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TECHNOLOGICAL INNOVATIONS AND PERFORMANCE OF LOGISTICS FIRMS IN KENYA – A CASE STUDY OF KUEHNE + NAGEL LIMITED

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ABSTRACT

The main objective of this research study was to investigate influence of organizational practices on performance of logistics firms in Kenya. The specific objective was to ascertain the effect of technological innovation on performance of logistics firms in Kenya. This study was founded using resource-based view and planned behaviour theory. The study target population was 326 Kuehne + Nagel Limited employees working in Nairobi, Kenya. This study adopted survey research design. The study adopted stratified random sampling techniques. A 25% sample size was selected. This study used questionnaires to gather data. A pilot test was performed using five questionnaires. The collected data was scrutinized, coded, classified and systematically keyed in SPSS version 22.0 software for generation of data table and charts. The analysis incorporated both descriptive and inferential statistics. As ethical consideration, all work of authors used was acknowledged. The results indicate correlation r equal 0.900 for technology innovation. This indicates positive relationship between quality improvement and performance of logistics firms in Kenya. The study recommends logistics firms in Kenya, should extend investment level on technology such as use of GPRS, robots, chatbots and other artificial intelligence technologies to improve handling of cargo, tracking of goods on transit and real time information to customers. This study would benefit Kuehne + Nagel Limited and other logistic firms in Kenya to improve their logistical activities as well as future researchers as source of reference and citations.

Keywords: Organizational practices, Performance, Logistics firms, Technological innovation, Kenya, Kuehne + Nagel Limited

INTRODUCTION

Globally, the performance of logistics firms are affected by competitive markets, the ever evolving consumer preferences, increase in cost of doing business, stringent business regulations, and focus on customer satisfaction (Israel, Albrecht, Frazzon, and Hellingrath, 2020). Lee, Lee and Schniederjans (2018) adds poor corporate practices such as fixed policies,

not well thought strategies, rigid structures, autocratic styles of leadership and ill-skilled workforce reduces performance of logistics firms. According to Brulhart, and Moncef (2015), significant logistics firms fails to establish lean or flat organizational structures, does not entrench internal quality improvements systems, lacks strategic staff training and competency development, use outdated technologies, fails to outsource non-core services that adversely implicate their efficiencies and effectiveness.

In Africa, Kwado (2016) explains logistics industry lag behind to improve their competitiveness and adopting new technologies to bridge the gap in change in technology. The scholar also elaborates African logistics firms unlike the ones in Europe rarely establish modern inventory management system in order to optimize resources. Kogoh (2019) elucidate that the inability of African logistics industry to invest adequate resources and recruit logistics market analysts to foresee supply chain risks and provide interventions as well as developing seamless policies and processes to support timely decisions and planning in the industry is costing the firms' profits and competiveness.

In Kenya, Nyaga (2017) established logistics firms suffer from a number of issues that affects their performances including inadequate internal resources, lack of skilled logistics manpower, bureaucratic logistics and procurement policies, poor ethos and unethical behaviours, unplanned training and development practices, the issues of uncontrolled company frauds and corruption by the staff and late deployment of advanced technologies to maximize output from logistics market. It was based on this background that this study investigated influence of organizational practices on performance of logistics firms in Kenya with reverence to Kuehne + Nagel Limited.

Technological Innovations

An organizational practice is defined as internal variable(s) that influences how things are done within the organization, operations of the business, and its success or failures (Gelinas and Bigras, 2018). According to Hallavo (2015), there are several organizational practices not limited to organization's structure, size, physical and financial resources, culture, location, policies, values, technology capabilities, leadership, change readiness, project capabilities,

customers, employees, teamwork, quality improvement systems, and business strategies. These internal factors influence logistics firms' performance.

For instance, as logistics firms grow in size, structures and hierarchies, managers and heads of departments becomes of help rather than hindrance (Huang, Yen, and Liu, 2014). However, logistics companies across have to consider how they manage work from home employees, satellite offices, global partners and other issues in the 21st century workplace in order succeed (Kogoh, 2019). Additionally, the resources that logistics firms keep in-house versus the outsourced have consequences in their performance (Magutu *et al*. 2021).
In terms of culture, employees' attitude and feeling and how team structure makes that happen influence their performance (Mangan and Lalwani, 2020). Advances in technology also make it easier than ever to track various logistical metrics, collect, and analyse information, and communicate with others (Milimu, 2015). According to Mwanzia (2016), effective continuous quality improvement systems eliminate wastes, proactively detect defects, and increase logistics firms' efficiency (Kogoh, 2019). Well planned outsourcing is also associated with freedom that enables logistics firms to concentrate in core service delivery (Njiru, 2019). None the least, adequate and robust staff training empowers them to solve logistics problems and add value to the organization (Nyaga, 2017).

This study focused on how technology innovation as the organizational practice influences logistics firms' performance. The rationale of using these variables is based on (Al-Tit, 2016; Anyango, 2014; Awino, 2016; Gacuru and Kabare, 2015) studies that found there were factors that affect their effectiveness in logistical firms' performance. This study therefore sought to explore whether this applies to logistics firms in Kenya. Technological innovation is developing new ideas, concepts, methods or processes of doing things. It also includes developing new tools for undertaking organization activities. Thus, technological innovation is economic function under which use of new idea, concept or tool is used in the production process or transaction process. The organization fiancé, human resource, facilities and other instruments are then organized based on new way of doing things (Mudogo and Kadenyi (2019).

