THE IMPACT OF TECHNOLOGY ADOPTION ON THE PHARMACEUTICAL INDUSTRY'S DISTRIBUTION CHANNELS IN NAIROBI COUNTY, KENYA

BY

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DECLARATION

This research project is my original work and has not been presented for any award in this or any other institution.

Signature…… Date…….

Peter Munyasi

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I confirm that the work in this project was done by the candidate under my supervision.

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DEDICATION

I dedicate this research project to my family and friends. To my wife Linet Makali and children Ryan Machekhe Makali and Olivia Nakoba Makali for all the sacrifice and time that allowed me to engage in my studies. To my parents, Mr & Mrs Munyasi, thank you for the drive for excellence, instilling the culture of diligence, tireless ambition for education and success.

ABBREVIATIONS

APIs	-	Active Pharmaceutical Ingredients
CMS	-	Central Medical Stores
CPFR	-	Collaborative Planning Forecasting and Replenishment
EDI	-	Electronic Data Interchange
EPZ	-	Export Processing Zone
KEMSA	-	Kenya Medical Supplies Agency
MNCs	-	Multinational Corporations
NGOs	-	Non Governmental Organizations
OTC	-	Over the Counter
POS	-	Point of Sale
RFID	-	Radio Frequency Identification
TMS	-	Transport Management System
UNIDO	-	United Nations Industrial Development Organization
VMS	-	Vertical Marketing System
WMS	-	Warehouse Management System

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ABSTRACT

The Pharmaceutical industry in Kenya has consistently registered a double digit growth in recent past years. However, adaption of technology at the distribution channel level has been at different rates affecting the cost of distribution and service level delivery thereby impacting drug accessibility and overall industry growth. To gain in depth understanding, this study set up an objective of quantifying the impact of adoption of technology by the pharmaceutical industry's distribution channels in Nairobi County. The study focus was on the impact of adoption of technology on; the cost of distribution, the efficiency in service delivery and the growth of the industry. Relevant theoretical and empirical literatures were reviewed to assist in the formulation of the conceptual framework. Analyses of previous outcomes of similar studies were carried out to provide comparative information. The study used cross-sectional research design with a questionnaire as the tool for data collection. The study population included all the 2,030 pharmaceutical companies in Nairobi County and used stratified random sampling technique to identify the respondents. A 10% sample was selected from each stratum. The responses were analyzed through descriptive statistics and Pearson's correlation test. The study results pointed out that technology adoption had a great impact on the cost of distribution with the mean being 3.61 and a moderate negative correlation of -0.425; technology adoption had an impact on service delivery efficiency to a great extent with a mean of 3.70 and a significant positive correlation of 0.605; and finally technology adoption had an effect on distribution channel growth to a great extent of 3.77 mean and a moderate positive correlation of 0.445. From the study results, it was concluded that pharmaceutical companies that embraced new technologies had a competitive edge in sourcing and distribution of drugs due to the reduction in the costs associated with transportation, coordination and storage of products. These companies experienced a reduction in delivery turnaround timelines, reduction in data entry errors and enhanced accuracy in reporting and communication. On the industry growth, adoption of new technologies enhanced strong customer loyalty engagements and enabled quicker penetration of new markets. The outcome of this study also opened doors for regulators to identify gaps and formulate new operational guidelines.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Marketing decisions are influenced by a firm's channel decisions. Pricing decisions are dependent on firms discounting policy, profit and volume turnover objectives. The firm's decisions regarding its sales force and marketing communication messages are dependent on how much persuasion, motivation, training, and support its target customers along the channel need. Whether a firm develops or decides to launch new products in the market depend on the extent to which the products fit the channel members' capabilities. In recent years, the impact of globalization - whereby market channel structures alongside strategies are rapidly developed – has caused complexity in the concept of marketing channels. These days, dis-intermediation / re-intermediation as well as multi-channeling and new roles are emerging as relatively new issues of import (Rosenbloom & Larsen 2008). Additionally, the increasing quest for efficiency and agility in vertical relationships is sparking the convergence of perspectives particularly for channel related activities such as supply chain management, purchasing and logistics (Gundlach*et al*. 2006). For that reason, innovation in marketing channels is now a complex, multi-organizational as well as multi-disciplinary activity that demands collaboration and interactions right across the various entities within the entire supply chain. A substantial segment of the innovation process and the resulting outcomes occur at the level of buyer-seller interface (Ganesan*et. al*. 2009).

Pharmaceutical manufacturers face challenges in forecasting the right market demand, tackling fluctuating costs and handling the manufacturing pipeline. Firms' volumes of their finished products tend to fluctuate widely. Furthermore, with inconsistent product orders, in-bound logistic & transport challenges, manufacturer's ability to stock enough raw materials is impacted. This forces them to occasionally stop production. (McCabe, 2011). Ganesh & Ghadially (2013) stated that channel adoption of information technology could lead to improved efficiencies, a significant reduction in operational costs, improved or better customer service and greater satisfaction among members of the distribution channel.

Many countries in Africa maintain a combination of national and regional wholesalers who distribute pharmaceuticals to pharmacies to retailers and hospitals. In principle, national wholesalers provide the full range of medicines (or "Full Line Wholesalers) and regional wholesalers provide either an entire or partial range of medicines ("Short Line" – refers to the stocking of a strictly limited list of medicines). Much fewer countries, on the other hand, run single channel systems with a wholesaler having exclusive rights to distribute pharmaceuticals on behalf of a manufacturer. A single-channel system comprises a few wholesalers who hold a strong control of the market compared to wholesalers in multi-channel systems.

Most pharmaceutical companies in African source their active and inactive pharmaceutical ingredients for manufacturing from India, China, United States, and European countries. They buy these raw materials & equipment (APIs, manufacturing machinery, excipients, blister packages, paper cartons and glass bottles) with the help of a procurement agents as opposed to buying directly from source (manufacturers). It is noteworthy that procurement agents have access to prices from many suppliers in various countries and may source through brokers if quantities are too small. Since many African manufacturers have limited accessibility to credit facilities, they pay upfront for their orders. As this is difficult, many intermediary agents control the payment terms (credit period and credit amount)

1.1.1 Technology Adoption

Technological systems in the firm's hierarchical structures can be broadly classified in three categories; (a) Complex technological business systems, such as ERP (Enterprise Resource Planning) systems which are designed to cover and connect the entire company's operations; (b) Focused technological solutions, this comprises of the lower level of technological solutions that facilitate the optimization of certain business functions or that improve visibility along the channels. They include warehouse management system (WMS), advanced planning system (APS) or transport management system (TMS); (c) Technological tools that offer managerial solutions: such as RFID (or Radio Frequency Identification), Electronic Data Interchange (or EDI) or the Internet. Gallaugher (2002) stated that the internet's ability to assemble buyers and sellers from geographically diverse regions has seen increased leveraging of auction markets as the

distribution channels. Nonetheless, relative scarcity of items on offer significantly impacted on the motivation of auction participants. It also created a competitive advantage for the operator of the auction

1.1.2 Distribution Channels

Kotler and Armstrong (2012) defined distribution channel as an array of interdependent organizations in the marketplace that help, through their activities, make any product or certain service readily available for the use or consumption of the consumer or a business user. The success of a good distribution channel cannot be a patchwork of contacts from a randomly selected members of a channel, rather it is a carefully thought out and organized system in which members clearly assigned functions. How the product flows from producers through wholesalers to retailers and ultimately the final buyer largely depends on systematic, strategic planning by a firm and sound management. Bennett (1988) views distribution channels as interlocking, highly interdependent, and often complex. Supply and distribution of pharmaceuticals products are central any health system's success. Interruption of supply destabilizes health care outcomes by impacting on availability, accessibility and cost of healthcare to the communities. Some of the causes of poor supply and distribution of these products are; poor storage facilities, stock pilferage, poor supply chain management, insufficient human resources and limited financing.

1.1.3 Pharmaceutical Industry in Kenya

Kenya's pharmaceutical industry has three main stakeholders; Public institutions (Government), Nongovernmental organizations (NGOs) and Private Institutions (Private hospitals, clinics and wholesale & retail outlets). Pharmaceutical products are channeled from manufacturers through distributors to the three stakeholders and eventually to the patients. There is an estimated of 4,550 health facilities in the country. In the COMESA or Common Market for Eastern and Southern Africa region, Kenya currently is the largest producer of pharmaceutical products, controlling about 50% of the regions' pharmaceutical market share. About 30 out of 50 major pharmaceutical manufacturers are

based in Kenya. There are about 9,000 registered pharmaceutical products in Kenya which are classified either as over-the-counter (OTC) or prescription only.

