friendly and menu driven operations so that the users can view, access and modify the statistics without challenges.Chang and Lee (2007) further posit that anIFMSis a supporter of all features managementof logistics including and not limited to the management and coordination of a number of activities such as; inventoriesre-stocking,scheduling of fleetand stream of arrangements.

Transport companies faces many challenges including cost reduction, improving compliance with stakeholderôs organizational communications and improving customer satisfaction (Cooper, Lambert & Pagh, 1997). These challenges are best addressed through the IFMS that help companies to realize efficiency and profitability.Hidalgo and Hausmann (2009) affirms that in the in todayôs knowledge-driven economy with uncertainand ever changing environment implies that

transporters will have to face challenges on how to address the current scenario and to ensure improved operational performance. The growing competition within the market is a paramount, element that propels the adaptation of new techno and innovations. As organizations quest for opportunities to pull down costs by improving operational efficiency or by development of new products. It can be said that greater productivity, operational efficiency and better customer service are all associated with the efficient management of fleet operations.

Stefanson and Lumsden (2009) outline a number of indicators of IFMS; the indicators include automatic fleet identification, Integration of organizations and data exchange, configuration of decentralized information and technology enablersâ. The concept of freight smartness, in-truck goods identification system, the smart vehicle, fuel management and driver management. These indicators form the basis of implementation of IFMS in areas including vehicle finance and maintenance, vehicle telematics and driver and fuel management. Goh and Pinaikul (2017) posit that any logistics information system must help lessen the over-reliance on predictions by revamping the demand of information and by creating intelligent systems to respond for same. This allows firms achieve both strategic goals of cost reduction and service enhancement through faster response to logistics issues. They are of the view that the key indicators of IFMS include good data management, the use of telematics, smart surveillance and mobile application in management of fleet.

1.1.2 Information Communication Technology

Volman, Van Eck, Heemskerk and Kuiper (2005) define ICT as the study, design, implementation, aid and development of computerized systems of information, especially hardware and software applications. Olugbenga (2006) assert that ICT is used for

strategic purpose, conveyance, cooperation, customer approach, administrative decision making, and knowledge and data management. Therefore, ICTs helps in providing an effectual manner of organizational production and delivery of services. As per Brynjolfsson and Hitt (2003) there is a significant gain in productivity through ICT use within organizations. Buhalis (2003) additionally noted that the application of ICT in businesses can produce basic adjustments thereby providing solid strategies and tactics for the organizations if applied and used properly. This sequentially can have a substantial effect on improvement of organizational competitiveness and promotion.

Krishnaveni and Meenakumari (2010) urged that ICT has been instrumental in minimizing operational ineffectiveness and enhancing process of decision making in a number of spheres of administration. Cordella (2006) points out that ICT dispersion in the current era is linked with the information availability. Hengst and Sol (2001) urges that ICT empowers organizations in reduction of costs thereby increasing organizational capacity, subsequently helping in shaping inter-organizational harmony Therefore, ICT use can assist in cutting down costs associated and multiply outsourcing in organizations. Irvine and Anderson (2008) also discussed ICT use for management which allows organizations to overpower the drawbacks of site and latitude utilities in haulage.

ICT performance can be measured in a number of ways. Costwise, it allows companies reduce costs for providing services and increase service revenues. This is goal is achieved by injecting greater utility into the clientsô processes that creates value addition through new products(Anderson, Fornell & Rust, 1997).Equally ICT enhances service quality through integrated solutions and timeliness (Matthyssens &

Vandenbempt, 1998). Lastly, in information management, ICT is a tool for gathering and sharing of information on products utilization and needs of the customers (Jong & Vermeulen 2003). Instantaneous processing and collection of information can be used with a focus thereby enabling new services with an attention on the value in use. (Kowalkowski & Brehmer, 2008).

1.1.3 Operational Performance

Operational performance of companies is calculated against stipulated barometers of efficacy, cost effectiveness, and environmental awareness such as; interval time, yield, waste minimization, and compliance (Belekoukias, Garza-Reyes &Kumar2014). A process of quantification of efficiency and effectiveness of an activity, Cost effectiveness is a gauge of how reasonably firmsô inputs are used when delivering customer contentment contrary to efficacy which implies to the expanse to which customer needs are met. As per Venkatraman and Ramanujam (1986) operational performance anchors on indicators such as; percentage of the market, introduction of new idea, quality of product, promotion, efficacy, production value-adding and other determinants within the domain of business.

Zhu, Sarkis and Lai (2008) on the other hand posit that operational performance indicators includes; quantity of goods delivered in time, levels of inventory, flake rate, quality product, capacity utilization and product line. Therefore, operational performance takes into account the organizational performance in arriving to its goals including yield, service delivery and quality. Operational performance concerns with the management of cost budgets. Improving efficiency implies that companies need to pinpoint the slackness and wastage in operations (Russell & Taylor, 2008). Efficiency refers to the maximization of output with the use of minimum possible inputs. This

results in low cost products through the reduction of wastage and thereby enabling the company to give good value to the esteem customers. Endless development is attained through proper breakdown of components of cost that affect the organizational performance in terms of cost in totality.

Prajogo and Goh (2007) posit that cost measurement can be compared to quality management. Operational performance also means improving on speed of service and product delivery. Speed Improvement that encourages an organization to be able to provide timely service to the customer, thereby shortening the time between delivery and request of services. For the purpose of this study, operational performance will be measured using indicators of cost, flexibility, product and service quality and speed of service delivery.

1.1.4 Transport Companies in Kenya

The Transport and logistics sectors play a crucial part in the economic growth and stability of a country. There is facilitation of both domestic and international trade through efficient and effective transport infrastructure and services. There is also national integration which provided access to markets, jobs, health care, education and other essential social services. Kenyaôs transport industry has responded to the opportunities and challenges brought about by globalization. The countryôs infrastructure has been under pressure from the increased rail and road traffic levels. At the same time, limited maritime and poor inland infrastructure is under immense pressure from the massive increase in importation and exportation (Kenya Shippers Council, 2017) (KSC). The existing logistics operations and hence transport companies are strained by port overcrowding, declining in the levels of reliability , a

deficient road transport capacity, the inability of railways to meet the ever rising demand.

The cost of transport in the region is higher than that of US and Europe and 30% higher than that of South Africa. A study by the Northern Corridor Transit and Transport Coordination Authority (NCTTA)(2016) estimates that total logistics costs of transporting a 20ft. container from the Port of Mombasa to various destinations within the region ranged from US$ 800 to Nairobi, and US$ 4,800 to Juba. It is estimated that the costs of road transport within the region account for 35% of the total logistical costs on average with delays contributing to about 44%. The infrastructure of this country is under immense pressure from the increasing levels of traffic KSC, (2017). At the same time limited maritime and poor inland infrastructure are under immense pressure from the massive increase in imports and exports. Kenya is a major gateway country for the interior of Eastern and central Africa, through the port of Mombasa. The active dynamic private logistics services on this corridor provides good basis for transport companies to thrive well (KSC, 2017).

1.2 Research Problem

Transport companies are faced with the pressure to be reliable, deliver faster and offer affordable services through cost effectiveness. This has created the need for an IFMS in their businesses (Jonsson &Waters, 2009). IFMS helps to minimize fuel and vehicle costs and improve the welfare of employees. The use of ICT improves instantaneous tracking of various variables, such as position, speed and data field in order to spot gridlock in deliveries and thereby minimizing costs of operation (Crainic & Laporte, 2000).The use of ICT in fleet management helps in providing strong logistical support that ensures there is effectiveness and efficiency in the

transportation processes. An effective IFMS would ensure that transport companies experience the operational success through reduced transportation cost, business process improvement and improved customer service (Said, Nicoletti, & Perez-Hernandez, 2014). Despite all these benefits associated with IFMS, there has not been realized, a remarkable cost reduction of operation and general efficiency in the operations of transport firms. Equally the impact of the transport industry on the Gross Domestic Product (GDP) has not improved to a greater extent. There is the necessity to assess the magnitude to which the use of ICT in fleet management would help reduce cost, increase efficiency and generally improve operational performance of transport companies.

Transport sector in Kenya, contributes between 5 to 15 % of the Gross Domestic Product (GDP). Nevertheless, the effect of transport is greater than its participation in the economy since it work as a linkman provider of service for all quarters and hence important to economic development and comfort. Thus, the quarter gives the society with effective, adequate and efficient services. The quarter delivers these services at the lowest costs possible to the community including an assurance on any unfavorable effect on the community and itôs environing (UNCTAD, 2017). Transport companies must therefore deal with new challenges requiring up-to-the-minute follow up, developing cost efficiencies and ensuring timely delivery, having backup plans for any anticipated problem. The focus is on IFMS to cut on operational costs and better manage their vehicle fleets (Nelson, 2000).

