

**EFFECTS OF DIGITAL BANKING ON BANKING SECTOR PERFORMANCE IN
KENYA**

BY

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DECLARATION

This Project is my original work and has not been presented for a degree in any other University.

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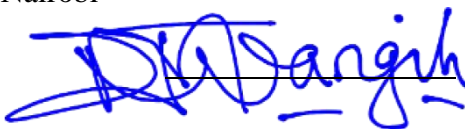
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LIST OF ABBREVIATIONS AND ACRONYMS

EQTA	Capital Ratio
FC	Facilitating Condition
FP	Financial Performance
IT	Initial Trust
PV	Perceived Value
SPSS	Statistical Package for Social Science
UK	The United Kingdom
USA	United States of America
API	Application Programming Integration

ABSTRACT

In the recent past the bank's financial performance has benefited when expenses are kept to a minimum through adoption of different financial innovations. Some of these financial innovations include digital banking which has helped banks to significantly cut on the high labour expenses by providing digital services that are oftenly automated. Therefore, the goal of the research is to establish how digital banking has affected Kenya's banking industry's performance. The study was founded on these theories; financial intermediation theory, innovation diffusion theory and modern economics theory. Financial performance of the banking sector was measured using the Return on Assets (ROA) of the banking sector while the components of digital banking discussed in this study included card transactions, mobile money transactions, ATM transactions and Agency transactions. The research was conducted using a descriptive research approach. The research data used in this study was secondary data obtained from the CBK bank supervisory reports, as well as revenue earned from ATMs and POS and electronic banking as well as the natural log of total assets for each bank. This was between the year 2011 to 2020 and on a quarterly basis. The results of the study revealed that the trend analysis of all the study variables analysed had an increasing trend. The correlations results also indicated that internet banking, mobile banking, Point of Sale (POS), ATM and total assets had a positive and significant relationship with ROA. The study also found that internet banking, mobile banking, Point of Sale (POS), ATM and total assets had a positive and significant effect on ROA. Therefore, The study came to the conclusion that the financial performance of Kenya's banking industry is positively and significantly impacted by digital banking. The study advocated that the management of banks should seek for innovate strategies to increase the efficiency of the different digital banking practices and ensure customer satisfaction. The study also recommended that the bank regulatory agencies should implement comprehensive digital banking regulations so as enable banks to invest more on digital banking and other financial innovations.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

The economy depends on banks for a variety of important reasons. The two most significant sources of liquidity are long-term loans and short-term deposits. In addition to this role, the market will have difficulty funding loans that are opaque. The amount of data that can be changed and processed as a result of the digital revolution has skyrocketed. Natural branch closures and acquisition of digital alternatives are not lucrative according to (Sibanda, 2020). According to (Sibanda, 2020) findings, the efficiency of IT service channels, bank branches closing result in revenue development prospects being lost along with the costs.

The financial intermediation theory and the diffusion of innovation theory will serve as the foundation for this study. Financial intermediation is the process by which financial organizations receive money from surplus units in exchange for lending to deficit units (Mutua, 2013). This theory will serve as a foundation for all of the variables in the study. The key role of the financial intermediary is to offer structured financial services. They insist that these financial commodities are developed where there are market imperfections. The internet and digital banking are two examples of recent technologies that the diffusion of innovation theory will seek to define and demonstrate (Clarke, 2018). The diffusion of innovation theory serves as a foundation for the first dependent variable that explains digital banking access.

Kenya's banking sector has likewise embraced automation in order to better serve its customers' more complicated needs and the globalization issue. Banks have had their work cut out for them as a result of the constitution and CBK's prudential standards being promulgated. Competition from domestic and foreign banks, some of which are new entrants to the nation, is on the increase. Because of the fierce rivalry in Kenya's financial sector, financial institutions are being forced to adopt innovative technologies in order to cut costs and improve revenues. It is possible for clients of a banking institution to carry out specific monetary operations using a personal device, such as a smartphone. (Carsten's 2018).

1.1.1. Digital Banking

By merging information, information technology, communications and connectivity technologies, Vial (2019), state that digital banking attempts to make an organization better by altering its structure. In accordance with Larson's (2019) definition of digital banking as a common terminology in the banking industry, electronic signatures, online trading platforms, digital storefronts, e-statements, and mobile payments are all covered. This type of banking as defined by Yip (2019), involves using a mobile phone to conduct electronic banking transactions. In other words, digital banking is the use of technology to replace the old banking model of going to the bank in person with more convenient options like using a cell phone.