The local manufacturing firms are either large Multi-National Corporations (MNCs), subsidiaries or local joint ventures. They manufacture or repack formulated drugs into the size or doses commonly used. They import most of the active ingredients and excipients. The manufacturing and pharmaceutical distribution industry continues to expand. This is as a result of the Government's efforts in promoting both local and foreign investment in this sector (Export Processing Zones Authority, 2005).

The Kenya Medical Suppliers Agency (or KEMSA) a major player in the industry is a division of the Ministry of Health that has the mandate of distributing pharmaceutical products to Government institutions. KEMSA has been autonomous since 1 July, 2003. Its mission is to facilitate accessibility of essential drugs and basic medical equipment to the public in Government health facilities. There are about 700 registered wholesalers and more than 4,000 retailers operating in Kenya in facilities that are managed by both registered pharmacists as well as pharmaceutical technologists. The World Health Organization (2012) has categorized into five alternative supply routes for pharmaceuticals products to Governmental and Non-governmental organizations:

* **Central medical stores (CMS):** A centralized government unit that procures and distributes pharmaceutical products.

* **Autonomous drug supply agency:** Procurement and distribution is undertaken and managed by a pharmaceutical supply agency that is autonomous or semi-autonomous.

* **Direct delivery system:** A decentralized system where manufacturers / suppliers directly deliver pharmaceutical products to districts and major facilities. Government authorities select the specific supplier and establish the price for the respective item. The Government is not involved in the storage and distribution of the drugs.

* **Primary distributor (or prime vendor) system:** The government authorities select a contract distributor as well as contract of suppliers. Here, the contracted primary distributor receives medicines from suppliers on behalf of the Government. The

contracted distributor then stores and subsequently distributes them throughout the country's districts and major facilities.

*** Primarily private supply:** This system enables a private pharmacy located within or close to Government health facilities to provide diverse medicines for use by the general public. In this approach, certain measures are put in place to ensure equity of access for not only the poor but also the medically needy in the target populations.

These systems do vary considerably in regard to Government's role, the private sector's role and the incentives for efficiency. These represent a mixed systems whereby different categories of pharmaceuticals products are supplied to health facilities. Countries that exploit the capacities available in both public and private sectors run more effective systems. They are also more prepared for disasters.

1.2 Research Problem

Africa represents 11% of the world's population, it also accounts for 24% of the worlds' disease burden. Poor accessibility to quality medication, sanitation and general health care is a key component of this challenge to many African countries. The supply and distribution of pharmaceutical products is often highly centralized and marked by poor storage facilities, inaccurate demand planning processes, insufficient human resource management capabilities, high stock pilferage and inadequate financing all these resulting in frequent stock outs. African pharmaceutical manufacturers are challenged in setting up good demand planning processes, raw material cost fluctuations due to instability in foreign exchange rates and poor control of manufacturing pipeline. This affects the manufacturing firms output. The situation is made worse by irregular customer orders, transport & logistic challenges and credit inaccessibility. Most manufacturers are unable to hold adequate stock holding thereby impacting production. Some of these challenges can be reduced by adoption of relevant technology at the distribution channel level. Several studies with regard to the impact of technology on channel distribution have been done. Scott & Scott (in their 2011 study) indicated that digital platform ability is undervalued in the entire pharmaceutical industry and tools such as mobile phones, e-mail and social media are under deployed. Grackin (2010) illustrated that embracing digital technology to label goods, move them, invoice, monitor climate control, manage

inventory, the JIT or Just in Time concept is vital. Newer technology leads to greater efficiency, more effectiveness and the reduction of costs. Electronic Marketing Channels as an example has a worldwide scope and reach, ensure swift processing of transactions, proficiency in information processing, effective management of databases, and has a reduced cost associated with sales and distribution.

In Kenya, Amara (2012) carried out a study on the impact of marketing strategies on the distribution channel on a firm's overall performance among the commercial banks operating in Kenya. Also, Nyalita (2009) analyzed the factors that affected the performance of the distribution channels of Kenya Wine Agencies Ltd products in various malls in Kenya. These studies highlighted the knowledge gap with regards to the impact of technology adaption on the pharmaceutical industry's distribution channel in Kenya. The international studies had also not analyzed a developing country's context where there was no extensive application of technology at the distribution channel level. It was with this regard that the identified research gap became the basis for this study; "What was the impact of technology adaption on the pharmaceutical industry's distribution channels in Nairobi, Kenya?"

1.3 Objective of the Study

The objective of this study was to undertake research that would determine the impact of technology adoption on the pharmaceutical industry's distribution channel in Nairobi, Kenya.

The precise objectives of this particular study are determination of technology adoption's impact on the:

i) Cost of distribution
ii) Efficiency in service delivery
iii) Growth of the pharmaceutical industry.

1.4 Value of the Study

The industry stakeholders can make use the study findings to improve the industry performance standards. First, the study will be of value to the manufacturers, wholesalers, and the retailers by offering a guide on improved business performance associated with

adoption of new technologies in their businesses with regards to operational efficiency, improved profitability and increased turnover.

Secondly, the study would be of value to the industry's regulatory board. Government agencies such as Pharmacy and Poisons Board and medical supplies distribution entity such as KEMSA can use the study findings to formulate policies that will make better and faster accessibility to medication by the population. They would also be able to know how to link with the other stakeholders to enhance efficiency in the industry.

Finally, the study will also be useful to scholars and academicians to further the study and also serve as a literature in other studies related to it. This will help to increase the general knowledge of the subject and also provide useful reference to future studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This specific chapter covers both theoretical as well as empirical literature on adoption of technology by pharmaceutical industry channels. Section 2.2 discusses the theoretical literature, highlighting the various theories that form the bedrock of the study. Section 2.3 looks at the empirical literature that is used, where previous studies reviews in order to fill the research gap, while the summary of the literature review was done in Section 2.4.

2.2 Theoretical Literature

Theories used in reviewing the impact of technology adoption on the distribution channel of the pharmaceutical industry in Nairobi, Kenya and will be used in understanding the research include:

2.2.1 Technology Acceptance Model

Technology Acceptance Model, abbreviated as TAM, was advanced by Davis in 1986. It deals with the prediction of how acceptable an information system is. The Davis model is designed to predict how acceptable a tool is and to also identify which modifications should be made to a system to make it readily acceptable to users. The model goes on to propose that the perceived usefulness as well as perceived ease of use determine acceptability of an information system.

Perceived usefulness is, at the outset, defined as level to which a person is convinced or believes that the expected use of that particular system will improve his performance. Perceived ease of use, on its part, denotes the degree to which the individual person believes that his or her use of the system will be effortless. Several factorial analyses illustrate that the concepts of perceived usefulness and that of perceived ease of use may as well be considered as two very different dimensions (according to Hauser & Shugan, 1980; and also Larcker & Lessig, 1980). Davis (1986) asserts that an individual's approach is not the only factor that fully determines the use of a system. The use of a system is also based on the likely impact on his or her performance. This theory will be

important for this study as it will show how both staff and consumers are able to accept, implement and adopt the new prepayment systems model which in itself is based on Information Technology.

2.2.2 Unified Theory of Acceptance & Use of Technology (abbreviated as UTAUT)

The UTAUT is recognized as a unified model. It was developed by Vankatesh *et al* (2003) who based the model on the social cognitive theory. These scholars combined eight prominent information technologies, or IT acceptance research models. These authors in particular examined the ultimate predictive validity of eight specific models in determining the behavioral intention as well as usage to permit fair comparison of the selected models. The UTAUT states that, for an individual, actual use of an information system is directly influenced by the facilitating conditions. However, this use is indirectly influenced by various factors that include performance expectancy, social conditions and effort expectancy.

UTAUT model integrates the issues into four main core determinants. These are: effort expectancy (EE), performance expectancy (PE), facilitating conditions (FC), and social influence (SI). Four control variables are also included and these are: experience, gender, age as well as the voluntariness of use.