Several studies related to fleet management and operational performances have been conducted. Vilaldini,De Souzaand Pires (2012) conducted a study in Brazil on how fleet management technology can be used to improve logistics services. The study

found out that fleet management assist in increasing services and to smoothen information in order to respond timely to customer needs. In another study, Orr and Kempter (2009) conducted a study on improving operational performance through automatic vehicle management. They found out that automatic vehicle management has led to improved fleet safety, reduced cost and reliability. Waiyakiôs (2013) accessed the effectiveness of a modern IFMS to improve the logistics of moving of resources in KPLC. Conclusion made was that IFMS lead to reduced accidents, availability of wide range of fleet, minimizes costs of operation and improvement on data management system for a proper resolution process. The study was however based on the operations of the KPLC.

Mumias Sugar Company limited (MSC) Kenya, Mukolwe and Wanyoike (2015)in a study assessing the impact of logistics management practices on operational efficiencies found out that transport management and physical distribution practices improved operational efficiency. The above studies present a number of contextual gaps. The current study attempts to address these gaps by responding the queries, ówhat is the influence of IFMS on the operational performance of transport companies in Mombasa County, Kenya.

ówhat is the moderating effect of ICT on the correlation between IFMS and operational performance of transport companies in Mombasa County, Kenya.

1.2 Research Objective

The objectives of the study include:

1.2.1 General Objective

To determine the effect of IFMS and ICT on the operational performance of Transport Companies in Mombasa County, Kenya

1.2.2Specific Objectives

i. To establish the effect of IFMS on the operational performance of transport companies in Mombasa County, Kenya.

ii. To determine the moderating effect of ICT on the correlation between IFMS and operational performance among transport companies in Mombasa County, Kenya.

1.3 Value of the Study

The study offers valuable benefaction to theory, policy and practice. First the study adds extra mileage to operations management body especially in the more demanding concerns regarding adoption of ICT in operational process improvements. This forms building block for further research through the identification of knowledge gap that arises from this study. This research also offers scholars a foundation into the critical area of the need operational cost management, achievement of efficiency in operations and safety concerns.

The results from this study are useful when developing policy guidelines for making changes in the institutional frameworks and policy interventions. The findings regarding IFMS would hence be of relevance in formulating policies in the transport sector by addressing the questions of integrated transportation. The study can therefore be used as a basis of formulating policies in supply chain management (SCM) discipline particularly in the area of transport operations.

In practice, the study findings greatly benefits the transport companies in strengthening the effect of the IFMS executed within its operations. Providing empirical bodywork for other organisations in Kenya to refer who may wish to benchmark the application of the

GPS fleet management. This study also offers an understanding on the importance of IFMS in offering competitive advantage to the firms through effective operational performance. Knowledge of the impact of IFMS on operational performance would help the top management and decision makers within the transport companies to focus on achieving these conditions and desired effects.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

In this chapter, the discussions of various presumptions underlying the study are provided. It further shows studies that have been done and are relevant to this study, a literature review summary and conceptual bodywork.

2.2 Theoretical Review

There are quite a number of theories have been formulated to predict, explain, and comprehend concepts in the area of IFMS and ICT. The study is however based on resource based theory, technology diffusion theory and replacement theory. These theories provide more insight regarding the understanding of IFMS, ICT and operational performance.

2.2.1 Technology Diffusion Theory

Technology diffusion theory, developed by Rogers (1995) Main focus was on appreciating the manner in which innovation and technology diffuse within a social pattern and the rate at which they spread. Rather than focusing on inducing people to adjust, considers adjustment fundamentally as about the development or revamping of products and behaviors which suits the requirements of users. In technology diffusion theory, itôs not individuals who adjust, but the innovations which changes (Les Robinson, 2009). Diffusion is the process and through which certain channels of modernization is transmitted over a period of time, amongst the social system members (Rogers, 2003). Fichman (2000) according to him diffusion is the manner by which a technology diffuse through a society of an organization. Therefore, diffusion as a concept of implies to the dissemination of ideas from a focal point or organization in the society to other areas of that particular group.

Despite of its wide application and acceptance, criticisms of technology diffusion theory as evaluated by components of the theory which should be developed and adjusted before being applied in technology transformation. Lyytinen and Damsgaard (2001) found that an innovation does not necessarily need to experience various phases of reception for a person to adjust to it as proposed by the hypothesis. At times adoptions were conveyed in dyadic relationships and it was very hard to identify the stages of adoption. Botha and Atkins (2005) noted out that the theory biasness in favor of, there in it assumes change to be a great and reflect this position in the value laden classification of later adopters as ñsluggardsò. They conjointly noted that the model underlines ñindividual blameò at the cost of a lot of consciousness of the influence of social set ups on the choice to embrace modernization.

In IFMS, acceptance of a fresh ideas, processes, products or services, developed in house or acquired from an external environment ensures efficient services delivery and optimizes cost of operations. The adoption of innovation however derives from the repertoire upon an organization's contingent of technical, administrative and strategic skills (Nelson & Winter, 1982). IFMS are innovative approaches that present fleet managers with required instruments to meet tight-lipped due dates to optimize deliveries and trace the whole organizationôs fleet (Egbert & King, 2003). Tracing devices in fleets and a master computer at the dispatch centre are some of the basic elements of an IFMS.

2.2.2 Resource Based View

The theory was first developed by Wernerfelt (1984) and later advanced by Rumelt (1984). According to the theory, firms should not outsource core skills or those

involving special skills. The emphasis is on the fact that organizations must compare their skills with those of the market. Organization must then position themselves and their resources. The theory also posits that firms should use their strategies to position its resources in the market. The RBV of the firm argues that the source of operational success of a firm lies within the resources and capabilities it possesses and controls and the unique way it operates (Barney, 1991). Crook, Ketchen, Todd andCombs (2008) are also of the view that firms can create and maintain operational success through the identification and possession of internal strategic resources.

The RBV is however criticized on a number of aspects. The argument is that the theory is only realistic if the level of demand is analyzed and is adequate (Priem & Butler, 2001). On criticizing the theory, Bower and Christensen (1995) propound that a number of thriving innovational organizations stall to recognize the impact that new modernizations will have on the present ICT users. Launching extreme new products can be made very demanding if products demands comprehensive promotion for customers to apprehend that the new idea has the similar product taste as the previous one. There are innovations that have not been fully disseminated into their considered market and may never oust popular devices.

Despite these ICT is a strategic resource. It allows administrators advantage and ensuring accuracies in clientsô contentment by improving the organizationôs ability to render a customized and certain experience and by minimizing order-processing blunders and reaction time (Borges, Hoppen & Luce, 2009). Facilitation the purchase and processing of information, prior, throughout and following-transaction technologies enable extra intelligent feedback to customersô requirement. Firms can and should wrestle more favorably by combining its range of products with artificial

intelligence. It helps to increase buyersô utility and thus differentiate one company from its competitors leading to market gains (Sawhney, Balasubramanian & Krishnan, 2004). ICT ensures that the company achieves high operational efficiency and to attain a high magnitude of operational efficacy throughout the orientation of the market. It further helps to maintain closer contact with customers, while keeping competitors at chest, and assuring that the acquired capacity and intuitions are incorporated swiftly to steer operations (Jeffers, 2012).

2.2.3 Theory of Replacement

Theory of Replacement is concerned with capital equipmentôs optimal life. Optimum life the period betwixt the period the assets begins services and the period when it must be restored for productive purpose. Optimum life and restoration policy are crucial in the administration of capital assets including fleet (Van Hilten, 1991). Mostly, the running cost of a piece of capital investment rises as its condition degenerate over time. At a certain point the cost affiliated with investment in advance equipment turns to be less than that of exhausted equipment. This describes the basis of effective IFMS. The replacement examination usually analysis both trends in running costs and the final of replacement, which is the disparity betwixt the cost of advance equipment and the residual (Rust, 1987). In some instances, replacement evaluation also put into consideration the value it will fetch if equipment at different phases of its useful life (Reid & Bradford, 1983).

Critics of the theory of replacement are of the view that vehicle replacement models needs a number of forecasted and historical data describing fleets operation and elements. This is always a challenge to most companies especially in developing countries (Nakagawa, 1984). This data should therefore be collected, updated and

processed with the application of a modern database. Most organizations also have difficulty dealing with fluctuations in fleet replacement spending needs because the amount of funds they can devote to the purchase of vehicles each year generally does not fluctuate.

Replacement decisions depend on a number of factors. A new technology can lower cost or improve efficiency. Thus, to develop correct estimates of future capital and running costs, the theory perceive that an administrator need to put into consideration adjustments in equipment design, efficiency, and capital and labor requirements (Jin & Kite-Powell, 2000). In the management of fleet, the theory helps to define the optimal replacement policies for vehicles of the organization. Based on this, the economic theory of fleet replacement impound that vehicles should be substituted when the ownership sum of running costs is at its lowest point historically. The theory is of the view that a good fleet replacement methodology lets the administration of the freight transportation companies to define the optimum replacement policies for used fleet resulting in the costs minimization and the improvement of the fleet economic and technical conditions.

2.3 Empirical Literature Review

Several researches have been undertaken in the field of IFMS, ICT and operational performance. These studies helps to develop various arguments regarding the effect of IFMS on the operational performance ,likewise the effect of ICT moderation on the correlation betwixt operational performance and IFMS among transport companies in Mombasa County, Kenya.