Because of the dynamic nature of today's technological landscape, every sector of the economy must undergo a digital transformation. Both additional service channels and lower operational expenses are enabled by digital transformation, which decreases the number of physical locations and employees needed to run them (e-branch stores, POS) and allows them to use new electronic platforms and service points (e-banking, virtual banking) (Deng, 2019). In comparison to all other industries, the banking business invests three times as much in IT as any other, according to (Shin, 2019). There has been a lot of attention paid to business models in banking.

New technology, disruptive innovation and digitization are the main factors affecting conventional company models and operations. For this reason banks must modify their business operations to stay competitive and ready for the future while also changing how they connect with clients and manage their middle and back office activities (Cziesla, 2015). Customers' changing service expectations and technical advancements are driving elements in the financial sector's shift to digital banking (Carsten's 2018). On the technological supply side, APIs, cloud - based services, smartphones, virtual money, and blockchain network are all significant elements. As a result, APIs have facilitated enhancement of operations, like speeding up of transactions and the ability to unbundle services more easily. For so-called open banking applications, they have become the de facto standard for sharing data. Access by third parties to customer bank information is becoming important in the world of digital banking (with the customer's consent). They let consumers compare product and service alternatives in markets that have high price sensitivity by allowing software products to share information and features (OECD 2018).

After conducting an investigation to the impact of bank digitization on Kenyan commercial banks' profitability, researcher Ouma (2013) discovered that technological innovations, turnaround times, and ease of use in relation to bank digitalization influenced the financial excellence of the Kenya commercial banks, while many recorded high deposit amounts and increased loan values.

Electronic payment has had an effect on the profitability of commercial banks in Kenya, according to Njogu (2015). Commercial banks were able to quickly adopt electronic banking, which allowed them to become more omnipresent in flexibility, coverage, interactivity, and accessibility when compared to traditional banking channels like ATMs and branch banking. Digital banking has also allowed Kenya commercial banks to reduce transactional costs when banking by allowing banks to offer customers greater flexibility.

1.1.2 Financial Performance

Financial performance, according to Ouma (2020), is defined as a stable banking system where deposits are safe. Financial performance is measured by the acronym CAMELS (Capital adequacy, Asset quality, Management, Earning, Liquidity and Sensitivity analysis) this helps banking firms prove their capabilities finances.

In financial context, financial performance refers to how well a company's strategies and operations are being implemented (Business dictionary, 2015). It evaluates how effectively a business can generate profits using its main mode of operation (Swalih, 2020). Similar companies and sectors in the same industry can be compared using the measure of a company's total economic condition over a specific division of time. While there are numerous ways to gauge a company's financial health, they should all be seen as a whole. Total unit sales can also be used as a line item, as well as revenue, operating income, or cash flow from activities (Cho, 2019).

According to Mugembe (2008), exogenous variables that contribute to bank failure include liberalization, a lack of transparency among bank consumers, and standardization in bank operations. in Kenya, commercial banks' financial stability is bolstered by digital banking activity. Banks and financial institutions are increasingly relying on digital banking due to the fact that clients accept it, it lowers operational costs, and it has the potential to generate extra revenue. It's an ever-changing process. Digital banking solutions are specifically aimed at the rural and hard-to-reach population that earns but does not have a bank account.

Net profit after tax is a valuable metric for evaluating financial performance since it incorporates exact profit after the taxes and all expenses have been taken to account. An organization's return on assets (ROA) is calculated by dividing its net income (NIAT) by the total assets (Almagtari, 2019). Managerial efficiency is depicted by the ROA, which shows how well banks have managed their assets to generate profits over time. The performance of the banks improves as the ratio increases. It is thus, helpful to evaluate the profitability of different banks, as well as the performance of the broader commercial banking system (Enekwe, 2015). Dividing the total income after all the taxes by the equity capital as well as any capital reserves that may be held in the bank's account determines the bank's return on equity, or ROA (Vatavu, 2015).

1.1.3 Digitization and Performance of Banks

It is challenging for banks to offer its products to a wide variety of retail consumers due to the fact that the success of banks is heavily reliant on commercial and institutional banking operations (Haebazoka, 2018). The brick-and-mortar banking system was extremely expensive, thus digital banking emerged as a solution for banks to address this issue. Some banks have improved their performance despite the economic challenges, while others are still on the verge of collapsing due to the lack of innovation in the banking business, such as mobile and online banking. Because banks haven't fully embraced the digital banking system, this may be the case (Ouma, 2020).