2.2.3 Distribution Models

For the entire channel to perform excellently, the role of each channel member should be specified. Also, channel conflict must always be managed. The channel will register better performance were it to include a firm or agency, or mechanism to provide leadership and is empowered to not only assign roles but also manage conflict. Ordinarily, a conventional distribution channel comprises one or more of the following independent players: producers, wholesalers as well as retailers. Each of these parties is a separate business out to maximize own profits. They do not mind achieving this even at the expense of the entire system. Generally, no channel member wields much control over the rest. Also, no formal means is in existence for purposes of assigning roles and resolving any channel conflicts. A vertical marketing system (VMS) consists of producers, wholesalers as well as retailers acting as one unified system. A single channel member owns the rest in the channel, has contracts with them, or, alternatively, wields

immense power that they all have no choice but to cooperate. The VMS may be dominated by the producer or the wholesaler or even the retailer.

The intensity of distribution i.e. the total proportion of the covered market will depend on decisions that are made in the whole context of the current overall marketing strategy. The decision as to which among the available strategies is adopted as with immediate implications for distribution strategy. The three principal strategies are: intensive, selective or exclusive distribution:

Extensive distribution: Those who market commodities as well as other low unit value products, typically, seek extensive distribution. That is, they seek saturation coverage of the entire market. This is likely in cases where the product is not just fairly well standardized but also requires no particular expertise to retail. Such mass marketing will almost invariably involve the participation of several intermediaries. This is because the achieving extensive distribution entails massive costs. In most developing countries Kenya included, the decision arrived at to sell commodities nationwide has, historically been politically inspired and not based on commercial judgments. For example, many marketing boards have since discovered the huge financial burden that pan-territorial distribution entails. They have discovered that their role in basic food security is incompatible with the economic or business objective of breaking even.

Selective distribution: Suppliers, who select a few retailers, or other preferred middlemen, are picked to handle a designated product line. They have and pursue a policy of selective distribution. Here, limiting the number of selected intermediaries may help keep the supplier's marketing costs low while also enabling the grower or producer to cultivate closer working ties with their intermediaries. The distribution channel is effectively kept relatively short with few or no intermediaries at all between the producer on one hand and the organization that ultimately retails the product to consumer or the end user. Selective distribution is common among new businesses with scarce resources. Their strategy comprises concentrating on gaining distribution in bigger cities and towns whose huge market potential can cost-effectively exploited with minimum marketing costs incurred. As the firm grows its resource base, it may steadily extend its range of

distribution to a level where further intensification of distribution becomes no longer economically justified.

Exclusive distribution: This is an extreme form of the concept of selective distribution. The producer of the goods grants exclusive right to a selected wholesaler or retailer who will sell in a given geographic region. However, some of the firm's market coverage may, under this arrangement be lost through the policy of exclusive distribution. This can, however, be offset by the deliberate development and sustained maintenance of an image of quality as well as prestige for that specific product in addition to the reduced marketing costs that are associated with the existence of a few accounts. Under the exclusive distribution arrangement, producers and middlemen tend to work closely in making or arriving at decisions that concern promotion, the type of inventory to be stocked and pricing.

2.2.4 Technologies Used in Distribution Channels

Integration is a key objective of use of IT in Supply Chain Management – for the purpose of delivering the many positive effects that integration brings. This is based on comprehensive information sharing that is more accurate and faster. Firms are able to get better demand forecasts that are based on precise information. Another benefit is the effects of economies of scale. Firms realize significant savings all by avoiding multiple operations that are unnecessary. Yet another benefit is agility: faster reaction times to the expected and the unexpected demands. All these culminate into better service for the final consumer or buyer. According to Segetlija *et al.* (2011), four main phases can be differentiated in relation to the development and the application of information systems as well as IT in a distribution channel:

Transaction support system - represents an information system and technology in a firm's logistic functional areas and also serves as a support tool when it comes to logistic operations. The system's main job is to provide not just reliable but also accurate and timely (or if possible, in real time) data as well as information to provide support to logistic activities. Among these are bar-coding, scanning and POS or Point-of-Sale system. Despite being relatively new, RFID technology can also feature in this group.

WMS and TMS systems, in addition to order processing systems as well as supply management systems also play a critical role in supporting functional logistic systems.

Intranet systems – make it possible for the effective communication and smooth exchange of logistic data at all times across the entire organization. That is regardless of the extent of the spatial spread of a company's logistic departments since its systems specialized in single functional areas are integrated. These intranet systems have evolved into organization-wide ERP systems.

Extranet systems – by expanding the integration of information exchange among various organizations, the most famous forms of extranet systems used along the supply chain have since been created. These include EDI (abbreviated to Electronic Data Exchange) and CPFR or Collaborative Planning Forecasting & Replenishment in short. Thus, the modern exchange of logistic as well as trading information among trading partners that exist along the supply chain occurs in a well-structured and truly standardized communication system.

Channel systems – are based on the internet or the many information exchange systems ran over the internet to enable the smooth exchange "from one to many" and "from many to one". This is slowly and gradually replacing systems like EDI which are based on the one-to-one approach. Additionally, this system's advantage is the relatively low cost of accessing it or using it, the widely spread as well as accepted data transfer standards in addition to easier information synchronization - by all supply chain members. Internet's wide use in the distribution channel (or supply channel) is capable of significantly altering the channel structure itself.

2.2.5 Technology and Distribution Channel Costs

Technology is expected to lower the cost of communication and distribution to suppliers and customers. A conceptual framework was developed by Parasuraman and Grewal (2000) on the quality-value-loyalty chain of distribution channels. The framework synthesized lower costs being one of the key aspects in providing competitive advantage in an organization. Henderson et al (2001) did a study analyzing the determinants of expected internet sales in agribusiness industries. They indicated that transaction and

communication costs were some of the factors that influenced online sales since the technology reduces these costs.

2.2.6 Technology and Distribution Channel Service Delivery

Drennan and McColl-Kennedy (2003) did a study on information technology and service delivery and stated that internet may be deployed as a viable tool for delivering customer service. This is particularly in enhancing customer satisfaction as well as building business revenue. These researchers focused on internet impact on performance, and investigated the relationship that exists between, on one hand, the extent of use of internet and, on the other hand, the perceived performance exhibited among two types of small business firms: that is, retail services alongside professional health services. They found that a direct positive relationship exists between perceived performance on one hand and internet use on the other. Therefore, the more a firm engages in Internet activities (and this is particularly, email for contacting various clients or for obtaining customer feedback or for searching for diverse products and/or services or even selling goods and services as well as paying for purchases straight away via the Internet) then it can be concluded that the perceived performance is greater.

Sultan and Henrichs (2000) also showed how the factor of time influences consumer preferences – that is in regard to innovative technological services – particularly for services that are delivered through internet. They discovered that already existing time preference frameworks which were previously applied at least to technological consumer durable products may also be applied to known technical service innovations, a prime example being the Internet. Their research further confirmed that consumer preferences for Internet services may vary by profile of service. They also found that some service features may at times be discounted in value by those consumers more rapidly than other features.

2.2.7 Technology and Distribution Channel Growth

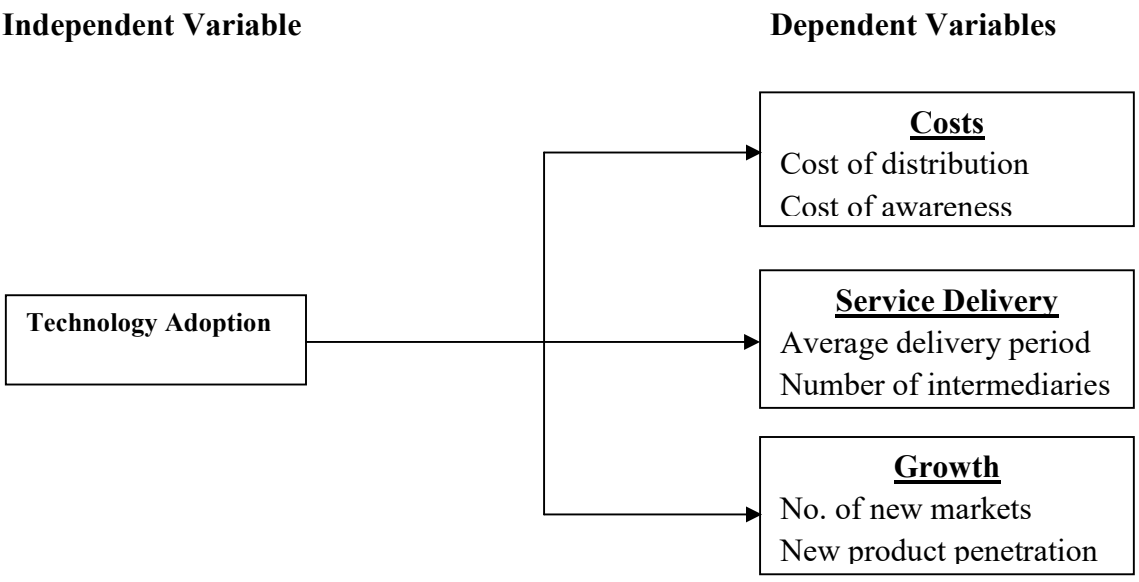
Adoption of information technology can be expected to demonstrate a positive impact on the growth of distribution channels because of a wider reach of customers. The internet is widely regarded as a powerful communication tool that effectively blurs the traditional boundaries that have existed between distribution and information (as observed by