2.3.1 Intelligent Fleet Management System and Operational Performance

There are a number of studies that form arguments on IFMS and operations management. Vivaldini, Pires and De Souza (2012) conducted a study on the improvement of logistics services through the applied technology in the management of fleet. The results indicate that providers of logistics services seeks to increase services and sort out information in order to respond timely to customer needs .It is also an affirmation that the combination of the technology available together with the FMS has become a distinctive feature for this logistics service provider. There is an increase in important information and their skills for both clients and organization.

Orr and Kempter (2009) conducted a study on improving operational performance through automatic vehicle management. The study found out that automatic vehicle management system has proved to be rewarding in where it has been positioned. It has created an allowance for better administration of important capital investments of the company, not limited to fleet and human resources. The overall operational efficiency has improved while miles driven have been reduced. Team, moreover are most probable to drive less risky and are in compliance with the accepted standards of driving. The organization has all the grounds to maintain that advancement will go on as the system is employed in secondary quarters. The findings indicate that the operational improvements from automatic vehicle management include reduced fuel usage, safety, efficient routing and elimination of after hour usage.

Mukolwe and Wanyoike (2015) conducted an evaluation on the impact of logistics management applications on efficacy of operations at MSC, Kenya. The purpose of this research was to evaluate logistics management applications on operational efficacy of MSC, Kenya. The research disclosed that efficient administration of

outflow of information enhances the organizationôs processes both within and without. Mechanizations of tasks tremendously promote accuracy, momentum of operations and reduction of scraps. Transport administration and distribution practices permits faster and cost efficient outflow of resources thus improving operational efficiency. The research commends a tactical stratagem to the management of logistics applications by adopting advance technology and employee development.

2.3.2 Intelligent Fleet Management System, ICT and Operational Performance

Several studies have been administered on the correlation betwixt IFMS, operational performance and ICT. ICT has provided an adequate platform for the adoption of IFMS.

Harris, Wang and Wang (2014) conducted a study that explored ICT in intermodal transport and technological shift. The study recognized the role of ICTs in haulage as central. After a substantial assessment of 33 European Union (EU) framework programme projects, the study concludes that rapid development and decision-support systems will enhance decision-makers' capacity. The study further concludes that the analysis of local intelligence together with ñBig Dataò via the use of decision support system (DSS) is adjusting business performance and taking it closer to the suppliers and clients with an advantage of upgraded business line, thereby minimization of cost, lead time and upgrading levels of services.

Vivaldini, Pires and De Souza (2012) posit that efficiency in fleet management is crucial in establishing a higher standard of customer service. The pronouncement is that with advancement in vehicle tracking systems and technology, this management approach has gained new possibilities for the improvement of transport services.

Kuei, Madu & Lin (2001) posit that specific operational performance improvements include reduced fuel usage, safety, improved start/stop time, monitoring and assisting with efficient routing, elimination after hours usage and storm management. Orr & Kempter (2009) are further of the view that through the use of IFMS, traffic obstruction can be ward off, trucks can be routed more efficiently and teams with more than one locations of work in a working day can be provided with real time directions to their destinations. This helps to achieve operational improvement through enhanced reliability, cost effectiveness and efficiency of operations.

Mukolwe and Wanyoike (2015) discovered that management of fleet and physical distribution practices allows faster and a more profitable flow of raw materials and goods thus improving efficiency in operations. In another study, Waiyaki (2013) posit that transport enterprises should adopt the modern and advance technology that enables safe and sound, efficient and that is cost-conscious. Human resource use to improve management of time and processes in placement of orders to impact and to maintain suitability in delivery of services. The argument is that for an optimal fleet operation, instantaneous interaction and observations with fleet are necessary in the provision of quick response to customer wants and needs. IFMS therefore, can be analyzed in terms of how they may be beneficial to organizations in terms of both profitability and efficiency.

Waiyaki (2013) studied technology leveraging for business in fleet implementation: a case study of FMS applied at KPLC. The study concluded that adoption of Global Positioning System (GPS) has helped in saving human resource and time; ensure availability of actual position of fleet, consequently improving fleet planning and scheduling. Efficient retrieval of historical information of a particular; trip, driver,

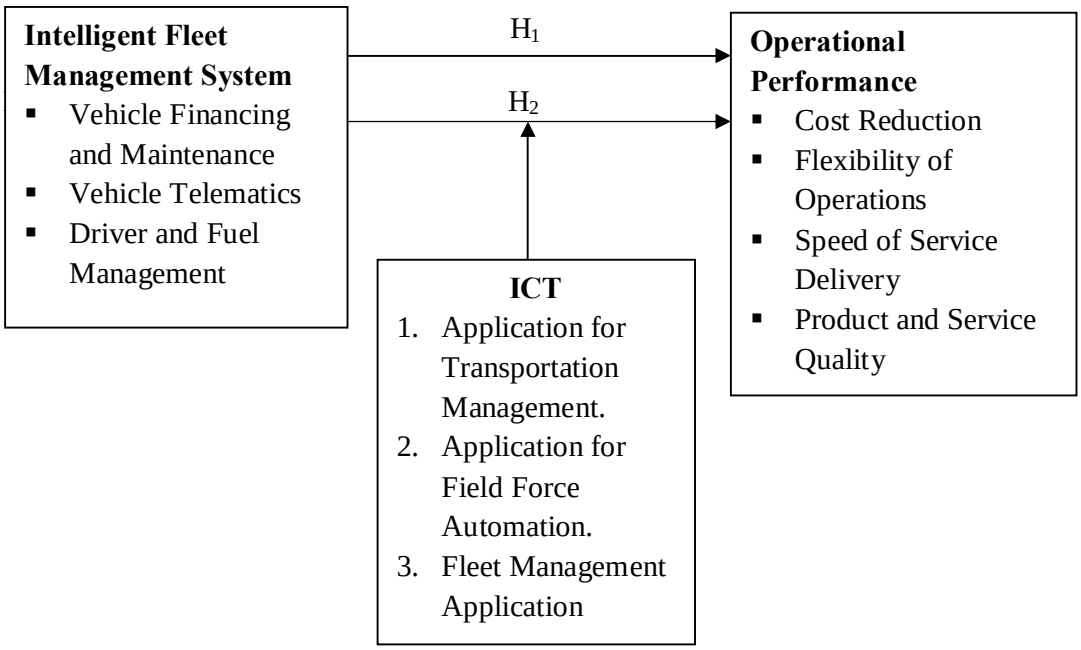
month and the overall vehicleôs movements has also been enhanced through replays. Accurate pre-accident data accessibility for inspection and minimized theft of fleet, cargo and retrieval of any stolen unit through the web based GPS tracer.

Matata (2016) finally studied factors influencing the adoption of ICT in logistics and freight transportation sector in Mombasa, Kenya. The findings indicate there is a significant correlation betwixt the dependent and independent variable.

2.4 Conceptual Framework

The influence of IFMS and ICT on the operational performance of transport companies in Kenya can be illustrated using a conceptual framework in this study. In the present study, the independent variables include fleet management practices while operational performance is the dependent variable. ICT is used to control the IFMS on operational performance. This is given in the figure 2.1 below:

Figure 2.1: Conceptual Framework



Based on the conceptual framework above, the two hypotheses proposed for this study are:

H_1: IFMS has a significant positive effect on a firmôs operational performance.

H_2: ICT has a significant moderating effect on the relationship between IFMS and operational performance.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

In his chapter a research methodology applied is presented, that was used in administering of the research. Target population, research plan, data analysis techniques and collection methods are all covered in this particular chapter.

3.2 Research Design

The study adopted an explanatory cross-sectional analysis. It illustrates peopleôs reaction to questions regarding a situation or phenomenon with the objective of appreciating intuitions of respondents on which banality is constructed (Kim, 2009). A cross-sectional analysis gathers data about a population of interest at one point in time then infer. This kind of study, either subgroup or the whole population a hence is selected, data is collected from these individuals, to assist in answering questions of interest (Olsen & George, 2004). The researcher in this case makes all the measurements on a single occasion or within a short period of time. Cross-section analysis is hence well suited to the objective of illustrate variables and their patterns of distribution hence suitable for this study.

3.3 Population of Study

The study targeted all transport firms in Mombasa County. According to Business List (2017) there are one hundred and two (102) companies. The study conducted a census of all the firms. The companies are listed in appendix II.

3.4 Data Collection

Raw data was used in this study, gathered by the use of self administered questionnaire Appendix I. The questionnaire comprised of close ended questions.

They we redistributed through hand delivery, to be picked later. The structured questionnaire had three parts. This includes personal data, IFMS and ICT and operational performance.

The questionnaires were managed using drop and collect method. The respondents were the senior managers in charge of operations in the various companies. These managers were considered to be well conversant with IFMS and ICT as adopted by the companies.