There is a substantial link between mobile phone coverage, service types, prices, and company performance, according to Toroitich (2016). Profit-maximizing companies in markets with little competition provide fewer services but charge more for them. Bangladesh's digital banking study revealed that numerous currently unbanked people could benefit from low-cost digital bank accounts through mobile phone banking (Rayhan et al., 2012). Banking and advanced payment operations can also be done using a mobile phone at a low cost.

A study was conducted by Donner and Tellez (2008), on the link between financial growth and e-banking. According to the report, electronic banking systems might be a game-changing innovation for the growing world since they offer options to lower the cost of moving money around and give more people a chance to participate in established financial institutions.

1.1.4 Banks in Kenya

In the last five years, Kenyan banks have grown tremendously and now operate in East Africa. Profit increased to 147.4 billion in December 2016 before tax from Ksh. 89.5 billion in December 2011 in the banking sector (CBK annual report, 2015). CBK Economic Security Report states that banks' overall ratios of capital adequacy was 19% in December 2015, higher than the statutory threshold of 14.5% with an average liquidity ratio of 38.3%. (2015). Kenya's banking sector has likewise embraced automation in order to better serve its customers' more complicated needs and the globalization issue. In December 2015, customer deposits, the primary source of finances for banks, increased from Ksh 2,485.9 billion to Ksh 2,618.4 billion in December 2016 an increase of 5.3percent, according to CBK annual report (2016). As deposits were mobilized through mobile phone and agency banking channels, the economy grew. Client onboarding and system maintenance will be costly for Kenyan commercial banks if they want their digital banking platforms to run smoothly. Currently, commercial banks spend a significant amount of money on mobile technology in addition to salaries and benefits. When it comes to the rise in their operating costs, Kenya Commercial Bank has blamed their IT and investments in communications infrastructure, particularly for the Mobi Bank (Oduor, 2012).

1.2 Research Problem

It takes a lot of work to run a bank. When these processes fail, bad things begin to happen. Poor workflow management can lead to a variety of issues, such as missed chances for organizational efficiency, operational disruptions and other issues that hinder the best possible performance of a corporation. As a result, new business models and processes are needed (Kithaka, 2014). As a result, banks must adjust their corporate strategies to better serve their clients, manage their middle and back offices, and plan for the future by putting an emphasis on better procedures, processes, and product development that are focused on positive actions that are healthy, economically advantageous, socially advantageous, and environmentally friendly (Rajnak,2020).

Most banks' strategies and corporate goals now include a focus on decreasing costs and boosting competitiveness through the use of digital technology. Essentially, a bank's financial performance benefits when expenses are kept to a minimum (Kithaka, 2014). Most banks are overly concerned about high labor expenses; therefore it's a good thing digital banking may help reduce those costs. Businesses may benefit from bank digitization since it is a fantastic way to manage, enhance and

perfect the organization's operational procedures. There existed before a lackluster performance of Kenya's commercial banks in the recent several years. The average profitability of banks has been quite variable. In the third quarter of 2018, the net interest margin fell to 8.0 percent from 8.5 percent in the third quarter of 2017 (Cytonn, 2018). There was a 9.6 percent drop in pre-tax profit for the sector from 147.4 Billion Kenya Shilling in December 2016 to 133.2 Billion Kenya Shilling in December 2017. In the year 2017 June 30th profit before tax climbed from Kshs.69.4 billion to Kshs.76.2 billion, this is an increase of Ksh. 6.7 billion approximately 9.8% increase in the period of 30th June, 2018.

This is less than the 12.4 percent five-year average margin. income from unfunded sources grew by 5.9 percent less slowly than the 10.9% achieved in the third quarter in 2017. Currently, the banking industry's average net interest margin is 78.0%, down from an 8.5% level reported in the third quarter of 2017 (Cytonn, 2018). Corruption, unconventional policies, antiquated frameworks, disturbing models and technology, fresh commercial ventures, a clientele with constantly shifting demands, a failure to reach remote areas, systemic issues, fragmentation, fraudulent activity, and incompetent leadership have all been cited as factors in this decline in the industry. Bank digitization has the potential to help companies stay on top of their game and maintain their competitive edge. There is a lack of adoption of bank digitization in most banks, according to Eikebrokk, (2018). The cause for this lack of adoption is unclear.

Although it is widely acknowledged that financial innovation significantly affects banks' financial performance, many studies have neglected to look at all aspects of digital banking. Mutua (2012) research on the impact of mobile banking, for example, on the financial health of Kenyan commercial banks, only took to account monthly volumes and implementation costs. A research by Ngumi (2013), which was particularly concerned with the influence of cellphone and internet subscriptions on the economic results of Kenya commercial banks, he found out that these variables had a substantial influence. While examining the effect of digital payment on financial performance in Uganda's commercial banks, Mbilo (2012), concentrated on the adoption and improvement of banking service through mobile banking. It is obvious that one of the research mentioned above looked at the influence of bank digitization on Kenya's commercial banks' financial performance. How Kenya's banking system is performing in relation to digital banking?