Swarbrooke, 1996). Henderson *et al* (2001) did a study on e-business and the distribution channel strategies employed widely in agribusiness industries. The result of the study indicated that manufacturers who have greater levels of e-communications sustained with their respective suppliers stood a better chance of higher expectations of their internet sales growing with traditional payment in a span of the next three years. Also, distributors exhibiting greater levels of e-communications sustainably with their customers could be expected to enjoy much higher growth in their internet sales – with traditional payment as well as in internet sales overall with internet payments.

2.3 Relationship of Key Concepts

The conceptual framework identifies the relationship between the identified variables in the study, and operationalizes them. The relationship of the variables is as follows:

Figure 2.1: Conceptual Framework



Source: Researcher, 2015

The independent variable in the study will be technology while the dependent variables will be distribution channel costs, distribution service delivery, and distribution channel growth.

2.4 Empirical Review

Ganesh and Zoher (2013) carried out a study on enhancement of supply chain management in pharmaceutical industry and the incorporation of electronic means in distribution. The study used factor analysis to determine the predominant factors towards using e-channels. The study concluded that digital technology use in managing channels was essential to the success and ultimate growth of the particular industry. Those benefits not highlighted include the revenue benefit, improvement in channel relationships, reduced attrition levels, staff and channel satisfaction.

Grackin (2010) stated that embracing digital technology use in moving of goods, labeling, inventory management, invoicing, climate control monitoring overall led to greater efficiency, effectiveness and a substantial reduction of costs. Rosenbloom (2007) observed that the benefits of using electronic marketing channels are now at a worldwide scope as well as reach, information processing efficiency, quick transaction processing, effective database management, and reduction in the cost of sales and distribution. Several advantages far exceed the disadvantages.

Scott and Scott's study (2011) concluded that the utilization of innovative digital platforms is not optimized in the business run by the pharmaceutical industry. Tools such as mobile phones, e-mail, and social media are rarely, if ever, used. Worth noting also is the Business Person's Guide to Channel Management Software published in 2011. The guide considers Channel Management Software a particularly unique service through which to grow channel revenue, develop customer loyalty as well as administer all channel needs in an easily accessible central location.

Gallaugher (2002) did a study on e-commerce's role in restructuring channels. This was by examining several different scenarios where the aspects of collapse, shift as well as channels expansion have occurred. The study indicated that distribution channels are considered a strategic asset and channel design now appreciated as key to really effective and successful competition. Nonetheless, many managers are confused and unable to understand

the impact that online commerce has on existing channels. They are also unable to determine where the opportunities or even recognizing the existing threats.

Local studies done with regards to supply channel are many but not related to technology. Amara (2012) did a study on the effect of specific marketing supply channel strategies on firm performance among commercial banks operating in Kenya. The study results indicated that the branch network, electronic banking and multiple distributions were used by the banks. The marketing distribution strategies resulted to increased sales, market share and profits, the bank being able to market changes more effectively and enhanced ability of the bank to generate, disseminate, and respond to market changes.

Nyalita (2009) did a study on the factors that influence the supply channel performance of the Kenya Wines Agencies Ltd.'s products within malls throughout Kenya. The study results indicated that factors significantly affecting KWAL distribution channels were economic and competition. Others like managerial challenges, legal issues and technological and social–cultural challenges were fairly significant. Thus economic and stiff competition from its rival companies emerged as the major challenges that affect the performance of existing distribution channels for KWAL many products in the various supermarket outlets in Kenya.

2.5 Summary

This chapter evaluates both theoretical and empirical literature on the impact of technology on distribution channel of pharmaceutical industry in Nairobi, Kenya. The purpose of the evaluation is to analyze the theories used and identify the research gap in the study using the empirical reviews. The theories and empirical studies used in the study assisted in providing a framework. These were the technology acceptance theory (or TAM), alongside the unified theory of acceptance and use of technology (UTAUT). From the review, it is noted that adaptation of technology has a positive impact on the cost, service delivery, and the growth of distribution channels. The international studies indicated the impact of adaptation of technology on the distribution channels in the pharmaceutical industry. No local studies have been carried out to analyze the impact of technology adaption in the pharmaceutical industry's known distribution channel in Nairobi County, Kenya. These gaps provided a background for analyzing the topic and enabled the conceptualization of the research variables.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter contains the methodology of research used in this study. Section 3.2 began with discussion of the overall research design, while section 3.3 discussed the target population. Section 3.4 looked at the sampling procedure, which was used to arrive at the appropriate sample size. Section 3.5 presented the data collection techniques and instrument used in data collection and the justification for the choices while section 3.6 looked at the data validity and reliability. The technique of data analysis was contained in Section 3.7.

3.2 Research Design

Bryman & Bell (2007) view research design as a general plan which provides a clear framework to enable a researcher select the appropriate data collection techniques as well as the relevant data analysis procedures. A descriptive cross-sectional design was suitable for this study as it analyzed different pharmaceutical entities in Nairobi County, Kenya. This is because analysis of different pharmaceutical entities with regards to the impact of technology adaption in the distribution channel is possible at the same time.

In the descriptive study information is collected without altering the environment while a cross sectional study is one which involves a one-time interaction (snapshot) with the unit of analysis. The benefit of the cross-sectional study design is that it allows researchers to compare many different variables at the same time. The pharmaceutical manufacturers, wholesalers and retailers as the units of analysis were analyzed at the same time and descriptive information sought from them.

3.3 Population

The study population was comprised of all the pharmaceutical manufacturers, wholesalers, and retailers in Nairobi County, Kenya. The Export Processing Zone Authority (2005) indicated that there are slightly over 2000 dealers in Kenya with 30 being local manufacturers, 700 being wholesalers, and more than 1,300 retailers in

Nairobi. These pharmaceutical dealers constituted our study population for sampling and the unit of analysis was the individual manufacturer, wholesaler, or retailer.

3.4 Sampling Design

With the nature and the size of the population, the study employed a stratified random sampling technique. The strata comprised of the manufacturers, wholesalers, and the retailers and from these strata a sample will be collected with the aim of identifying the study objective. Mugenda and Mugenda (2003) stated that 10% of accessible population is sufficient to represent the total population if properly randomized. The study therefore analyzed all the identified pharmaceutical entities and sent questionnaires to procurement and logistics officers who were given the questionnaires to answer. This therefore gave a sample size of 203 pharmaceutical entities as indicated in the table below.

Table 3.1: Sample Size

Pharmaceutical entity	***Population Size in Nairobi County***	***Sample Size (10%)***
Manufacturers	30	3
Wholesalers	700	70
Retailers	1,300	130
TOTAL	**2,030**	**203**

3.5 Data Collection

Creswell (2002) illustrates data collection as means by which information is collected from the selected subjects of an investigation. Data collection stage shows what type of data is collected, whether primary or secondary, the instrument of data collection used, and the period of which the data is collected. This study deployed both primary and also secondary data, and the instrument for collecting primary data collection was a questionnaire. Questionnaires are relevant tools for primary collection since they provide relevant information from the people relevant to the study and therefore provided first-hand information for analysis. The study questionnaire was semi-structured so as to include both quantitative and qualitative data. According to Mugenda and Mugenda (2003), questionnaires provided detailed answers to complex problems. Also, they are a

widespread method for collecting data. This is because of they are relative easy to construct and administer as well as cost-effective.

The questionnaire was sent to pharmaceutical procurement staff and was designed to seek the impact of technology adoption in distribution channels in the pharmaceutical industry in Nairobi, Kenya. This was through both email and hard copy together with a cover letter specifying the research topic and guarantee of confidentiality. The study collected secondary data from organizational and industrial reports as well as diverse websites, examining information on technological impact on distribution channel in the pharmaceutical industry in Nairobi, Kenya.