3.5 Data Analysis

The gathered data was cleansed, endorsed, and modified its perfection, consistency, conformity and comprehensiveness. To know the effect of IFMS on the operational performance of transport companies in Mombasa County, the regression model was used is as follows:

$$\mathbf{Y = a + b_1X_1 + b_2X_2 + b_3X_3 + Ů}$$

Where:

Y = Operational performance index

a = Constant

$ƃ_1$, $ƃ_2$ and $ƃ_{3are}$ coefficients

X_1= Vehicle financing and maintenance

X_2 = Vehicle telematics

X_3 = Driver and fuel management.

Ů= Error term.

The study used MMR In order to test the ICT moderation effect on the correlation between IFMS and operational performance. The correlation coefficient of multiple R was used to test the degree of the correlation between the dependent variable and

independent variables. The strength of the model in explaining the influence of IFM Sand ICT on the operational performance of transport companies in Kenya was then tested using R^2.

According to Hair, Sarstedt, Ringle and Mena (2014) MMR uses least square regression equation to compare interaction effects in a regression model such that:

$$\mathbf{Y = b_0 + b_1X_1 + b_2X_2 + b_3X_1X_2}$$

Y= Operational performance index

b_0 = the intercept of the model.

b_1X_1 = the linear effect of IFMS

b_2X_2 = the linear effect of ICT

$b_3X_1X_2$ = the moderator effect of ICT on IFMS

3.6 Operationalization of Study Variables

Independent variable consists of IFMS while the dependent variable is operational performance. IFMS was measured using vehicle financing and maintenance, vehicle telematics and driver and fuel management levels while ICT was measured using extent of electronic; tilt tracing, roads flaws monitoring and calculations of wasted time. Operational performance was estimated by the degree of diminished operational cost, adaptability of activities, enhanced item and administration quality and speed of administration conveyance. The summary of these variables is given in the table 3.1 and 3.2 below:

Table 3.1 Operationalization of the Independent Variables

Independent Variables	Indicators
1. Vehicle financing and maintenance	▪ Records planned occasions in the support recurrence reference book. ▪ Automatic expectation of the following arranged activity date in view of the data on engine hours, mileage or time. ▪ Banking of data on attributes of tires pending to logging, including their administration life. ▪ Tire mileage logging
2. Vehicle Telematics	▪ Existence of infotainment features. ▪ Driver assist features e.g. Remote diagnostics. ▪ Point of interest/location based Interest e.g. weather details ▪ Safety and security e.g. stolen vehicle tracking.
3. Driver and Fuel management	▪ Fuel level, temperature, thickness observing and signing stable stockpiling tanks ▪ Fuel level, temperature and amount of filling fuel to eve vehicle in refuelers. ▪ Fuel utilization figuring for each vehicle. ▪ Automatic email and SMS message sending in the event conceivable fuel robbery. ▪ Automatic trips, remove tallying and capacity ▪ Automatic over paces, over-burdening, inclines observing a information stockpiling ▪ Additional fuel level sensor in the tank

Source: Researcher (2018)

Table 3.2: Operationalization of the Dependent Variables

Dependent Variables	Indicators
1. Cost Reduction	i. Decrease in transportation cost. ii. Decrease in warehousing cost. iii. Reduced labour cost. iv. Reduced operating expenses v. Increased fuel saving. vi. Lower insurance premiums
2. Flexibility of Operations	i. Variety of services ii. Readily available services iii. Volume flexibility iv. Mix flexibility
3. Speed of Service Delivery	i. Improved communication. ii. Increased service rates. iii. Existence of up to date procurement information. iv. Reduced lead time.
4. Product and Service Quality	i. The company looks to achieve high customer loyalty ii. Company looks at increasing the number of customers iii. The company aims at achieving high sales revenue iv. There are reduced emissions.

Source: Researcher(2018)

Table 3.3: Operationalization of ICT

1. Application for Transportation Management	▪ Use of ICT to find the most effective for the movement of goods in terms of time and cost. ▪ Existence of management transportation system to allow programming and route optimization. ▪ The use of generated information by the systems in order to make minute by minute analysis of performance by transporters. ▪ Existence of a system that can generate financial, environmental and fuel consumption reports.
2. Application for Field Force Automation	▪ Existence of installed automated scheduling. ▪ Configuration of user-defined alarms or notices. ▪ Optimized scheduling that differentiates and combines resource intelligences, modeling and planning, with advanced street level routing.
3. Fleet Management Application	▪ Existence of advanced traffic management systems tasked with purchasing minute by minute information about traffic conditions, data analysis, predictions on travel time, administration emergency response. ▪ Electronic payment and automated vehicle identification that allows the demand and the current amount of trucks running in actual time to be known. ▪ Availability of systems that allows the positioning and use of freight to be planned, resulting in the system's optimality and authority towards real time information.

Source: Researcher (2018)

CHAPTER FOUR: DATA ANALYSIS AND FINDINGS

4.1 Introduction

This chapter contains findings and review of data from the study. The analysis is focused on the study objectives. The research is centered to construct the impact of IFMS on the operational performance of transport and logistics companies in Mombasa County, Kenya. The study was also meant to decide the ICT moderation effect on the correlation between IFMS and operational performance in transport companies in Mombasa County, Kenya. The researcher distributed out 102 questionnaires, out of which 90 questionnaires were received back. This represents 88.2% response rate. As per Mugenda & Mugenda (2003) any50% and above response rate is sufficient for analysis and therefore response rate in this study was adequate.

4.2 General Information

The respondents were characterized by companyôs name, position that one holds in the company and years of expertise of the respondents. The years of expertise with the company was constructed on the number of years that the respondents are within the aforementioned relevant position. This ranged from less than one year to others being in the company for more than eleven (11) years. The years of experience is analyzed in the Table 4.1 below:

Table 4.1: Years of Experience

	Categories	Frequency	Percent	Valid Percent
	Less than one year	5	5.6	5.6
	1-5 years	15	16.7	16.7
Valid	6-10 years	54	60.0	60.0
	Above 11 years	16	17.8	17.8
	Total	**90**	**100.0**	**100.0**

Source: Researcher (2018)

The Table 4.1 shows that the largest number of the respondents were those who have been in their organizations for between 6 ï 10 years making 60% of the total respondents. This is followed by those who have been in their organization for above 11 years at 17.8% with least representation being those who have been in the organization for less than one year with 5.6%. The respondents that have been in the company between 1-5 years represent 16.7%.

4.3 Intelligent Fleet Management Systems

The respondents were provided with a list of IFMS. The requirement by the researcher was that they indicate their level of consensus on the degree to which the company has used the systems using the scale of 1-5 where 1= totally disagree; 2 = Disagree to a moderate extent; 3 = Neither Agree Nor Disagree; 4 = Agree& 5 = Agree to a strong extent. The analysis is given as in the Table 4.2:

Table 4.2: Descriptive Statistics on Intelligent Fleet Management System

Variable	N	Mean	Std. Deviation
Driver and fuel management	90	3.926	.311
Vehicle Financing and Maintenance	90	3.772	.394
Vehicle telematics	90	3.667	.493
Valid N (list wise)	90		

Source: Researcher (2018)

The Table 4.2 shows that driver and fuel management has the highest mean of 3.926 with a SD of 0.311. This is followed by the activity of vehicle financing and maintenance with a mean of 3.772 with a SD of 0.394. The activity with the least mean is vehicle telematics with a mean of 3.667 and a SD of 0.493. The implication is

that the companies use the IFMS of driver and fuel management to a hire extent comparatively, followed by vehicle financing and maintenance. The companyôs least adopts the use of vehicle telematics. The lower standard deviation (SD) shows that the extent betwixt the lowest and the highest values is low. This means that the respondents have almost similar view on the adoption and use of the IFMS. A higher SD shows that there are varied opinions of the respondents regarding the adoption of the IFMS.

4.4 Information Communication Technology (ICT)

The respondents were requested to pin point their degree of consensus on the extent to which the company has adopted ICT using the scale 1-5 where 1= totally disagree; 2 = Disagree to a moderate extent; 3 = Neither Disagree nor Agree; 4 = Agreeand 5 = Agree to a strong extent. The results as given in the Table 4.3:

Table 4.3: Descriptive Statistics on ICT

Variable	N	Mean	Std. Deviation	Rank
Application for Field force Automation	90	3.9247	.32020	1
Application for Transportation Management	90	3.8489	.35852	2
Fleet Management Application	90	3.6703	.40700	3
Valid N (Listwise)	**90**	**3.8146**		

Source: Researcher (2018)

The Table 4.3 shows that application for field force automation has the highest mean of 3.9247 with a S.D of 0.32020. This is followed by the application for transportation management with a mean of 3.8489 with a S.D of 0.35852. The activity with the least mean is fleet management application vehicle with a mean of 3.67033 and a S.D of 0.40700. The implication is that the companies adopt ICT to support the fleet

management system. The lower standard deviation (SD) shows that the extent between the lowest and the highest values is low. This means that the respondents have almost similar view regarding the use of ICT. A higher S.D shows that there are varied opinions of the respondents.