1.3 Research Objective

The research looked at how digital banking has affected the banking sector's performance in Kenya.

1.4 Value of the study

The research findings were crucial for enhancing the theory by decreasing transaction costs and information asymmetries through digitalization. Financial intermediary theory depends on banks' surplus spending units depositing funds to the banks, which they loan to undersupplied units.

Managers of Kenya commercial banks will gain greatly from the results of the study, because they will be able to better grasp how profitability is affected by banking digitization and the predicted outcomes of digital banking adoption on their banks' prosperity.

Kenya's commercial banks have experienced a substantial performance hit as a result of banking digitization, and this study will help policymakers in the banking industry better understand the potential impact of banking digitalization. Future researchers and academics will benefit greatly from this research because it will serve as a foundation for new investigations and as a resource for research to electronic banking.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The segment comprised an assessment of the literature, including a conceptual model, theoretical analysis, empirical data, a critique of the study and the gap in knowledge that this study aims to address.

2.2 Theoretical Review

The concepts that outline the performance of the bank that underpin this study were discussed in depth. In adding value and improving performance the financial intermediation theory will be relevant. Modern economics and innovation diffusion theories will have critical effects on outlining the achievement of the bank.

2.2.1 Financial Intermediation Theory

Based on information asymmetry and the agency hypothesis, Gurley and Shaw in 1960 first proposed the financial intermediation theory. Excess units deposit money using financial organizations, which they later loan it to deficit spending units as part of a process known as financial intermediation (Mutua, 2013). This hypothesis serves as a fulcrum for all of the investigation's factors. Scholtens and Wensveen (2003), claim that producing specialized commercial commodities for clients is the principal duty of a commercial intermediary. They point out that these financial products are generated in areas where the market is not functioning properly. Financial commodities are formed anytime a mediator discovers that it can sell at a price that covers the relevant expenses of production, as well as the costs of avoiding other opportunities, they said.

Because they function as financial intermediates, Kenyan banks enlarge their network and obtain more affordable deposits using digitized technologies, hence, they are able to lend out at an increased rate in interest and increase their return on investment. In many marketplaces, buyers and sellers have different levels of information, which results in market imperfections. When it comes to financial markets, information asymmetries are substantial since borrowers have a better grasp of their assets, work ethic, and integrity than lenders do. Entrepreneurs conversely have access to confidential information about their own initiatives and the funds they need (Leland & Pyle, 1977).

2.2.2 Innovation Diffusion Theory

New inventions are spread across time using Rogers's theory, which was first proposed in 1962, (Liu & Li, 2009). According to Mahajan and Peterson (1985), members of the social system consider an innovation as any new idea, item, or prior that is disseminated through certain routes throughout time to other social systems. Internet and digital banking are two examples of new innovations that have been embraced and become successful because of diffusion of innovation hypothesis (Clarke, 1995). For the first dependent and independent variables relating to digital banking and e-banking services, this theory provides an anchor. As stated by Dillon and Morris (1996); Rogers (1983 & 2003), relative advantage, compatibility, trialability, observability and complexity are elements that influence the diffusion of an innovation. As a result, how a company interprets new innovations' relative importance, the compatibility, tangibility, complication, and observability will affect how quickly they are accepted. Further, he said that even though resistance to change may not impede the spread of innovation, it will slow it down.

When viewed via the Dubin framework, Rogers' (2003) theory of diffusion of innovation has some flaws (Lundblad & Jennifer, 2003). Organizations are commonly referred to as social systems even if teams and departments side an organization can also act as social systems. The impact of these limitations on the adoption of innovation in teams or departments within a larger organizational environment is not mentioned. As a result, the boundaries are not resolved when innovation expands across entities, such as among schools in a school district or clinics and hospitals in a health care delivery system (Lundblad & Jennifer, 2003). Although the theory starts to describe how an organization makes decisions regarding innovations, it does not address how an innovation's characteristics work together to impact its acquisition side organizations, or if organizations' structure, scale, or industry influences adoption (Ndungu, 2014). A decision-making process for individuals and organizations is detailed, but it is not documented how the factors interact when discoveries spread throughout the organization (Lundblad & Jennifer, 2003). Given other criteria like the availability of necessary equipment, a Kenyan firm will adopt mobile and internet banking if it sees their benefits. In firms having internet connection and IT departments, uptake of these innovations was quicker than in companies without IT divisions or access to the internet. This research benefitted from this idea since it explains why Kenyan banks are slow to adopt new technology.