3.6 Data Reliability and Validity

3.6.1 Data Validity

Berg and Gall (1989) defined validity. They termed it as the degree to which the specified sample of test items is confirmed to represent the content that the test is ostensibly designed to measure. Here, validity was analyzed using the following validity constructs: Face validity ascertained clearly that the measure in question appears to be correctly assessing the intended construct that is under study; the construct validity, used to ensure that the particular measure actually measured that which it was intended to correctly measure and that no other variables; also criterion-related validity, used to predict expected future performance or the current performance, correlated results of the test with another criterion that is of interest; and sampling validity which ensured the measure covered properly the broad range of the areas that fell within the particular concept under study.

3.6.2 Data Reliability

Shanghverzy (2003) considers reliability to be the consistency of measurement while Mugenda and Mugenda (2008) referred reliability to the relationship between the data and the variable being measured. This is consistency and the dependability of all the data that has been collected through the repeated use of a determined scientific instrument or a data collection procedure that is used under the same conditions. The study therefore used Cronbach-Alpha as a tool for reliability testing and from a range of between 0 and 1, a

value of 0.7 and above will be considered adequate to proceed. The test provided the following results:

Table 3.2: Cronbach Alpha

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.637	.626	5

The table appearing above indicated a Cronbach Alpha value of 0.637 which indicated that 63.7% of the variance were 'true scores' or reliable.

3.7 Data Analysis

In data analysis stage collected data is coded then processing, cleaning and tabulation done using SPSS v.17. The study used both quantitative and qualitative data analysis to determine the objectives of the study. Quantitative techniques comprised descriptive statistics which include mean and a standard deviation as well as inferential statistics which used Pearson's correlation test and simple regression analysis. Pearson correlation test was used to determine the relationship between technology and effective distribution channels in the pharmaceutical industry in Nairobi, Kenya. The correlation values were between +1 and -1. Here, +1 indicated the existence of a perfect positive relationship. In this case, -1 indicated the existence of a perfect negative relationship, while a value of 0 or near 0 indicating no relationship. The regression analysis was used to determine the extent to which technology affects distribution channel of pharmaceutical industry in Nairobi, Kenya.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

This study's objective was to determine the direct impact of technology adoption on the distribution channels in the pharmaceutical industry in Kenya. This particular chapter contains the summary statistics from the pharmaceutical responses followed by the analysis of the impact of technology on distribution channel in pharmaceutical industry in Kenya was contained in chapter 4.3. Chapter 4.4 contained the discussions of the study findings, and chapter 4.5 summarized the data analysis findings, results and discussions.

4.2 Summary Statistics

With the study's objective being to analyze the impact of the adoption of technology on the distribution channels in the pharmaceutical industry in Kenya, questionnaires were sent to 203 pharmaceutical companies in Nairobi County. 94 responded by sending back the questionnaires. This gave the study a response rate of 46% with the other 54% not responding either because they were not in a position to give their company information or could not answer in time for the study.

4.2.1 Descriptive Statistics

4.2.1.1Type of Pharmaceutical

Table 4.1: Type of pharmaceutical

		Frequency	Percent	Cumulative Percent
Valid	Manufacturer	2	2.1	2.1
	Wholesaler	10	10.6	12.8
	Retailer	82	87.2	100.0
	Total	94	100.0	

Source: Survey data, 2015

Table 4.1 indicates the type of pharmaceutical operation which the respondent was. The study results indicates that 87.2% (N=82) of the respondents were retailers, 10.6% (N=10) of the respondents were wholesalers, and only 2.1% (N=2) of the respondents

were manufacturers. This roughly reflects the ratio of the number of each category in the industry since the study used a stratified random sampling.

4.2.1.2 Duration of Operation

Table 4.2: Duration of Operation

	N	Minimum	Maximum	Mean	Std. Deviation
Duration of operation	94	8	36	21.01	8.484
Valid N (list wise)	94				

Source: Survey data, 2015

Table 4.2 indicates the duration of operation by the pharmaceutical industry respondents, with the response having a mean operation duration of 21.01 years, with the minimum period of operation provided being 8 years, and a maximum operation of 36 years. The table indicates that the standard deviation of pharmaceutical operations is 8.484 years.

4.2.1.3 Average Waiting Period of Delivery

Table 4.3: Average Waiting Period of Delivery

		Frequency	Percent	Cumulative Percent
Valid	Less than 1 day	89	94.7	94.7
	1day	5	5.3	100.0
	Total	94	100.0	

Source: Survey data, 2015

Table 4.3 indicates the average waiting period of delivery for the pharmaceuticals from suppliers. The table results show that 94.7% (N=89) of the respondents have an average waiting period of less than 1 day while only 5.3% (N=5) of the respondents stated that they have an average waiting period of supplies of one day. This shows that in overall it takes pharmaceuticals in Kenya a day or less to receive their supplies.

4.2.1.4 Average Delivery Period of Delivery

Table 4.4: Average Delivery Period of Delivery

		Frequency	Percent	Cumulative Percent
Valid	Less than 1 day	29	30.9	30.9
	1 day	64	68.1	98.9
	2 days	1	1.1	100.0
	Total	94	100.0	

Source: Survey data, 2015

Table 4.4 indicates the average delivery period of delivery for the pharmaceuticals to customers. The table results show that 30.9% (N=29) of the respondents have an average delivery period of less than 1 day, 68.1% (N=64) of them have an average delivery period of one day, while only 1.1% (N=1) of the respondents stated that they have an average delivery period of supplies to customers of two days.

4.2.1.5 Extent of Distribution Channel Efficiency

Table 4.5: Extent of Distribution Channel Efficiency

		Frequency	Percent	Cumulative Percent
Valid	Little Extent	3	3.2	3.2
	Moderate Extent	17	18.1	21.3
	Great Extent	74	78.7	100.0
	Total	94	100.0	

Source: Survey data, 2015

The extent of distribution channel efficiency is displayed in Table 4.5, with 78.7% (N=74) of the respondents indicating that in the pharmaceutical industry, technology has an effect on distribution channel efficiency to a great extent. The table also indicates that 18.1% (N=17) of the respondents stated that technology affected distribution channel efficiency to a moderate extent, while only 3.2% (N=3) of them stated that technology affected distribution channel efficiency to a little extent. The responses therefore indicates that technology affects distribution channel efficiency to a great extent as majority of the respondents (78.7%) stated that technology affects distribution channel efficiency to a great extent.

4.2.1.6 Acquisition and Distribution of Drugs Technologies

Table 4.6: Acquisition and Distribution of Drugs Technologies

		Responses		Percent of Cases
		N	Percent	
Technologies in Acquisition and Distribution of Drugs	Emailing	39	14.2%	41.5%
	E-payment	89	32.5%	94.7%
	Mobile Payment	61	22.3%	64.9%
	E-ordering	51	18.6%	54.3%
	Integrated Order System	34	12.4%	36.2%
Total		274	100.0%	291.5%

a. Dichotomy group as tabulated at value 1.

Source: Survey data, 2015

Table 4.6 above is a schedule of the technologies used in the acquisition and distribution of drugs in the pharmaceutical industry in Kenya. The respondents had an option to select more than one option and select all technologies that applied to their pharmaceutical company. The study results indicates that emailing is used in 14.2% (N=39) of the total responses and used by 41.5% of the respondents; e-payment is used in 32.5% (N=89) of the total responses and used by 94.7% of the respondents; mobile payment is used 22.3% (N=61) of the total responses and used by 64.9% of the respondents; e-ordering is used 18.6% (N=51) of the total responses and used by 54.3% of the respondents; and finally integrated order system is used in 12.4% (N=34) of the total responses and used by 36.2% of the respondents. This indicates that e-payment is the most common technology used in the acquisition and distribution of drugs by pharmaceuticals in Kenya.

4.2.1.7 Storage, Management and Tracking of Drugs Technologies

Table 4.7: Storage, Management and Tracking of Drugs Technologies

		Responses		Percent of Cases
		N	Percent	
Technologies in Storage, Management and Tracking of Drugs	Point of Sale	94	49.0%	100.0%
	Inventory Management System	85	44.3%	90.4%
	Warehouse Management System	11	5.7%	11.7%
	Transport Management System	2	1.0%	2.1%
Total		192	100.0%	204.3%

a. Dichotomy group tabulated at value 1.