4.5Operational Performance

Operational performance was appraised by the magnitude of minimized flexibility, costs of operations, improved service and product quality and speed of service delivery. The respondents were tasked to point out the extent to which cost minimization, mobility and products and services standards have been enhanced through adoption of IFMS. The analysis is as follows:

4.5.1 Reduction in Cost of Operations

The study used a number of constructs to measure cost reduction through adoption of IFMS. This includes decreased transportation cost, warehousing cost and labour cost. It would also help to reduce operating expenses, realize fuel savings and lower insurance premium. The analysis is given in the Table 4.4:

Table 4.4: Reduction in Cost of Operations

Variable	N	Mean	Std. Deviation	Rank
Reducing operating expenses	90	4.100	1.071	1
Increase of fuel saving	90	3.922	1.104	2
Reducing labour cost	90	3.589	.935	3
Decrease of transportation cost	90	3.433	.862	4
Decrease of warehousing cost	90	3.367	.905	5
Lowering insurance premiums.	90	2.789	1.011	6
Valid N (Listwise)	**90**	**3.533**		

Source: Researcher (2018)

Regarding reduction in the cost of operations, adoption of IFMS has the highest impact on reducing operating expenses with a mean of 4.1 followed by the effect on increased fuel savings with a mean of 3.922. The third ranked effect on reducing cost of operations is reduced labour cost with a mean of 3.589. Decreasing transportation cost has a mean of 3.433 followed by decreasing of warehousing cost with a mean of 3.367. The least effect is on lowering of insurance premiums with a mean of 2.789. The implication is that through adoption of IFMS, transport companies experience reduction in cost of operations majorly through reduced operating expenses, followed by increased fuel savings and then reduced labour cost. The highest SD of 1.104 in increased fuel savings means high differences in opinion regarding the increased fuel savings by the different respondents.

4.5.2 Flexibility of Operations

Flexibility of operations is achieved when the company provides a variety of services, offer readily available services, achieves volume flexibility and mix flexibility. The analysis is given in the Table 4.5 below:

Table 4.5: Improved Flexibility of Operations

Variables	N	Mean	Std. Deviation	Rank
The company aims at volume flexibility	90	3.244	1.105	1
Company looks at mix flexibility	90	3.122	1.069	2
Offering readily available services	90	2.900	1.112	3
Provision of a variety of services	90	2.656	1.439	4
Valid N (List wise)	**90**	**2.980**		

Source: Research Data (2018)

The adoption of IFMS leads to improved volume of flexibility with an average of 3.244, succeeded by improved mix flexibility with a mean of 3.122 and then availability of ready services having an average of 2.9. The least effect is on provision of a variety of services with a mean of 2.656. The effect on provision of variety of services has the highest SD of 1.439 with the lowest SD of 1.069coming from the effect on mix flexibility. The implication is that through adoption IFMS, transport companies experience improved flexibility of operations through volume flexibility, mix flexibility and then availability of ready services.

4.5.3 Product and Service Quality

In this study, the constructs for assessing improved product and service quality as a result of adopting IFMS include achieving high customer loyalty, increasing the number of customers, achieving high sales revenue and reduced emissions. The evaluation is as given in the Table 4.6 below:

Table 4.6: Improved Product and Service Quality

Variables	N	Mean	Std. Deviation	Rank
Achieving high customer loyalty	90	4.111	.9415	1
Achieving high sales revenue	90	4.044	.9470	2
Increased number of customers	90	4.022	1.005	3
Reducing emissions	90	2.689	1.002	4
Valid N (List wise)	**90**	**3.717**		

Source: Researcher (2018)

Regarding improved product and service quality, adoption of IFMS has a mean effect of 3.717. The largest effect is on the fact that it helps the companies to achieve high customer loyalty with anaverage of 4.111 and a SD of 0.94148. This is followed by

helping the company to achieve high sales revenue with a mean of 4.044 and a SD of.94704. The least effect is on reducing emissions with an average of 2.6889 and a SD of 1.00162. The companies experience increased number of customers with a mean of 4.022 and a SD of 1.005. The implication is that adopting IFMS leads to improved customer loyalty at a higher level as compared to the other effects.

4.5.4 Speed of Service Delivery

Speed of service delivery would be achieved through improved communication, high service rates, up-to procurement information and reduced lead time. The respondents were asked to point out the extent to which the following operational outcomes have been enhanced. The analysis is as given in the Table 4.7 below:

Table 4.7: Increase in Speed of Service Delivery

Variables	N	Mean	Std. Deviation	Rank
Keeping up to date procurement information	90	4.911	7.429	1
High service rates	90	3.744	1.045	2
Reduced lead time	90	3.733	1.036	3
Improved communication	90	3.711	.986	4
Valid N (Listwise)	**90**	**4.025**		

Source: Researcher (2018)

The Table 4.7 shows that adoption of IFMS has led to increased speed in service delivery with a mean of 4.025. It helps the companies to keep up to date procurement information with the highest average of 4.911 and a SD of 7.429. This is followed by helping the companies to achieve high service rates with an average of 3.744 and a SD of 1.045. The least effect is helping the companies to improve communication with a mean of 3.711 and a SD of 0.986.

4.6Regression Analysis

The first objective was to establish the effect of IFMS on the operational performance of transport firms in Mombasa County, Kenya. A regression analysis was conducted to accomplish this objective. The independent variables included vehicle finance and maintenance, vehicle telematics and driver and fuel management against the dependent variable of operational performance. The outcome of the analysis is as given in table 4.8, 4.9 and 5.0 below:

Table 4.8: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.677[a]	.458	.439	.302

a. Predictors: (Constant), Driver and Fuel Management, Financing, Telematics

b. Dependent Variable: Operational Performance

Source: Researcher (2018)

In Table 4.8, the adjusted $R^2$of 0.439 implies that 43.9% of the variations in operational performance can be described by variations in vehicle finance and maintenance, vehicle telematics and driver and fuel management. This implies that 56.1% of the variations in operational performance are explained by variations in alternative variables not enclosed within this study. The $R^2$of 45.8% further point out that the model explains 45.8% of the variability of the response data around its average while R of 0.677 shows that the relationship between operational performance and vehicle finance and maintenance, vehicle telematics and driver and fuel management is positive and strong. Finally, the standard estimate of the error given at 0.302depicts that the typical distance of the data points from the best-fit line is about 0.3%. Below represented is the analysis in Table 4.8:

Table 4.9: Analysis of Variance (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.642	3	2.214	24.243	.000[b]
	Residual	7.854	86	.091		
	Total	14.496	89			

a. Dependent Variable: Performance

b. Predictors: (Constant), Driver and Fuel Management, Financing, Telematics

Source: Researcher (2018)

In the ANOVA, the Table 4.9 shows F-value of 24.243 at 0.000 implying that the model is significant statistically. The 0.000 p-value shows that vehicle finance and maintenance, vehicle telematics and driver and fuel management reliably predicts operational performance. The table 4.8 further shows that variance in total has N-1 degrees of freedom given by N-1 (90 ï 1). The Residual degrees of freedom on the other hand are 86. Finally, it shows the model sum of squares and the mean squares.

Table 4.10: Regression Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
(Constant)	2.015	.572		3.52	.001	.878	3.15		
Vehicle Financing and Maintenance	.669	.082	.654	8.20	.000	.507	.831	.991	1.009
Vehicle Telematics	-.022	.065	-.026	-.330	.742	-.151	.108	.991	1.009
Driver and Fuel Management	-.213	.103	-.164	-2.07	.042	-.418	-.008	1.00	1.000

a. **Dependent Variable:**Performance

From the table 4.10, the following regression equation was established

$$\mathbf{Y = 2.015 + .669X_1 - 022X_2 - 213X_3}$$

From the equation the study found that holding vehicle finance and maintenance, vehicle telematics and driver and fuel management, operational performance index (dependent variable) would be 2.015. The findings show that there is a direct relationship between vehicle finance and maintenance and operational performance of the companies. This means that an improved vehicle finance and maintenance practices would lead to high level of operational performance. This relationship is significant with a p-value of 0.000 meaning that vehicle finance and maintenance reliably predict operational performance. The study also found out that adoption of vehicle telematics is inversely related to operational performance. The relationship is insignificant with a 0.742 p-value of. Therefore, the adoption of vehicle telematics does not reliably predict operational performance.

From the table 4.10, it can also be noted that the correlation between driver and management of fuel and operational performance is inverse meaning that a higher adoption of driver and fuel management leads to reduced operational performance of the companies. The relationship is significant with a 0.042 p-value. This implies that a change in driver and fuel management reliably lead to a change in operational performance of the companies. The variance of inflation (VIF) data suggests that multicollinearity is not a problem as suggested by the figures below 10.0 for each variable.