In this study's context, technological innovation was studied in terms of how Kuehne + Nagel Limited uses it to adopt even faster internet to improve communications, use artificial intelligence to improve data gathering, use vehicle tracking technologies to improve security of goods on transit, reintegrate processing systems to improve transactions and adopt newer technologies to identification of stock in stores.

Performance of Logistics Firms

Globally, offer cargo transportation by sea, land, and air whilst adapting to economic trends and growing digitization patterns. According to Stank and Closs (2021), the logistics industry is worth 5.7 trillion euros globally. However, the emergence of Covid-19 disrupted logistics industry operations cutting major supplies to local and international companies that depend on them across the world. For instance, lockdown triggered acute growth of e-commerce thus straining already overstretched freight networks (Thia, Cahoon, & Tran Thanh, 2021). In Africa, a recent Briter Bridges survey of logistics reports three trends will shape the future of logistics in African markets performance; close rural-urban divide; digitize logistics; and continue rise of B2B logistic companies (Mangan and Lalwani, 2020).

According to Okongwu, Brulhart, and Moncef (2019), performance is linked to quality output, timeline of output, attendance to the job, work efficiency, and effectiveness of work completed. Rao *et al*. (2018), however describe performance as fulfilment of task visa vies set standards, quality, costs, speed, and completeness. Song and Lee (2020) define performance concept as multidimensional abstract concept with its measurement pegged on variety of factors. Performance may refer to both enterprise organizational performance and an activity, a department, a manager or a performer (Stank and Closs, 2021).

According to Israel *et al*. (2020), organizational performance can be measured based on efficiency, effectiveness, productivity, profits, economy, and competitiveness. It can also be measured on service quality, return on investment, assets return, market share, sales growth, customer base, manpower as well as financial and technology capabilities (Gelinas and Bigras, 2018).

In logistics industry, firms' performance is measured in form of zero wastes, zero defect, cycle time, lead time, delivery on time adherence, freight payment accuracy, average dwell time, trailer utilization rate, average cost per skid/order and on-time pickup percentage. This study measured performance on reduction of cost of operations, profitability, delivery on time adherence and freight payment accuracy since logistics firms adopt technological innovation to reduce costs, improve profits, accuracy, and deliver timely.

STATEMENT OF THE PROBLEM

Conceptually, the link between organizational practices and performance of logistics firms is not conclusive. For instance, whilst Bagshaw (2017) established direct positive core correlationship between strong organizational practices and performance of logistics firms; Bryman and Bell (2018) found the performance of logistics firms is not directly tied to organizational practices only but more other factors such as individual staff personality and commitment at work. Thus, direct link between organizational practices and performance of logistics firms still needs more scientific investigation and empirical evidence to fill the grey gap.

Based on methodological gaps, Bagshaw (2017) undertook a study on logistics management from firms' performance perspective. This study however relied on small sample size of 41 respondents. The current study used sample size of 82 participants. Bowen (2018) focused on logistics performance analysis and improvement. The study scope was however based in United Kingdom and its finding was therefore not based on Kenyan logistics firms. Gacuru and Kabare (2015) also investigated factors affecting efficiency in logistics performance of trading and distribution firms based in Kenya. This study was however, purely quantitative in methodology thus lacking narrative interpretations. The current study therefore chose quantitative and qualitative approaches.

Contextually, Kuehne + Nagel Limited is a shareholder funded company and thus exists to make profits to guarantee return for investment. However, there have been customer complaints indicating there are ineffective organizational practices at the firm. These

ineffective organizational practices are unknown and their effects on the performance of the logistics firm are also unknown.

For instance, in Kuehne + Nagel Limited Complaints and Reviews database available on Kuehne + Nagel: Reviews, Complaints, Customer Claims (complaintsboard.com), there are registered number of customers' dissatisfaction with the company's services indicating there are organizational practices affecting the operations of the logistics firm. For instance, one of the complaints read; "NTG620055579 Tracking has been booked since 19th April 2022 and the pallet has still not arrived. I have lost the number of times I have tried to get information from the company representatives to no avail. All promises given to me are NEVER met and I have to say this is probably the worst company I have dealt with in my 30 years of business. You are not running a proper service and need to be accountable to customers - THEY pay your bills," (Kuehne + Nagel Limited Customer Complaints and Reviews Database, 2022).

Another customer complains read, "I am writing to report one of your delivery drivers being extremely obstructive, unhelpful and downright rude". In another customer post, it reads, "Kuehne have repeatedly failed to deliver my goods, and have consistently given be unclear and inaccurate advice. It has cost me a lot of time on the phone to customer services and holiday from work," (Kuehne + Nagel Limited Customer Complaints and Reviews Database, 2022). The above samples of customers' complaints against company's services indicate there are ineffective organizational practices that need to be identified and research undertaken on how they can be improved to enhance firm's performance. It was based on this background that this study sought to investigate how technological innovation as internal factor influence performance of Kuehne + Nagel Limited in Kenya.