Source: Survey data, 2015

Table 4.7 indicates the technologies used in the storage, management, and tracking of drugs in the pharmaceutical industry in Kenya. The respondents had an option to select more than one option and select all technologies that applied to their pharmaceutical company in the storage, management, and tracking of drugs. The study results indicates that point of sale is used in 49.0% (N=94) of the total responses and used by 100% of the respondents; inventory management system is used in 44.3% (N=85) of the total responses and used by 90.4% of the respondents; warehouse management system is used 5.7% (N=11) of the total responses and used by 11.7% of the respondents; and the transport management system is used in 1.0% (N=2) of the total responses and used by 2.1% of the respondents. The findings indicate that point of sale is used by all the respondents in the pharmaceutical industry and majority also used inventory management system.

4.2.1.8 Rate of Email Usage

Table 4.8: Rate of Email Usage

		Frequency	Percent	Cumulative Percent
Valid	Hardly	5	5.3	5.3
	Frequently	71	75.5	80.9
	Always	18	19.1	100.0
	Total	94	100.0	

Source: Survey data, 2015

Table 4.8 presents the frequencies of usage of email as a means of technology in the distribution channel of the pharmaceutical industry. The table indicates that 19.1% (N=18) of the respondents stated that they always use email, 75.5% (N=71) of them stated that they frequently use email, while 5.3% (N=5) hardly use email. This result is in line with that of technologies used in acquisition and distribution of drugs which indicated that 41.5% of the respondents use email but the extent of usage is what varies.

4.2.1.9 Rate of E-Ordering Usage

Table 4.9: Rate of E-Ordering Usage

		Frequency	Percent	Cumulative Percent
Valid	Never	7	7.4	7.4
	Hardly	16	17.0	24.5
	Frequently	59	62.8	87.2
	Always	12	12.8	100.0
	Total	94	100.0	

Source: Survey data, 2015

Table 4.9 presents the frequencies of rate of usage of e-ordering as a means of technology in the pharmaceutical industry supply channel. The table indicates that 12.8% (N=12) of the respondents stated that they always use e-ordering, 62.8% (N=59) of them stated that they frequently use e-ordering system, 17% (N=16) hardly use e-ordering system, while 7.4% (N=7) never use the e-ordering system. This indicates that e-ordering is used to a great extent since 85.6% of the respondents use e-ordering frequently or always.

4.2.1.10 Rate of E-Payment Usage

Table 4.10: Rate of E-Payment Usage

		Frequency	Percent	Cumulative Percent
Valid	Never	5	5.3	5.3
	Hardly	9	9.6	14.9
	Frequently	74	78.7	93.6
	Always	6	6.4	100.0
	Total	94	100.0	

Source: Survey data, 2015

Table 4.10 provides the frequencies of rate of-payment usage as a means of technology in the distribution channel of the pharmaceutical industry. The table indicates that 6.4% (N=6) of the respondents stated that they always use e-payment, 78.7% (N=74) of them stated that they frequently use e-payment system, 9.6% (N=9) hardly use e-payment system, while 5.3% (N=5) never use the e-payment system. This indicates that e-payment is used to a great extent since 85.1% of the respondents use e-payment frequently or always.

4.2.1.11 Rate of Integrated Order System Usage

Table 4.11: Rate of Integrated Order System Usage

		Frequency	Percent	Cumulative Percent
Valid	Never	12	12.8	12.8
	Hardly	40	42.5	55.3
	Frequently	41	43.6	98.9
	Always	1	1.1	100.0
	Total	94	100.0	

Source: Survey data, 2015

Table 4.11 provides the frequencies of rate of integrated order system usage as a means of technology in the pharmaceutical industry supply channel. The table indicates that only 1.1% (N=1) of the respondents stated that they always use the integrated order system, 43.6% (N=41) of them stated that they frequently use the integrated order system, 42.5% (N=40) of them hardly use the integrated order system, while 12.8% (N=12) never

use the integrated order system. This indicates that integrated order system is not greatly used by pharmaceuticals in Kenya since only 44.7% of the respondents use integrated order system frequently or always.

4.2.1.12 Extent of Point of Sale Usage

Table 4.12: Extent of Point of Sale Usage

		Frequency	Percent	Cumulative Percent
Valid	Frequently	14	14.9	14.9
	Always	80	85.1	100.0
	Total	94	100.0	

Source: Survey data, 2015

Table 4.12 provides the frequencies of extent of point of sale usage as a means of technology in the pharmaceutical industry supply channel. The table shows that 85.1% (N=80) of the respondents stated that they always use the point of sale system, and 14.9% (N=14) of them stated that they frequently use the point of sale system. This indicates that integrated order system is greatly utilized by pharmaceuticals in Kenya since all the respondents use integrated order system frequently or always.

4.2.1.13 Extent of Inventory Management System

Table 4.13: Extent of Inventory Management System

		Frequency	Percent	Cumulative Percent
Valid	Hardly	1	1.1	1.1
	Frequently	93	98.9	100.0
	Total	94	100.0	

Source: Survey data, 2015

Table 4.13 provides the frequencies of rate of inventory management system usage as a means of technology in the pharmaceutical industry supply channel. The table shows that only 98.9% (N=93) of the respondents stated that they frequently use the inventory management system, while 1.1% (N=1) of them stated that they hardly use the inventory management system. This shows that integrated order system is used by pharmaceuticals in Kenya to a great extent.

4.2.1.14 Extent of Radio Frequency (RFID) Usage

Table 4.14: Extent of Radio Frequency (RFID) Usage

		Frequency	Percent	Cumulative Percent
Valid	Never	93	98.9	98.9
	Frequently	1	1.1	100.0
	Total	94	100.0	

Source: Survey data, 2015

Table 4.14 highlights the extent of radio frequency (RFID) usage by the pharmaceutical industry in Kenya. The respondents indicates that 98.9% (N=93) of the respondents never use RFID technology in their distribution channel and only one respondent (1.1%) uses the RFID technology. This response shows that the RFID technology is still not used in the country despite its presence for many years. This may be due to its technical nature in operation that makes its usage low.

4.2.2 Impact of technology on distribution channel costs

Analysis of the impact of technology on distribution channel costs was carried out through descriptive and inferential statistics. The variables were scaled ordinary with values ranging from 1 which indicated low impact to a value of 5 which shows great impact. Responses were given on each variable question and the mean response together with the standard deviation provided in order to evaluate the impact of the statements.

4.2.2.1Technology on Distribution Channel Costs

Table 4.15: Technology on Distribution Channel Costs

	N	Mean	Std. Deviation
Decrease in cost of pharmaceutical product awareness (marketing).	94	2.99	.103
Decrease in cost of pharmaceutical product delivery.	94	3.92	.145
Decrease in cost of storage of pharmaceutical products.	94	3.99	.179
Decrease in distribution coordination costs.	94	3.96	.203
Decrease in cost of data collection and analysis.	94	3.19	.232
Mean		3.61	.172

Source: Survey data, 2015

Table 4.15 above indicates the effects of technology on distribution channel costs of the pharmaceutical industry in Nairobi, Kenya. From the responses, the results highlights that technology had an impact on distribution channel costs to a bigger extent, as illustrated by a mean of 3.61 and a standard deviation value of 0.172. Under distribution channel costs, technology had the greatest impact on the cost of storage of pharmaceutical products (3.99), distribution coordination costs (3.96), and pharmaceutical product delivery cost (3.92).

4.2.2.2 Technology on Service Delivery Efficiency

Table 4.16: Technology on Service Delivery Efficiency

	N	Mean	Std. Deviation
Decrease in average delivery period of drugs to customers.	94	4.01	.103
Reduction in average delivery period of drugs by suppliers.	94	4.21	.106
Better response to market changes.	94	3.00	.127
Better coordination and reduction in errors in the distribution process.	94	3.99	.103
Better analysis and insight of distribution channel and market.	94	3.98	.206
Increase in distribution cycles	94	3.02	.214
Mean		3.70	.143

Source: Survey data, 2015

Table 4.16 above indicates the effects of technology on distribution channel service delivery efficiency of the pharmaceutical industry in Nairobi, Kenya. From the responses, the results show that technology had a significant impact on distribution channel service delivery efficiency as indicated by a mean of 3.70 and a standard deviation of 0.143. Under distribution channel service delivery efficiency, technology had the greatest impact on the reduction in average delivery period of drugs by suppliers (4.21), followed by decrease in average delivery period of drugs to customers (4.01), and thirdly better coordination and reduction in errors in the distribution process (3.99).