Table 4.11: Correlation Co-efficient

		Operational Performance	Vehicle Financing and Maintenance	Vehicle Telematics	Driver and Fuel Management
Pearson Correlation	Operational Performance	1.000	.656	-.091	-.165
	Vehicle Financing and Maintenance	.656	1.000	-.095	-.001
	Vehicle Telematics	-.091	-.095	1.000	.018
	Driver and Fuel Management	-.165	-.001	.018	1.000
Sig. (1-tailed)	Performance	.	.000	.196	.060
	Vehicle Financing and Maintenance	.000	.	.186	.498
	Vehicle Telematics	.196	.186	.	.434
	Driver and Fuel Management	.060	.498	.434	.
N	Performance	90	90	90	90
	Vehicle Financing and Maintenance	90	90	90	90
	Vehicle Telematics	90	90	90	90
	Driver and Fuel Management	90	90	90	90

Source: Research Data (2018)

Regarding coefficient of correlation, the Table 4.11 shows the magnitude of the relationship betwixt the variables. It implies that there is a moderately high positive correlation between operational performance and vehicle financing and maintenance given by .656. This correlation is also significant at 0.05. On the other hand, the coefficient of correlation between operational performance and vehicle telematics is inverse and low at -.091. It is however not significant at 0.05. Lastly, there is an inverse relationship between operational performance and driver and fuel management at-.165. The relationship is however not significant at 0.05. The findings

of the study show that only the correlation between operational performance and vehicle financing and maintenance is significant at 0.05

4.7 Moderating Effect of ICT

To establish the ICT moderation impact of on the correlation between IFMS and operational performance MMR was used. The result is given in the Table 4.12 below:

Table 4.12: Model Summary of Mediating Effect of ICT

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.679[a]	.461	.436	.30309

a. Predictors: (Constant), ICT, Vehicle telematics, Driver and fuel management, Vehicle financing

It shows that the R^2adjustedwas 0.436implies that 43.6% of the variations in operational performance can be expound by variabilities in vehicle finance and maintenance, vehicle telematics and driver and fuel management with the moderating effect of ICT. This implies that 56.4% of the disparities in operational performance are described by variations in other variables not enclosed within the current study. The R^2 of 46.1% further signifies that the model expounds that 46.1% of the variations of the response data around its average while R of 0.679 expound that there is a positive and strong ICT moderation impact on the correlation betwixt operational performance and vehicle finance and maintenance, vehicle telematics and driver and fuel management. Finally, the standard error of the estimate given at 0.303 shows that the typical distance of the observations from the line fit is about 0.3%.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The purpose of the study was to establish the impact of IFMS on the operational performance and determination of the effect of ICT moderation on the correlation betwixt IFMS and operational performance among transport companies in Mombasa County, Kenya. This chapter sums up the determinations of the research and then conclusions and recommendations are presented.

5.2 Summary of Findings

The summary is anchored on the study determinations. The research found out that only 43.9% of the deviations in operational performance can be described by deviations in vehicle finance and maintenance, vehicle telematics and driver and fuel management. This implies that 56.1% of the deviations in operational performance are described by deviations in extraneous variables. The R^2 of 45.8% shows that the model describes 45.8% of the discrepancy of the response data around its mean while R of 0.677 indicates that the correlation between operational performance and vehicle finance and maintenance, vehicle telematics and driver and fuel management is positive and strong. Ultimately, the standard error of the estimate given at 0.302 shows that the mean distance of the data points from the fitted line is about 0.3%. The study further found out that the model is statistically significant.

To substantiate the impact of IFMS on the operational performance of transport entities and to ascertain the impact of ICT moderation on the correlation between IFMS and operational performance in transport companies in Mombasa County, Kenya. Determinations indicate that vehicle finance and maintenance and operational

performance of the transport companies are directly related. This implies that an improved vehicle finance and maintenance practices would lead to high level of operational performance. This correlation is significant with a p-value of 0.000implying that vehicle finance and maintenance reliably predict operational performance. The study also found out that adoption of vehicle telematics is inversely related to operational performance. The correlation is not significant with a p-value of 0.742. This implies that adoption of vehicle telematics does not reliably predict operational performance. The study also found out that the relationship between driver and fuel management and operational performance is inverse meaning that a higher adoption of driver and fuel management leads to reduced operational performance of the companies. The correlation is significant with a p-value of 0.042. This implies that a change in driver and fuel management reliably lead to a change in operational performance of the companies. The variance of inflation(VIF) data urges that multicollinearity is not the issue as the figures are well below 10.0 for each factor.

Concerning Pearson-product correlation coefficient (PPMCC), the study found out that exist a moderately high positive relationship between operational performance and vehicle financing and maintenance given by .656. This correlation is equally significant at 0.05. On the other hand, the coefficient of correlation between operational performance and vehicle telematics is inverse and low at -.091. It is however not significant at 0.05. Lastly, the relationship between operational performance and driver and fuel management is also inverse at -.165. The relationship is however not significant at 0.05. Determinations of this study show that only the correlation betwixt operational performance and vehicle financing and maintenance is

significant at 0.05.The study determinations are consistent with the conclusion by Vivaldini, Pires & De Souza (2012).

Finally, to establish the effect of ICT moderation on the relationship between IFMS and operational performance, moderated multiple regression analysis (MMR) was used. It was found that 43.6% of the deviations in operational performance can be described by deviations in vehicle finance and maintenance, vehicle telematics and driver and fuel management with the moderating effect of ICT. This implies that 56.4% of the deviations in operational performance are described by deviations in extraneous variables. The R^2 of 46.1% further stipulates that the model describes 46.1% of the discrepancies of the response data around its mean while R of 0.679 signify that there exist a positive and strong ICT moderation effect on the correlation between operational performance and vehicle finance and maintenance, vehicle telematics and driver and fuel management.

The study determinations consistently realigns with the theories that forms the base of the research. The RBV considers ICT to be a strategic resource. Further it ensures that the company achieves high operational efficiency and to achieve a greater degree of operational efficacy through orientation of the market. Replacement theory on the other hand is of the view that a good vehicle replacement method helps to in costs minimization and the improvement of technical and economic condition of the fleet. Finally, technology diffusion theory posits that through IFMS adoption, there is possibly efficient service delivery and optimization of cost of operations. IFMS are therefore innovative approaches that provide the fleet administrators with the instruments needed to meet tense schedules maximize deliveries and trace the whole fleet.

5.3 Conclusion of the Study

The purpose of the research was to demonstrate the impact of IFMS on the operational performance of transport companies and the determination of the ICT moderating impact on the correlation between IFMS and operational performance in transport firms in Mombasa County, Kenya. From the results, the research deduces that there exist a direct correlation betwixt vehicle finance and maintenance and operational performance of the companies. This implies that an improved vehicle finance and maintenance practices would lead to high level of operational performance. The determinations are consistent with the study by Orr and Kempter (2009) which established that automatic vehicle management system improves the administration of key organization assets, fleet and human resource included. It further complements the determinations of Mukolwe and Wanyoike (2015) that electrification of tasks highly emphasizes on perfection, pace of operations and trimming of extravagance. This enables quicker and cost conscious outflow of raw materials and goods thereby enhancing operational perfection.

The study also concludes that adoption of vehicle telematics does not reliably predict operational performance. Regarding the moderating effect of ICT, the study concluded that adoption of ICT strongly and positively influences the relationship between operational performance and vehicle finance and maintenance, vehicle telematics and driver and fuel management. This implies that ICT adoption is significant in intelligent fleet management. This finding is conforming to the research by Harris, Wang and Wang (2014) which recognized the contribution of ICTs in haulage transport as decisive.

5.4 Recommendations

This study set out to establish the impact of IFMS on the operational performance of transport companies and to ascertain the effect of ICT moderation on the correlation betwixt IFMS and operational performance in transport firms in Mombasa County, Kenya. The study commends that based on the determinations, structures within and set ups should be put in place to permit free movement information between staffs and departments. This will eventually permits actual movement of information between the organization and stakeholders. The study also recommends that the management and training of fleet and employees respectively should be a top priority on best operations so as to avoid extravagance and catastrophes within the system.

The study determinations therefore provide a unique opportunity to improve the understanding of the need to adopt IFMS. Logistics companies needs to install fleet management system in all their fleet. The GPS use will heighten delineating and programming of the meter reading schedule. This will sequentially and to a greater extent minimize the costs of billing in the meter reading coverage and enhance operational efficiency generally.

5.5 Limitations of the Study

The study had some few constraints. First and far most, there were impediments in data collection because most of the respondents were dispersed in different areas. When administering questionnaires, most respondent requested for extra hours to return back the questionnaires. This was settled by helping the respondents to review the questionnaires for an expeditious and reliable response. There were some which were also dropped to the respondents and were later collected. Secondly, the researcher employed the Likerôs scale. This brought in the likelihood of understating

or overstating their count on the questions. To handle with this kind of problems, a number of questions were employed in response to same measure.

Thirdly, the population was confined only to logistics companies in Mombasa County, Kenya. The fact that there are many other companies owning and using fleet, the study would also have a more commanding outcome if projected in all logistics firms in Kenya. This is a limitation of the generalizability of the determinations. However, these shortcomings did not jeopardize the research diligence, quality of data, determinationsô clarification, reporting and the utility of the study.

5.5 Suggestions for Further Research

Further studies can be done on other aspects of supply chain management (SCM) other than fleet administration and how these determinants can impact the operational efficiencies. Studies could further be done to relate other elements of firms performance such as social performance and environmental with logistics.