OBJECTIVE OF THE STUDY

The objective was to determine the effect of technology innovation on performance of logistic firms in Kenya.

RESEARCH HYPOTHESIS

The null hypothesis of the study states that there was no relationship between technology innovation and performance of logistic firms in Kenya.

SIGNIFICANCE OF THE STUDY

Kuehne + Nagel Limited operates in logistics industry in Kenya. However, there was knowledge gap on how technology innovation influences performance of Kuehne + Nagel Limited. This study outcome could therefore be used by Kuehne + Nagel Limited to inform or shape its future business strategies and policies.

To the Government of Kenya, logistics industry stakeholders in Kenya, and logistics practitioners in Kenya; the outcome of this study could be an instrumental source of information for logistical policy development in Kenya. For effectiveness and efficiency, the logistics firms in Kenya could also adopt recommendations from this study to redesign their logistical operational policies informed by the outcome of this study.

Further, the finding of this study would be of significance to future researchers as they would use it as source of reference and citations. This study also suggested areas for further studies that future researches would undertake to add value in body knowledge with regard to organizational practices influence on performance of logistics firms in Kenya.

SCOPE OF THE STUDY

The study focused on organizational practices on performance of logistics firms in Kenya. And even though there are several logistics firms in Kenya, this study was only limited to Kuehne + Nagel Limited as case study to improve accuracy of study's outcome. The study specifically investigated how technology innovation as organizational practice affecting performance of logistics firms in Kenya. This study target population was 342 Kuehne + Nagel Limited employees working in Nairobi, Kenya. The study was undertaken for a period of eight months from January 2023 to August 2023.

LITERATURE REVIEW

THEORETICAL FRAMEWORK REVIEW

This study was anchored on resource based view theory (RBV). The resource based view theory was advanced by Penrose in the year 2009. Penrose proposed the model for effective management of companies' resources, executing the diversification strategies, and exploring the productive opportunities. In Pensorse view, an organization was conceptualized as plethora of resources that if used well is capable and enables a firm to achieve its short term, medium term and long term goals and objectives. This theory usage highly began in the 1990s under the growth of the firm concept but was highly criticized by Jay Barney's work that also dominated the strategic management and planning in the 1990s (Mudogo, 2019).

The resource based view theory (RBV) concept is influential approach in strategic management. This theory is highly and often applied in management of firms to determine the resources vital for the competiveness and the achievement of the companies' advantages. This theory is also the basis under which firms predicts their future performances or competitive advantages (Milimu, 2015).

RBT provide fundamentals to foresee a firm's performance and competitive advantage. The Penrose's the RBV concept is based on meso perspective which was a reaction to earlier interest in industry management and structure more so in macro perspective side. Thus, the RBT focuses on the internal angle of the organization especially the resources contrary to macro approaches that focuses to understand why firms fails or get successful based on the factors such as technology innovation, political stability, the economic stability, the environmental perspective, the legal frameworks and the social fabric of the society. In other words, the RBT seeks to explain how imperfect imitable a firm resource could essentially become a source of its competitive advantage for success (Mwanzia, 2016).

It is notable to say that some form of confusion often exists as to whether RBT or RBV is the ideal label for this theory. Some scholars prefer RBT (resource based theory) since a view has evolved into a theory whilst some researchers use the term RBV. However, upon reflection of

several perspectives in community studies, several scholars often adopt and use the term RBT which this study adopted (Njiru, 2019).

This theory links organization resources to competitive advantage of the firm. The theory proposition is that for a firm to be competitive in the market, it must use rare distinct resources it has to its advantage. The rare resources can be personnel, technology, finance power, knowledge, and other physical facilities (Grant, 2014). The theory further posit that organization competitive advantage comes in using or converting resources it has to make unique services or products that cannot be imitated by other firms (Barney & Hesterly, 2021).

In RBT, the resources are viewed in two dimensions, the internal resources and the external resources. The internal resources refer to the company's pool of staff, financial capability, the transaction or production processes of the firm, the polices and procedures, the strategies developed by the management, the vision and mission that guide the operations of the firm, skills and body of knowledge retained in the organization, the firm information systems, the firm's physical facilities. The other others are firm's logistics channels, the brand image and the research and development (Huang et al, 2014).

The external resources of the firms comprise of the suppliers, the customers' and the technology change. For instance, a good supplier often ensures a firm production is continuous which offer reliable and steady flow of company products into the market. This win customers' trust that results in repeat sales and the growth of the firm in profitability and the market share. Additionally, customers' goodwill often acts as source of asset to the firm since it can be translated into loyalty to company products or services and act as source of repeat sales, customer base, market share, profitability and the expansion (Hallayo, 2015).

The RBT further categorizes resources into three areas; namely human capital resources, physical capital resources and the organizational capital resources. The theory explains the physical capital resources as resources such as company production plant, raw goods, finished goods, company vehicles, science or computer lab, business premise, company accounts, company valued land among others (Karaman et al, 2019).