4.2.2.3 Technology on Distribution Channel Growth

Table 4.17: Technology on Distribution Channel Growth

	N	Mean	Std. Deviation
Increase in number of new markets (market size).	94	3.96	.250
Increase in new pharmaceutical products launched.	94	3.95	.306
Increase in the number of types of market channels.	94	3.01	.179
Increase seen in customer loyalty.	94	4.00	.147
Increase in winning customers from competitors.	94	3.92	.269
Mean		3.77	.230

Source: Survey data, 2015

Table 4.17 above indicates the effects of technology on supply channel growth of the industry in Nairobi, Kenya. From the responses provided, the results indicated that technology had a significant impact on distribution channel service delivery as represented by a mean of 3.77and a standard deviation of 0.230. Under distribution channel growth, technology had the greatest impact on the increase in customer loyalty (4.00), followed by the increase in the number of new markets (3.96), and thirdly an increase in new pharmaceuticals launched (3.95).

4.2.2.4 Distribution Channel Improvement

Table 4.18: Distribution Channel Improvement

		Frequency	Percent	Cumulative Percent
Valid	No	72	76.7	76.6
	Yes	22	23.5	100.0
	Total	94	100.0	

Source: Survey data, 2015

Table 4.18 above show the responses on whether the distribution channel efficiency can be improved. From the table, 23.5% (N=22) of the respondents reveal that the distribution channel efficiency can be improved, while 76.7% (N=72) of the respondents stated that the distribution channel as it is now cannot be improved and it is operating optimally. Those who stated that the distribution channel can be improved indicated that their

organizations can introduce other technologies especially in the storage and management of drugs.

4.2.3 Pearson Correlation test

Pearson's correlation test was done to identify the existing relationship between the independent variable (technology) and the dependent variables (distribution channel costs, service delivery efficiency, and distribution channel growth).

Table 4.19: Pearson Correlation test

		Adoption of Technology	Distribution Channel Costs	Service Delivery Efficiency	Distribution Channel Growth
Pearson Correlation	Technology	1.000	-.425	.605	.445
	Distribution Channel Costs	-.425	1.000	.179	-.145
	Service Delivery Efficiency	.605	.179	1.000	.207
	Distribution Channel Growth	.445	-.145	.207	1.000
Sig. (1-tailed)	Technology	.	.001	.001	.005
	Distribution Channel Costs	.001	.	.047	.023
	Service Delivery Efficiency	.001	.047	.	.050
	Distribution Channel Growth	.005	.023	.050	.

Source: Survey data, 2015

Table 4.19 shows the correlation coefficient or an expression of the relationship that exists between the dependent variables (distribution channel costs, service delivery efficiency, and distribution channel growth) and the independent variables (technology). The study results denote a moderate inverse relationship existing between the independent variable, technology, and the dependent variable, distribution channel cost with a value of -0.425. This points out to an improvement in technology in the pharmaceutical distribution channel signals a decrease in distribution channel costs. The test results also indicated a significant positive relationship between technology as the

independent variable and service delivery efficiency with a value of 0.605. Lastly, the results reveal a moderate positive relationship between technology and distribution channel growth with a value of 0.445. The results imply that there are other factors that affect the distribution channel variables (distribution channel costs, service delivery efficiency, and distribution channel growth) apart from technology.

4.3 Discussion

The data analysed brought various aspects from both the descriptive statistics and inferential statistics. The descriptive statistics shows that pharmaceutical companies recognize that technology has an effect on distribution channel efficiency with 78.7% of the respondents having stated that it had an effect to a great extent. Also, the descriptive statistics indicates that the most commonly used acquisition and distribution technologies in pharmaceutical distribution channel were e-payment with 94.7% of the respondents stating that they use it, followed by mobile payments in which 64.9% of the respondents stating that they use, and e-ordering system in which 54.3% of the respondents stated that they use it. The most commonly used storage, management, and tracking technology used in the pharmaceutical distribution channel was point of sale with all respondents having stated that they use it, together with inventory management system which 90.4% of the respondents having indicated that they use it.

The study's first goal was to effectively determine the impact of technology adoption on cost of distribution channels of pharmaceutical industry on Nairobi, Kenya. The study results pointed out that technology had an impact on cost of distribution channels in the pharmaceutical industry in Nairobi, Kenya to a great extent with an overall mean of 3.61. From this, the cost of storage of pharmaceutical products was greatly impacted by technology with a mean of 3.99 which would be as a result of technological practices such as Just in Time (JIT) ordering hence lowering storage costs. The decrease in distribution and coordination costs were affected by technology with a mean of 3.96 which could have arisen due to better communication methods. Also, a decrease in cost of pharmaceutical product delivery was affected by technology to a great extent with a mean of 3.92 which would be as a result of efficient transport usage in product delivery. The Pearson correlation tests also confirmed a negative relationship between technology

and cost of distribution channel (-0.425) which shows that an increase in technology use reduces distribution channel costs. The results are consistent with that of Grackin (2010), and Ganesh and Zoher (2013) whose study found that the benefits of technology in the pharmaceutical distribution channel was not restricted to monetary aspects; technology adoption also led to better channel relationships, much lower attrition levels, as well as employee and channel satisfaction.

The study's second objective was to effectively determine the impact of technology adoption on the efficiency in service delivery of the distribution channels of pharmaceutical industry on Nairobi, Kenya. The study results show that technology impacted service delivery efficiency in the pharmaceutical industry in Nairobi to a great extent with a mean of 3.70. From the variable statements, reduction in the average delivery period by suppliers was the most affected by technology with a mean of 4.21 which could be as a result of better communication and efficient delivery methods.

Technology as the independent variable also had an effect on the average delivery period of drugs to customers with a mean of 4.01 which can also be attributed to better communication and efficient delivery methods. Better coordination and reduction in errors in the distribution cycle was affected to a great effect with a mean of 3.99 which could be attributed to efficient data storage and better data analysis. The Pearson's correlation test indicated a significant positive relationship between technology and distribution channel service delivery efficiency which meant that an increase in technology use improved service delivery efficiency.

The study's third and final objective was to determine the impact of technology adoption on distribution channel growth of pharmaceutical industry on Nairobi, Kenya. The study results show that technology had an impact on distribution channel growth in pharmaceutical distribution channel to a great extent with an overall mean of 3.77. Under the variable statements, technology has the greatest impact on customer loyalty with respondents stating that there is an increase in customer loyalty as a result of technology use (4.00). This could be as a result of better understanding of customers as a result of communication and feedback which has been made possible through technology. Technology also impacts penetration of new markets with results having a mean of 3.96.

This could be as a result of better market information gathering and easier market accessibility. Technology also had a significant impact on the increase in the new pharmaceutical products launched as denoted by a mean of 3.95 which could have also been due to better information gathering and market accessibility. Pearson's correlation tests indicated that technology had a moderate positive relationship with distribution channel growth (0.445) which meant that an increase in technology in the pharmaceutical distribution channel had a positive association with the channel growth.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This final chapter contains the study summary and conclusion with regards to the impact of technology adoption on the distribution channel of the pharmaceutical industry in Nairobi County, Kenya. The chapter looks at the study summary and presented the conclusion of the study based on the results of the analysis. The study's evident limitations of the study and its recommendations are also presented.

5.2 Summary

The pharmaceutical industry in Kenya has grown over the years with the emphasis on the importance of access to medicine by all citizens being a focal point to all stakeholders in the industry. Technologies which have been used in developed countries are gradually being adopted in the developing countries in a bid to improve efficiency in service delivery to consumers. This study finding identifies the gap and provides the direction to be taken on the study objective of determining the impact of technology adoption on distribution channel of pharmaceutical industries in Nairobi County, Kenya.

Specific formulated objectives determined the impact of technology adoption on the cost, efficiency in service delivery and growth of the distribution channel in pharmaceuticals in Nairobi County, Kenya.Literature and empirical reviews were done and formulated a conceptual framework that consisted of three dependent variables (distribution channel cost, service delivery efficiency, and distribution channel growth) and one dependent variable (technology adoption).