Studies should further be conducted regarding how the implementation of GPS and FMS can revitalized the internal processes of the haulers providers as well as the extent to which GPS contribute to minimization in accidents, majorly in urban transport applications where great damages resulting from public transport system is the order of the day with a high number of fatal accidents. Research can also extend to deal with other applications of business where minute by minute FMS can be used to increase efficiencies in operationas.

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APPENDIX I: QUESTIONNAIRE

PART A: BIO DATA

1. Name of the company_____
2. Position in the organization_____
3. Years of experience
   - i. Less than one year ☐
   - ii. 1 ï 5 years ☐
   - iii. 6 ï 10 years ☐
   - iv. Above 11 years ☐

PART B: IMPLEMENTATION OF FLEET MANAGEMENT SYSTEMS

The following is a list of IFMS. Please indicate your level of agreement on the extent to which the company has used the systems using the scale of 1-5 where 1= Strongly disagree; 2 = Disagree; 3 = Neither agree nor disagree; 4 = Agree& 5 = Strongly agree	**Level of agreement**				
	Strongly disagree	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**
	1	**2**	**3**	**4**	**5**
1. Vehicle Financing and Maintenance					
Does the company record scheduled events in the maintenance frequency reference book?					
Does the company employs automatic prediction of the next planned action date based on the information on motor-hours, mileage or time with a feature allowing manual correction of the information?					
Does the company ensure storage of information on characteristics of tires subject to logging, including their service life among all other data?					
Is there tire mileage logging in the company?					
2. Vehicle Telematics					
Does the fleet have infotainment features?					
Does the company drivers have assist features e.g.					

Remote diagnostics?					
Is there a point of interest/location based Interest e.g. weather details?					
Does the vehicles are fitted with safety and security features e.g. stolen vehicle tracking.					
3. Driver and Fuel Management					
Has the company installed fuelLog2 systems?					
Does the company use EDT's fuel management solutions?					
Is there monitoring of fuel level, temperature, dens and logging in immobile storage tanks?					
Is there display of fuel level, temperature and quantity of filling fuel to each vehicle in refuelers?					
Do the company practices fuel consumption calculati for every vehicle?					
Is there automatic e-mail and SMS message sending case of possible fuel theft?					
Is there automatic trips, distance counting and storage					
Does the company ensure automatic over speeds, overloading, slopes monitoring and data storage?					
Is there additional fuel level sensor in the tank?					

PART C: ICT ADOPTION IN FLEET MANAGEMENT

The following is a list of ICT variables. Please indicate your level of agreement on the extent to which the company has used them in fleet management systems using the scale of 1-5 where 1= Strongly disagree; 2 = Disagree; 3 = Neither agree nordisagree; 4 = Agree& 5 = Strongly agree	**Level of agreement**				
	Strongly disagree	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**
VARIABLES	**1**	**2**	**3**	**4**	**5**
1. Application for Transportation Management					
The company uses ICT to find the most efficient way for goods movement in terms of time and cost					
The company has put in place transportation management system to allow programming and route optimization.					
The organization is able to use the information					

generated by the system in order to make real-time analysis of transporters performance.					
The company has a system that can generate financial, environmental and fuel consumption benefits associated with cost reduction and route optimization.					
2. **Application for Field Force Automation**					
The company has installed automated scheduling that helps in personnel training and qualifications and identification of each teamôs material and equipment					
There is configuration of user-defined alarms ornotices to ensure the dispatcher is instantlyaware of any issues and can take relevantactions, rescheduling work orders ifnecessary.					
There is optimized scheduling that differentiates and combines resource intelligence, planning, and modeling with advancedstreet level routing.					
3. Fleet Management Application					
The company puts in place advanced traffic management systems in charge of acquiring real-time information about traffic conditions, data analysis, travel time predictions, emergency response management.					
The company has electronic payment and automated vehicle identification that allows the real demand and the current amount of trucks circulating in real time to be known.					
The company has systems that allow the positioning and use of freight to be planned, resulting in the system's optimization and its control in real-time.					

PART D: OPERATIONAL PERFOMANCE

Indicate the extent to which the following operational outcomes have been enhanced through intelligent fleet management system. 1= Not at all; 2 = Small extent; 3 = Moderate extent; 4 = Great extent; 5 = Very great extent	**What is the extent**				
	Not at all	**Small extent**	**Moderate extent**	**Great extent**	**Very great extent**
	1	**2**	**3**	**4**	**5**
Cost					
The company focuses on decreasing transportation cost					
The Company aims at decreasing warehousing cost					
The company focuses on reducing labour cost					
The company seeks to reduce operating expenses					
The company focus to increase fuel saving					
The company seeks to lower insurance premiums.					
Flexibility					
The company looks at provision of a variety of services					
Company seeks to offer readily available services					
The company aims at volume flexibility					
Company looks at mix flexibility					
Product and Service Quality					
The company looks to achieve high customer loyalty					
Company looks at increasing the number of customers					
The company aims at achieving high sales revenue					
The company focuses on reducing emissions					
Speed of Service Delivery					
The company seeks to improve communication					
The company aims at high service rates					
The company keeps up to date procurement information					
The company looks at reducing lead time					

PART E: MODERATING EFFECT OF ICT

Indicate the extent to which the following operational outcomes have been enhanced through the influence of ICT 1= Not at all; 2 = Small extent; 3 = Moderate extent; 4 = Great extent; 5 = Very great extent	**What is the extent**				
	Not at all	**Small extent**	**Moderate extent**	**Great extent**	**Very great extent**
	1	**2**	**3**	**4**	**5**
Cost					
The company focuses on decreasing transportation cost					
The Company aims at decreasing warehousing cost					
The company focuses on reducing labour cost					
The company seeks to reduce operating expenses					
The company focus to increase fuel saving					
The company seeks to lower insurance premiums.					

APPENDIX II

LIST OF TRANSPORT COMPANIES IN MOMBASA COUNTY

1. Milan Freight Services (K) Ltd
2. Panal Freighters Ltd
3. SaSa Logistcs Ltd
4. Green Leaf Travellers
5. Cipro Logistics
6. Corner Garage
7. TNT
8. Awale Transporters
9. DHL INTER.
10. African Line Transport
11. Afrofreight Forwarders
12. Al Shikely
13. Anwarali & Brothers
14. AO SAID Transporters
15. Consolidated Warehouses
16. Habo Agencies
17. Hakika Transport Services
18. Kara Roadways
19. Mukhi & Sons
20. Panal Freighters
21. Rashid AMIR Transporters
22. Roadtainers
23. Roy Parcel Services
24. Shiva Carriers
25. Shreeji Enterprises
26. Skynet
27. SOFITRA
28. TRANSEAST
29. Ufanisi Freighters
30. UMOTRANS HAULIERS
31. Modern Coast Express Ltd
32. Transeast Ltd
33. A A Transporters Ltd
34. Malde Transporters
35. Shiva Carriers Ltd
36. ASG Transport Ltd
37. Daham Transporters
38. Easy Transporters Ltd
39. Elmi Transporters
40. Gaab Transporters Ltd
41. Issa Transport Company
42. Mbuni Transport Co Ltd
43. Port Transport Co Ltd
44. Star Transport Co Ltd
45. PN MASHRU
46. Kenya Transporters Association Ltd
47. Buzeki Group of Companies
48. Denvi Fuels Services
49. k logistics
50. AA Transporters
51. AATSONS
52. African Express Automobile Ltd
53. AK ABDULGANI
54. COAST HAULIERS
55. ESRI STAR LTD
56. HIGHWAY CARRIERS
57. HUSSEIN DAIRY LTD
58. ISSA TRADING & PROVISION LTD
59. KENYA BUS SERVICES (MOMBASA) LTD
60. KYOGA INVESTMENTS LTD
61. QUANTUM LOGISTICS
62. Randa Coach Ltd
63. ROADSEA LINK
64. ROADTAINERS (MOMBASA) LTD
65. ROMARK
66. TAIB A BAJABER & CO LTD
67. TORNADO CARRIERS
68. TRANZAHI CO LTD
69. Blue Horizon Travels
70. Dane Investments (K) Ltd
71. Pallet Logistics Ltd
72. Taslim Transport Limited
73. Afreen Enterprises
74. Akamba Public Road Services Ltd -Mombasa
75. Akamba Public Road Services Ltd -Mombasa MWF

76. AL ZAKWAN TRANSPORTERS LTD
77. Busclass Ltd
78. BUSSCAR (K) LTD
79. COACH S LTD (BUS SERVICE)
80. COAST AGENCY
81. CROSSLINE LTD
82. Dream Line Bus
83. EASTEX KENYA LTD
84. Emmess Transport Ltd
85. FAST MOVERS & HAULIERS
86. GEOMIT AGENCIES LTD
87. HERCULES TRANSPORT CO LTD
88. Horizon Bus Service Co Ltd
89. JEKEAN ENTERPRISES
90. Leon Transporters
91. MAHADHI TRANSPORTERS LTD
92. MAPP HOLDINGS LTD
93. MOHAMED AHMED BAYUSUF & SONS LTD
94. Mombasa Liners Ltd
95. MOMBASA METROPOLITAN BUS SERVICES
96. Royal Star Bus Ltd
97. Simba Coach
98. TAKRIM BUS SERVICE
99. Tawfiq Bus Service
100. Trans Express
101. T S S Express Ltd
102. Mash Bus Services Ltd