The human capital are company employees, company managers, the top management team, the board of directors, the casual employees, employees under contract and contracted employees through outsourcing. The human capital also involves the skills firm workforce holds, the training capacity of the firm, the staff talents, the succession plan, creativity, and innovation as well as knowledge management and retention strategies (Kwado, 2016).

The organizational resources cover the organization information and data, the transaction systems, the production processes, the style of leadership, the policies and the procedures, the training or working manual, the ethical codes of conduct, the management structures, the reporting channels, the communication framework, the vision and mission and the objectives of the business (Nyaga, 2017).

According to RBT, firms' asserts can also be seen in the context of intangible and the intangible resources. The intangible resources include the skills of the employees, the experience of the staff, the knowledge in the workforce, the goodwill of the customers, the talents held by employees, the firm services, the staff talents, the workflow and the business processes (Owuor et al, 2019). The tangible resources of the firm are the company's financial power, the number of employees of the firm, the number of the company vehicles, the number of business premise, the capital land, the product, the physical plant, the machines and equipment, the computers, the lab and among others (Okongwu et al, 2015).

In the concept of RBT, the importance of firms' resources is seen in the capability to use such resources to improve the performance of the organization. This means the company managers and staff must use the unique tangible and intangible resources the firm has to turn raw goods or ideas into products or services that are then sold to customers for the company to earn profit. It is in this perspective that a company that is capable to develop unique products or services that are attractive to customers wins the competitive advantage in the market (Owuor et al, 2019).

However, RBV framework has no shortage of criticism. According to Peteraf and Barney (2021), RBV lacks managerial implications. For instance, the manager identifies resources that

it uses to improve competitive advantage of the firm. However, the firm still lose market share, profits and sales. Thus, RBV focus on internal elements of the firms but lacks executional strategies. This then leads to failure of the firms regardless of the resources at its disposal (Rumelt, 2018).

Further, the RBT is based on the assumption that every firm has unique resources that is not transferable or imitable. The theory holds that each company has an outstanding resource that it can use distinctively to produce unique services or the products in the market that gives it competitive edge. However, in real sense, this actually is not the truth. As Sink et al (2018) explains, one or more organization can have one or several similar resources and can be also operating from the same business environment with similar resources. This therefore reduces or eliminates the unique ability the RBT emphasize on and eliminates the competitive advantage the theory is anchored on.

The other weakness of this theory is that it assumes that firm characteristics cannot be modified. The work of Penrose holds that company unique abilities and characters differentiates them from the rest and thus when utilize gives them competitive advantage over the rest in the market. However, this assumption is a fallacy. For instance, a company might not have a resource the other company has but along the way acquires such unique resource it didn't have. For instance, a company might lack a particular skills or knowledge the company has to make or produce a certain product, however, the said company can recruit a staff that comes with the new skill that was lacking in the workplace. Thus, the competitive advantage of the other firm held the previous skill earlier is reduced if not eliminated in the market (Song & Lee, 2020).

RBV was used as an anchor theory in this study to signify organizational practices and performance of logistics firms depends on internal and external resources and how the firm competitively uses such resources to its advantage. For example, the internal skills employees have, the financial capability of the firm, how robust and effective their logistics operational policies and strategies are, as well as how the leadership respond to emerging logistical issues determines the logistical performance of the firms. However, RBV theory will be meaningless

if there is no planned intention to change the behaviour of employees and the culture required of them to practice. It is under this context that theory of planned behaviour was discussed and its connection to this study.

Empirical Literature Review

In 2019, Karaman Kabadurmuş undertook a study with the aim to attest logistics performance on firms' innovation decisions. Using 2015-2016 data from Turkey Regional Enterprise to measure logistics performance. The study also measured process, product, organizational and investment development. The finding has revealed innovation in key four areas tested has improved performance logistics firms in Turkey.

Karaman Kabadurmuş' study was however based on different sectors such as retail sector and construction sector. However, the current the study seeks to understand technology innovation in the context of logistics firm's performance in Kenya. Retail sector and construction sector operates under different environment and regulations compared to logistics firms. The current study is therefore warranted understand effect of technology innovation logistics firm's performance context. further, Karaman Kabadurmuş' study was in the context of Turkey's retail and construction sectors and not Kenya's logistics sector. Therefore, further research is necessary to bridge the knowledge gap in this context.

Durowoju (2017) explored technological change on SMEs in Lagos Estate. The study used descriptive design with sample size of 153 respondents covering managers and employees. The study also used linear regression technique. The result has shown technology change by SMEs has positive impact on their performance in terms of market share, sales and profitability. However, this study was based on SMEs in Nigeria and not logistical firms in Kenya. The current study is therefore necessary to understand technological change in logistical firms in Kenya context.

Wilson, Iravo, Tirimba, and Ombui (2015) has investigated 'effects of IT on logistics firms' performance in Nairobi Kenya.' The data was gathered from ten firms in Nairobi with 93

percent response recorded. The ANOVA result shown significant relationships between the four tested independent variables and performance of the firms in Nairobi County.