The study target population was the pharmaceutical manufacturers, wholesalers, and retailers in Nairobi County, Kenya which was 2,030 in number of which a stratified random sampling was taken for each type of pharmaceutical. A sample of 10% was taken and a total sample size of 203 pharmaceutical operators was selected in Nairobi. The respondents were given a structured questionnaire so as to provide relevant and information for this study. This data was analysed using the concept of descriptive

statistics (this comprised means and standard deviations) and inferential statistics (Pearson's correlation test).

From the study findings, it was established that technology adoption has an effect on the distribution channel efficiency to a great extent. The most commonly adopted technologies by the pharmaceutical industry are e-payment, mobile payment, e-ordering, point of sale, and inventory management system. The study also established that technology adoption has a significant effect on cost of distribution in the pharmaceutical industry in Nairobi County, with a mean of 3.61; technology has a significant effect on service delivery efficiency of pharmaceutical industry in Nairobi County, with a mean of 3.70; and also technology significantly impacted distribution channel growth, with a mean of 3.77 in Nairobi County.

Correlation tests done indicates that technology adoption had a negative correlation with the cost of distribution channel with a value of -0.425 which implies that there was a negative relationship between technology adoption and cost of distribution channel; with regards to service delivery efficiency, technology adoption had a positive correlation with service delivery efficiency with a value of 0.605 which implies that there is a positive relationship between technology adoption and service delivery efficiency; and finally, the test shows a moderate positive correlation between technology and distribution channel growth with a value of 0.445 which means that there is an association between technology adoption and distribution channel growth and expansion of the pharmaceutical industry in Nairobi, Kenya.

5.3 Conclusion

The study results are important in answering the research objectives, providing conclusions and formulating recommendations of the study to various stakeholders. The results enable conclusions to be made for each objective. The study's first objective was to effectively determine the effect of technology adoption on the cost of distribution channels of the pharmaceutical industry in Nairobi, Kenya. The findings of the study indicate that technology adoption had a great impact on the cost of distribution channel with both the mean and correlation test indicating a great impact and negative relationship respectively. The study therefore concluded that technology should be used

by pharmaceutical companies in Kenya and globally since the results indicated that technology has been able to reduce costs of pharmaceutical storage, distribution coordination costs, and pharmaceutical delivery process.

The study's second objective was to determine the effect of technology adoption on service delivery efficiency of distribution channels of pharmaceutical industry in Nairobi County, Kenya. The findings of the study point out that technology has a great impact on the efficiency in service delivery in the distribution channel with both the mean and correlation test indicating a great impact and positive relationship respectively. The study therefore concluded that pharmaceutical companies should accept technology since there is a reduction in average delivery period for drugs by suppliers to customers and better coordination and reduction in errors in the distribution cycle.

The study's third and final goal was to effectively determine the effect of technology adoption on the distribution channel growth of pharmaceutical industry in Nairobi County, Kenya. The findings of the study demonstrate that technology had a great effect on the distribution channel growth with both the mean and correlation test indicating a great impact and positive relationship respectively. The study therefore concludes that the distribution channel growth as a component of distribution channel can be improved by the use of technology by pharmaceutical companies. Technology adoption should therefore be implemented to increase customer loyalty, improvement in new market penetration, and also improvement in the launch of new pharmaceutical products.

5.4 Recommendations of the Study

For the policy, the study recommends that industry regulators and Government bodies such as KEMSA should come up with new guidelines with modern and effective processes of delivering drugs to patients in the country to improve accessibility and reduce drug shortages. Evaluations should utilize new technologies to identify which areas in the pharmaceutical distribution channel have bottlenecks and challenges, more so the rural areas where accessibility is not good.

For management, the study recommends that pharmaceutical companies that have not adopted technology in their sourcing and dispatch of drugs to invest in new technology. This will not only draw benefit in increased efficiency and costs reduction, but will

enhanced accessibility of essential drugs to people who need them. The study recommends that large pharmaceuticals operations should invest in additional technologies such as RFIDs, channel management software and in drone technology which can be used to deliver drugs to customers in remote areas of some countries.

5.5 Limitations of the study

In the course of carrying out the study, a few limitations were experienced but did not affect the quality of the research. One of the challenges experienced was the response time by the pharmaceutical companies. Some of the respondents took long to submit back the questionnaire prompting reminders. Due to the project timelines, the study had to work with the available 94 respondents.Another limitation which the study experienced was the analysis of the data. Since majority the data provided was ordinal and categorical in nature and others qualitative in nature, the output was not completely free of error as when it is in ratio scale. This limitation was mitigated by using scales of reasonable size so that the variation per class was not huge to affect the analysis output.

5.6 Suggestion for Further Research

From the study findings, one of the recommendations is for more similar research work in other counties outside Nairobi as this would provide a comparison and reinforcement or disapproval of this study's findings. Also other factors apart from technology may be analysed on how they affect distribution chain in the pharmaceutical industry. Finally, the impact of technology on distribution channel can be done in other industries other than the pharmaceutical industry to evaluate whether there is a similar impact as that for the pharmaceutical industry.

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QUESTIONNAIRE

The questions provided below form part of the research study which seeks to determine the impact of technology adoption on distribution channel of pharmaceutical industry in Nairobi, Kenya. Your participation will be highly appreciated and the information provided in the questionnaire will be confidential and purely for academic purpose.

PART I: GENERAL INFORMATION

	Response
Name of pharmaceutical company	☑
Type of pharmaceutical company	Manufacturer ☐ Distributor ☐ Retailer ☐
Duration of operation in Kenya	
What is the average waiting period for delivery from your suppliers from your ordering date?	
What is the average delivery period of orders from your buyers from their ordering date?	
What is the extent of efficiency of your organization's distribution channel?	Little Extent ☐ Moderate Extent ☐ Great Extent ☐

PART II: TECHNOLOGIES USED

	Response ☑
What technologies does your company use in the acquisition and distribution of drugs? (*Tick all that apply*)	E-mailing ☐ E-ordering ☐ E-payment ☐ Mobile payment ☐ Integrated order system ☐ Social media ☐ Other (State)_____
What technologies does your company use in storage, management and tracking of drugs? (*Tick all that apply*)	Point of sale ☐ Inventory management system ☐ Radio frequency (RFID) ☐ Transport management system ☐

	Warehouse management system ☐ Other (State)_____

Indicate the rate at which you use the following technologies in your organization:

	Never	Hardly	Frequently	Always
E-mailing	1	2	3	4
E-ordering	1	2	3	4
E-payment	1	2	3	4
Integrated Order System	1	2	3	4
Point of Sale	1	2	3	4
Inventory Management System	1	2	3	4
Radio Frequency (RFID)	1	2	3	4

PART III: IMPACT OF TECHNOLOGY ADOPTION

DISTRIBUTION CHANNEL COSTS

With a scale of 1 to 5 with **1= No Extent, 2= Little Extent, 3= Moderate Extent, 4= Great Extent and 5= Very Great Extent**, indicate to what extent technology adoption affects cost in a distribution channel:

	1	2	3	4	5
Decrease in cost of pharmaceutical product awareness (marketing).					
Decrease in cost of pharmaceutical product delivery.					
Decrease in cost of storage of pharmaceutical products.					
Decrease in distribution coordination costs.					
Decrease in cost of data collection and analysis.					

SERVICE DELIVERY EFFICIENCY

With a scale of 1 to 5 with **1= No Extent, 2= Little Extent, 3= Moderate Extent, 4= Great Extent and 5= Very Great Extent**, indicate to what extent technology adoption affects service delivery efficiency in a distribution channel:

	1	2	3	4	5
Decrease in average delivery period of drugs to customers.					
Reduction in average delivery period of drugs by suppliers.					
Better response to market changes.					
Better coordination and reduction in errors in the distribution process.					
Better analysis and insight of distribution channel and market.					
Increase in distribution cycles					

DISTRIBUTION CHANNEL GROWTH

With a scale of 1 to 5 with **1= No Extent, 2= Little Extent, 3= Moderate Extent, 4= Great Extent and 5= Very Great Extent**, indicate to what extent technology adoption affects growth of a distribution channel:

	1	2	3	4	5
Increase in number of new markets (market size).					
Increase in new pharmaceutical products launched.					
Increase in number of market channel types.					
Increase in customer loyalty.					
Increase in winning customers from competitors.					

Do you think your organization's distribution channel efficiency can be improved?

Yes ☐ No ☐

If yes, what would be done to improve your organization's distribution channel?

_____

_____