APPENDIX III: RAW DATA ON IFMS, ICT AND OPERATIONAL PERFORMANCE

S/No	Vehicle Financing	Vehicle Telematics	Driver and Fuel Management	ICT	Operational Performance
1	3.75	4.5	4.56	2	3.58
2	3.25	4	4.11	2	3.47
3	3	3.75	4.33	2.67	2.69
4	4.25	3.25	4	2.67	3.95
5	4.25	3.25	3.89	2.73	3.98
6	4	3.25	4.22	2.67	3.89
7	3	4	4	2.47	2.56
8	3.5	3	4.33	3.67	3.63
9	3.75	3.5	3.89	3.33	3.83
10	3.5	3	3.44	2.33	2.83
11	3.75	2.25	3.44	3.33	3.69
12	4	3.75	4.22	3.78	3.93
13	4	4	3.78	3.67	3.88
14	3.5	3.25	4	2.78	3.6
15	3.25	3	4	2.47	3.17
16	3.25	3.25	4.11	3	3.15
17	4.25	3.25	3.56	3	4.56
18	4	4	4.11	3.33	3.5
19	4	3.75	4	3	3.69
20	3.5	4	3.56	3.33	3.67
21	3.75	4	4.33	4	3.98
22	3.5	4.25	4.33	3	3.79
23	3.75	4.5	4.22	2.33	3.81
24	4.25	4	4	2.33	4.42
25	4.25	3.25	3.22	2.67	4.06
26	4.25	3.25	4.11	3	4.96
27	4	3.25	3.89	2.33	3.77
28	4.25	3.5	4.22	2.67	3.94
29	3.75	3.5	4.33	3	3.31
30	3.25	4.5	4.22	3.67	2.65
31	3.5	3.75	3.33	3	3.63
32	3.75	3.25	4.11	3	3.73
33	3.5	3.5	3	2.67	3.94
34	3.75	4.25	3.56	2	3.58
35	3.5	3.75	3.89	3.67	3.33
36	4	4	4.22	3.33	3.23
37	4.25	3.5	4.33	2.67	3.46
38	4.25	3.25	3.56	2.33	3.21
39	4	2.75	3.89	3	3.58
40	3.5	2.5	4.44	3.33	3.29

S/No	Vehicle Financing	Vehicle Telematics	Driver and Fuel Management	ICT	Operational Performance
41	3.75	3.75	4	3	3.6
42	3.75	3.5	4	3.33	3.83
43	3.75	3.75	3.78	3	3.69
44	3.25	4.5	3.78	2.67	3.58
45	3.5	4	4.11	2.33	3.63
46	4	4	3.67	3.67	3.38
47	4	4.25	3.67	2.33	3.38
48	3.5	4.25	3.89	3.67	3.52
49	4	4	4	2.67	3.73
50	3.5	3.5	4.22	2.33	3.23
51	4	3	4.22	2.67	3.6
52	4	3.5	4.11	4	3.52
53	4	3.75	3.78	4	3.77
54	3.5	3.5	3.78	2.33	3.46
55	3.5	3.75	4.11	1.67	3.67
56	3.5	4	3.33	2.67	3.54
57	4	4.75	3.67	1.33	3.63
58	4.25	4	4.11	2	3.73
59	4.25	3.25	4.22	2.33	3.78
60	4	3	3.89	2.67	3.71
61	4	3.5	3.78	3.67	3.67
62	4.25	3.5	4.44	4.33	3.85
63	4.25	3.25	3.89	3.67	3.85
64	3.75	4.25	3.78	2	3.15
65	3.25	2.75	3.89	2	3.06
66	3	3.25	4.11	2.67	3.1
67	4	4.5	4	2.67	3.6
68	4.25	4.25	4	3.67	3.77
69	4.5	3.75	3.67	3	4.38
70	3.25	3.75	3.78	3.33	3.38
71	3.75	3.75	3.44	2.67	3.69
72	4	3.5	3.56	2.33	3.84
73	3.75	3.25	4.11	2.33	3.27
74	4.25	3.5	4.11	1.67	4.27
75	4.25	3.75	3.78	2.33	4.38
76	4.25	3.75	4	4	4.13
77	3	3.5	3.67	2.67	3.44
78	3.25	3.5	3.89	3.67	3.85
79	3.25	3	3.67	2	3.5
80	4	3.75	3.67	3	4.08
81	2.75	4.5	4.22	2.67	3.02
82	3.75	4.75	3.89	2.33	3.25
83	2.75	4.25	3.44	2.33	3.29
84	3.75	3.75	3.44	3.67	3.58

S/No	Vehicle Financing	Vehicle Telematics	Driver and Fuel Management	ICT	Operational Performance
85	3.75	4	4.11	4	3.52
86	3.75	3.25	4.33	2.67	3.46
87	4	3.75	3.78	2.67	3.48
88	4.25	3.75	3.33	2.67	4.54
89	3.75	4	4.11	3	3.38
90	4	3.5	4.33	2.33	3.46

APPENDIX IV: RAW DATA ON OPERATIONAL PERFORMANCE

Respondent	Cost	Flexibility	Quality	Speed of Service Delivery
1	3.83	2.5	4.25	3.75
2	3.67	3	3.75	4.25
3	4	3	3.75	3.75
4	3.67	3	4	2.75
5	3	2.75	4.5	3.25
6	2.7	3	4.75	2.75
7	3.5	3.25	4.25	3.25
8	3.5	3.5	3.75	3.75
9	3.83	4	3.25	4.25
10	3.83	3.25	3.75	4.5
11	3.67	2.75	4	4.75
12	3.33	2.5	3.25	4.25
13	3.67	2.75	4	3.5
14	3.17	3.75	4.25	3.25
15	2.67	3.75	3	3.25
16	3.67	2.75	3.25	3.75
17	4	2.5	3.75	4
18	4	2.25	3.75	4
19	4	3.75	3.25	3.75
20	4.17	3.5	3.25	3.75
21	4.17	4.25	4	3.5
22	4.67	3.5	4	3
23	4	3	4	4.25
24	3.67	2.5	3.5	4
25	3.5	2	3.5	3.25
26	2.83	1.75	4	3.25
27	2.83	2.5	3	2.75
28	3	5	4	3.75
29	2.5	3.25	3.75	3.75
30	3.33	3.25	3.75	4.25
31	3.5	4	3	4
32	3.67	4	3.75	3.5
33	4	3.25	4.75	3.75
34	4.33	2.5	3.5	4
35	3.83	2	4.25	3.25
36	3.17	2.25	4	3.5
37	3.33	3	3.5	4
38	3.33	3	2.75	3.75
39	3.83	3	4	3.5
40	3.67	3	3.25	3.25

Respondent	Cost	Flexibility	Quality	Speed of Service Delivery
41	3.17	3	3.75	4.5
42	3.33	3.25	4	4.75
43	3.5	3.5	4	3.75
44	3.33	3.25	4	3.75
45	3	3.5	3.75	4.25
46	3	2.75	3.75	4
47	3	2.75	4.25	3.5
48	3.83	2.75	4	3.5
49	3.67	3	4.25	4
50	3.67	3	2.5	3.75
51	3.67	2.5	4	4.25
52	3.33	2.75	4	4
53	3.33	3.75	3.75	4.25
54	2.83	3.75	3.75	3.5
55	3.17	4	3.5	16
56	3.17	3.5	3.75	15.75
57	3	3.75	3.5	4.25
58	3.17	4	3	4.75
59	2.67	3.5	4	3.75
60	4.33	3	4	3.5
61	4.17	2.5	3.75	4.25
62	4.17	2.5	4	4.75
63	3.5	2	3.25	4.25
64	3.33	3	2.75	3.5
65	3.5	2.5	3.25	3
66	3.67	2.25	3.5	3
67	4.17	3	4	3.25
68	3.83	2.75	4.5	4
69	3.5	2.5	3.5	4
70	3	3.25	3.5	3.75
71	3.5	3.75	4.25	3.25
72	3.5	3	3.75	3.5
73	3.83	3	3.25	3
74	3.83	2.5	3.25	3.5
75	4	2.25	3.75	3.5
76	3.5	1.75	3.25	4
77	3.5	2.5	3.5	4.25
78	3.67	2.75	4.75	4.25
79	3.5	3	4	3.5
80	3.5	2.5	4	3.5
81	3.33	3.25	2.75	2.75
82	2.5	3.75	3.25	3.5

Respondent	Cost	Flexibility	Quality	Speed of Service Delivery
83	3.17	3.5	3.5	3
84	3.83	3.5	3.5	3.5
85	3.83	2.75	3.75	3.75
86	3.83	2.5	3.5	4
87	3.67	2	3.5	4.75
88	3.67	1.75	4	4.75
89	4	2	3.75	3.75
90	3.83	2.25	3.75	4