However, Wilson, Iravo, Tirimba, and Ombui study did not focus onorganizational practices and their performance of logistics firms in Kenya. Further, Wilson, Iravo, Tirimba, and Ombui study focused on variables such as cargo tracking and security system, level of IT usage, IT usage on customer service delivery and information integration not similar to the current study's variables namely continuous quality improvement, outsourcing, staff training and technological innovations. The differences in these two studies means there are gaps in how technology adoption and invocation influence performance of logistics firms in Kenya and therefore further study is needed to fill the gap. This is the gap the current study sought to fill.

Mudogo and Kadenyi (2019) explored technology innovation on performance of telco firms in Kenya. The study used descriptive design with focus on four telecommunication firms in Kenya using structured questionnaire. The finding revealed technology innovation had positive relationship with telco firms' performance. However, this study was undertaken in the context of telecommunications companies and not logistics companies in Kenya. The current study was therefore based in logistics companies in Kenya to address the gap.

Summary of Research Gaps

Table 37 Summary of Research Gaps

Author and Year	Title	Study variable	Findings	Research gap	Current study intervention
Mudogo and Kadenyi (2019)	Technological innovation on performance on telecommunication companies in Kenya	Technological Innovations	Innovations has strong positive influence on performance of telco companies	Study was undertaken in context of telecommunication industry.	Current study explored logistics companies in Kenya.
Wilson et al (2015)	IT on logistics firms' performance in Nairobi County.	Technology innovation	Strong link between four variables and performance of the studied firms.	Study delves on IT and not organizational practices affecting logistics firms operations.	The focus of current study delved on organizational practices

Source: Author (2023)

CONCEPTUAL FRAMEWORK

Independent Variable **Dependent Variable**

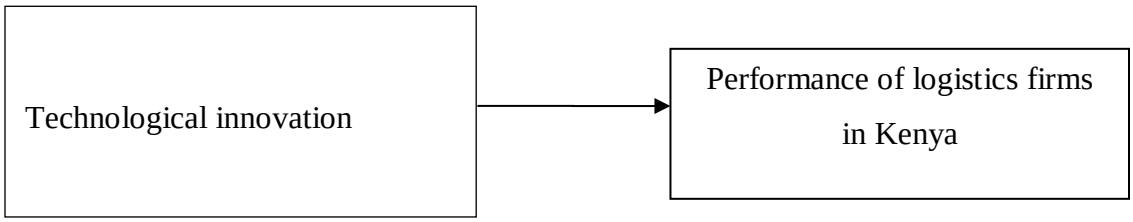


Figure 1: Conceptual Framework

Operationalization of Variables

Table 38 Operational Framework

Variables	Indicators	Measurements	Data Analysis
Technological Innovation	Adopt even faster internet to improve communications. Use artificial intelligence to improve data gathering. Use vehicle-tracking device to improve security of goods on transit Reintegrate processing systems to improve transactions Adopt newer technologies to identification of stock in stores	Scale of 1-5 where 1 is strongly disagree, 2 disagree, 3 neutral, 4 agree and 5 strongly disagree	Descriptive statistics
Performance of logistics firms	Cost efficiency Services effectiveness Manpower reduction Quicker orders fulfilment	Scale of 1-5 where 1 is strongly disagree, 2 disagree, 3 neutral, 4 agree and 5 strongly agree	Descriptive statistics

RESEARCH METHODOLOGY

This study adopted survey research design. Survey research means collecting information about a group of people by asking them questions and analyzing the results (Kothari, 2014). The survey research design was adopted in this study as it was good choice when want to find out about the characteristics, preferences, opinions, or beliefs of the target population. Surveys also allowed the researcher to collect a large amount of data in a relatively short period. This study target population was 326 Kuehne + Nagel Limited employees working at Jomo Kenyatta International Airport. The target population comprised top management, middle staff, and support staff.

Table 3 Target Population

Category	Population	Percentage
Top Managers	11	4
Middle Level Staff	67	21
Support Staff	248	75
Total	**326**	**100**

Source: Kuehne + Nagel Limited (2023)

The study adopted stratified random sampling techniques. A 25% sample size (an average of between 20% to 30%) was selected based on Peil (2021) that opine the sample size of a study should be between 20% to 30% of the target population. There were 326 Kuehne + Nagel Limited employees working at Jomo Kenyatta International Airport when 16 staff involved in pilot testing were excluded. As a result, 82 Kuehne + Nagel Limited employees were selected as the sample size. See table 4.

Table 39 Sample Size Distribution

Category	Target Population	Sample Size 25%) of Target Population)	Percentage
Top Management	11	3	3
Middle Level Staff	67	17	20
Support Staff	248	62	77
Total	**326**	**82**	**100**

Source: Author, (2023)

The data was obtained using a questionnaire. Kothari (2014) define questionnaires as structured documents with set specific questions to be answered by study participant. The questionnaire was designed to contain the things that are aligned towards achievement of objectives of the project. The questionnaire was a closed-ended questions. Closed questions consisted of a fixed questions answered by respondents in certain sequence and with pre-designated response options to take care of the quantitative part of the study. Comments were accompanied by a list of alternative options to choose from. The questionnaires were divided into three parts namely general information, technology innovation, and logistics performance.

The piloting study took place in Kuehne + Nagel Limited head office. The goal of the pilot research was to determine the questionnaire's dependability, including the language, structure,

and sequence of questions. The pilot test included 16 Kuehne + Nagel staff, however these were not included in the main sample size. This was justified by (Sheatsley 1983; Sudman 1983) studies that opine the rule of thumb is to test the survey on at least 12-50people prior to full-scale administration. The study's goal was to rewrite the questionnaire such that respondents in the main study had less difficulties answering questions.

Validity tests were conducted for criterion, content and construct validity to ascertain representative and relationships between variables. Triangulation was utilized before research instruments administration to guarantee research findings. Content validity ratio was used to calculate Content validity index using below formula:

CVI=Total number of items rated by all respondents (25 items)

Total Number of items in Instruments (32)

VCI=25/32

CVI=0.78

Content validity index of 0.7 and above, according to Peil (2016) qualified instrument of the study.

First step of reliability in this study was to operationalize variables. Thereafter, internal consistency was measured using Cronbach's alpha. If R2 (Alpha) equal or more than 0.7, the instrument was considered satisfactory (Kothari, 2014). After data collection, reliability analysis was undertaken and results presented in table 5 below.

Table 5 Reliability Statistics

Variable	No. of Items	Alpha
Continuous quality improvement	6	0.74
Logistics performance	4	0.89
Overall	**25**	**0.88**

The field data was coded and categorized using Statistical Package of Social Sciences (SPSS) version 22.0. The descriptive statistics was used to analyse the field data. The quantitative data was analysed and presented in tables using percentage, frequency, mean and standard deviation. The quantitative analysis was undertaken using narrative approach. The inferential statistics was also performed using multiple linear regression model to understand the

relationships between in/dependent variables. For instance, multiple regression model was developed to test organizational practices on performance of logistics firms in Kenya. The multiple regression formula was:

$$\mathbf{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon}$$

Where, Y = Performance of logistics firms

X_1 = Technology innovation

β0= Constant Term

β1, β2, β3, β4 = Beta coefficient; ε = Error Term.

RESEARCH FINDINGS AND DISCUSSIONS

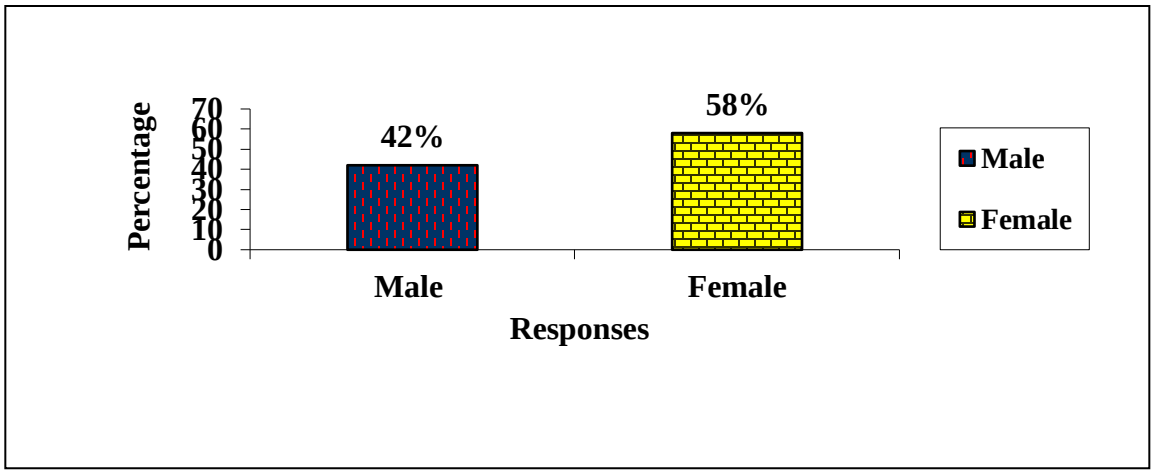
Response Rates

Table 40 Response Rates

Category	Frequency	Percentage
Filled and returned	65	79
Not returned	17	21
Total	**82**	**100**

According to (table 6), out of 82 questionnaires that were issued to a logistics firm in Nairobi County, 65 were fully filled and returned representing (79%) response rate. However, 17 questionnaires were never filled and returned representing (21%) return failure. The above average return on data collection tool (79%) indicates this study achieved its data collection objective as Kothari (2014) requires data from the field to be above 50 percent.

Figure 8 Gender Analysis



According to figure 2, the number of women that participated in this study were (85&%). The number of men that participated in the study were (42%). These results indicate that more female respondents than male respondents. It also indicates study used data gathered from both genders and therefore formed conclusions based on gender equity as required by Donalson and Preston (2016).

Table 7 Age Analysis

Age Range	Frequency	Percentage
18-25 years	13	20
26-33 years	19	29
34-41 years	11	17
42-49 years	15	23
50 years and above	7	11
Total	**65**	**100**

As shown in table 7, majority of employees (37%) and (31%) were between the age of 26-33 years and 34-41 years respectively. However, other employees had their age brackets spread in different categories as indicated above. The age of respondents were analysed to understand the pool of logistics firm's logistics and supply chain management staff.

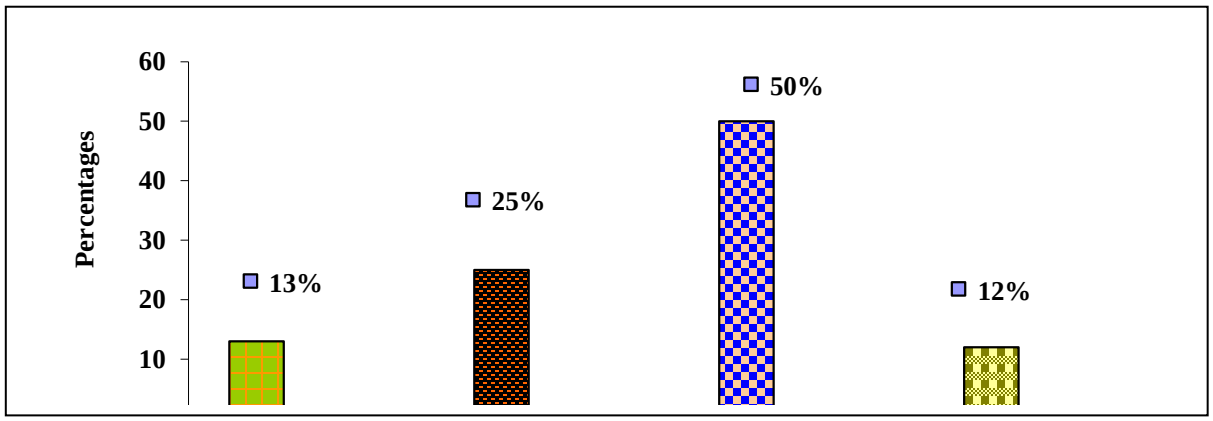


Figure 9 Highest Level of Education

As shown in figure 3 above, 50% of employees were graduates from different universities in Kenya and around the world. The other employees also had certificate, diploma and postgraduate qualifications as show in the above figure. The education level was analysed

because Hill and Jones (2017) require researcher to understand respondents level of reasoning and literacy skills.

Table 8 Duration of Employment

Categories	Frequency	Percentage
< 2 years	7	11
2-4 years	23	35
4-6 years	15	23
6-8 years	11	17
Over 8 years	9	14
Total	**65**	**100**

According to table 8 above, majority of employees (31%) and (25%) had working experience between 2-4 years and 4-6 years respectively. The work experience analysis was important to understand logistics firm's level of understanding in supply chain and logistical issues as supported by Miles (2017).

Results on technology innovation

Table 41 Effects of Technology Innovation and Logistics Performance

The last objective was to ascertain effects of technology innovation on performance f logistics firms in Kenya.

	N	Mean	Std. Deviation
We adopted faster internet that has improved our communications with customers.	65	3.34	1.503
We use artificial intelligence that has enabled us learn clients' purchasing pattern and adjust accordingly.	65	3.20	1.471
We use vehicle tracking technologies that has improved security of goods on transit.	65	3.95	1.386
Our integrated transaction systems have improved customers' payment processing from all over the world.	65	3.02	1.556
We adopted GPRS technologies that have eased of identification of our stock in stores.	65	3.42	1.345
Valid N (listwise)	65		

In table 12, the statement we adopted faster internet that has improved our communication with customers had mean score of 3.34 and standard deviation of 1.503. A statement we use artificial intelligence to learn and adjust to customers purchasing pattern had mean score of 3.20 with standard deviation of 1.471. The statement use of vehicle tracking system has improved security of goods on transit had mean score of 3.95 and standard deviation of 1.386. Another statement our integrated transaction systems have improved customer payment processing from all over the world had mean score of 3.02 and standard deviation of 1.556. Lastly, statement we adopted GPRS technology that has eased identification of cargo in stores had mean score of 3.42 and standard deviation of 1.345. The above findings were similar to Nyaga (2017) study on factors affecting performance of courier industry that also revealed technology has supported courier companies in terms of tracking customer behaviour trends, security of their wares and marketing.

Results on Performance of Logistics Firms

Table 42 Organizational practices on Performance of Logistics Firms

In the last bit, the researcher wanted to understand if organizational practices influence performance of logistics firms in Kenya.

	N	Mean	Std. Deviation
Our annual sale has increased by 10% due to our standard and quality services.	65	3.82	1.550
Our customer base has increased by 10% as our portfolio and reputation grows.	65	4.34	1.314
Company has opened 5 more branches because it focuses in its core function.	65	3.38	1.343
We have realized 10% profit increase for our ability to tap and retain talented logistics and supply chain professionals.	65	3.45	1.552
All shareholders are happy due to over 10% return on investment.	65	2.98	1.420
Internal survey indicates over 70% of our customers are satisfied with real time update on their orders.	65	3.98	1.293
Valid N (listwise)	65		

In table 13, the statement of annual sale has increased by 10% due to maintenance of quality standards had mean score of 3.82 and standard deviation of 1.550. A statement of customer

base increased by 10% as company portfolio and reputation grows had mean score of 4.34 and standard deviation of 1.314. The statement of company has opened 5 more branches since it has time to concentrate on core business had mean score of 3.38 and standard deviation of 1.343. A statement we have realized 10% profit increase because of ability to tap and retain logistics and supply chain management professionals had mean score of 3.45 and standard deviation of 1.552. The statement all shareholders are happy because of more than 10% return on investment had mean score of 2.98 and standard deviation of 1.420. Lastly, a statement over 70% of company customer satisfied due to real time update on their orders had mean score of 3.98 and standard deviation of 1.293. These findings were in agreement with Mwanzia (2016) study on success factors on organizational performance of third party firms in Kenya that further established staff competence, outsourcing, quality standards and investment in technology was the basis of indigenous third party firms' growth in Kenya.

Inferential Statistics

Table 43 Coefficient Correlation

Performance Of Logistics Firms		**Technology innovation**
Performance of logistics firms	1 65	
Technology innovation	.448 ** .000 65	

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

In investigating relationship between variables and findings, the researcher used Karl Pearson's coefficient of correlation (r) indicated in table above. From the results, it was no doubt there was positive correlation between organizational practice (technology innovation) and performance of logistics firms in Kenya. The results indicate correlation r equal 0.448 for technology innovation. This indicates positive relationship between technology innovation and performance of logistics firms in Kenya.

Coefficient of Determination R^2

Table 44 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of Estimate
1	.875[a]	.765	.760	1.93596

Predictors: (Constant), technology innovation

In table 15, the model shows 76.5% of variance (Adjusted R Square = 0.760) on the performance of logistics firms in Kenya. Undoubtedly, there are other factors other than four variables in this study that can be used to predict logistics performance. However, this still good model as Cooper and Schindler (2016) indicated lower value R square 0.10-0.20 is acceptable in social research. This therefore means 76.5% of relationship is explained by identified technology innovation variables. In nutshell, technology innovation constitutes 76.5% of relationship whilst 23.5% constitutes other factors not researched by this study.

Regression Results

Table 16 Analysis of Variance

Model		Sum of Squares	df	MeanSquare	F	Sig.
1	Regression	735.369	4	8.84	2.359	.003[b]
	Residual	224.877	60	3.748		
	Total	960.246	64			

Dependent Variable: Performance of logistics firms in Kenya

b. Predicators: (Constant), Technology Innovation

Regression Coefficients

Table 45 Regression Coefficient

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	**Std. Error**	**Beta**	**t**	**Sig.**
1 (Constant)	26.487	10.924		2.425	.0018
Technology Innovation	.332	.152	.100	2.184	.0003

Dependent Variable: Performance of Logistics Firms in Kenya

Regression equation was:

$Y=26.487 + 0.176X_1 + 0.312X_2 + 0.255X_3 + 0.332X_4$

Where Y= Performance of logistics firms in Kenya

X_1= Technology innovation

The regression equation performed above found considering all factors (the performance of logistics firms) constant at zero performance of logistics firms in Kenya is 26.487. The result also showed taking all other independent variables at zero; unit increase in technology innovation would lead to 0.716 increases in scores of performance of logistics firms in Kenya. This therefore indicates that tested variable had positive relationship with performance of logistics firms in Kenya with technology innovation being the dependent variable. From table, it is clear predictor variable of technology innovation got variable coefficients statistically significant because their p-values are less than common alpha level of 0.05.

Hypothesis H_{04} – There is no significant relationship between Technological innovation and the performance of logistics firms in Kenya. In relation to technological innovation variable, table 17results indicate technological innovation has effect on performance of logistics firms in Kenya. This was affirmed by regression analysis t-value of 2.184 that is greater than critical value 2.0 and p-value of 0.000 at 95% level of significance that was less than 0.05.

This finding aligned with Nyaga (2017) results. Upon testing hypothesis comparing scores of calculated t-value and the critical t calculated t-values was 2.184 for technological innovation

that is greater than critical $_{t36}$-(0.05) = 2.0. Thus, study rejected null hypothesis technology innovation had no effect on performance of logistics firms in Kenya. Consequently, study finding indicate technology innovation had no significant effect on the performance of logistics firms in Kenya.

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

The study sought to understand relationship between technological innovation and performance of logistics firms in Kenya. The finding indicates technology improved logistics performance. For instance, use of tracking machines for goods on transit and in store as well as artificial intelligence enabled logistics firms to easily update customer in real time thus earning their loyalty and increasing the satisfaction index that is reason for expansion of other company branches.

The study concludes technological innovation has significant effect on the performance of logistics firms in Kenya. The study has revealed use of tracking machines such as GPRS and artificial intelligence has enabled logistics firms to provide real time updates to clients. This has resulted in increased customer satisfaction leading to goodwill that has enabled expansion of services.

The study logistics firms in Kenya, should further improve their investment level on technology as it has positive effect on return on investment and customer satisfaction due to real time updates. Thus, logistics firms should fully adopt use of GPRS, robots, chatbots and other artificial intelligence technologies to improve handling of cargo, tracking of goods on transit and real time information to customers.

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