2.2.3 Modern Economics Theory

Smith proposed the modern economic theory (1790). It is possible to obtain a better understanding of how various individual expectations and choices influence the creation of community and societal aspects including hyperinflation, national earnings, increases in productivity, stockpiles and also the values on different kinds of capital, social traditions, and ethnic standards using modern economic theory (Kithaka, 2013). It is particularly difficult to understand economic theory because of two issues (Solmil & Shanmugham, 2003). Emergent qualities, prior choices, learning, practice, custom, and expectations for the future all have an impact on a person's decision-making at any given time, in addition, only fast-moving variables are included in the emerging aspects and can be adequately addressed using existent economic theory. It is acknowledged that attitudes, culture, and institutional structures are affected by slowly emerging qualities, yet these properties are poorly absorbed. It has become easier for firms to penetrate vast networks without having to open a physical location.

A better banking experience is desired by individuals who wish to spend more time on other matters rather than going to a bank to do transactions. In response to demands and expectations of the banking clients and businesses alike, digital banking has evolved as a result. Modern economic theory explains how these wants lead to emergent characteristics. According to Tiwari, Buse, and Herstatt (2006), changes in deeper, slower structures appear gradually and almost covertly as a result of the realization of economic benefits from fast dynamics. These adjustments may ultimately lead to unexpected problems. There are certain difficulties, however, in that most modern economists are unable to appreciate the interconnections between fast and slow-moving emergent features. As a current technology, digital banking is easier to use and more effective for banks. This study will help us better understand how this may be achieved.

2.3 Determinants of Financial Performance

According to Yakubu (2016), the factors affecting a bank's revenue and costs usually determine its profitability. Variables from financial and on-financial statements have been grouped together in several research. For example, the bank's balance sheet and income statement are directly affected by these variables. For example the size, location, and number of branches that a bank has are all on-financial statement characteristics (Homamen, 2018).

2.3.1 Loan Quality

As previously stated, lending money to those in need is among the major responsibilities of banks. Commercial banks generate revenue in this manner. As a result, loans are one of the bank's most profitable assets. The more loans a bank offers, the more money and profit it generates; this is apparent (Gosavi,2018). However, banks must exercise caution when providing additional credit to clients because doing so increases their exposure to liquidity and default risks, both of which had an unfavourable effect on the banks' revenue and their ability to remain in business (Rasiah, 2010).

2.3.2 Amount of Deposits

For the purpose of funding the loans they make to consumers, banks rely largely on deposits from the public. Deposits are often believed to be the most cost-effective form of bank funding, and as a result, if demand for bank loans is high, deposits benefit banks' bottom lines. In other words, the commercial bank capacity to offer loans and generate profits grows directly in relation to the volume of deposits it can bring (Devinaga Rasiah, 2010). Banks, on the other hand, may lose money if they have a lot of deposits if the demand for their loans isn't high. According to Devinaga Rasiah (2010), it's because banks offer a high interest rate on fixed, time, or term deposits as a way to thank depositors.

Commercial banks' performance in Jordan was examined by Yakubu (2016), who found that ROA and liabilities were significantly correlated with total assets. According to the ratio of deposits to total assets, (Vong et al. 2009) illustrated how deposits' (DETA's) influence profitability.

2.3.3 Capital Ratio

Studies by Devinaga (2010) and Vong et al. (2009) on the factors that influence bank profitability and performance, took to account the capital requirement (EQTA or CTRA), which is another source of funds in addition to borrowings and deposits. They claimed that the capital system that comprises of shareholder assets and reserved profits has an impact on a bank's profitability. Capital or debt can be used to finance commercial banks' assets, according to the researchers who recorded this fact.

2.3.4 Liquidity

Liquidity assets are mandated by regulators for commercial banks, according to Devinaga Rasiah (2010). To prevent bank runs, the goal of this legislation is to ensure that commercial banks always have adequate cash on hand. A highly liquid bank is one that possesses ample cash and liquid assets, and has the capacity to quickly raise money from outside sources, to enable it to fulfill its financial commitments and responsibilities on schedule.

2.3.5 Taxation

Tax variable (TOPB) was described by Vong et al (2009), as taxes on pre-tax operational profit. While (Devinaga Rasiah, 2010), included it in the expense factors, this study regarded it as a separate variable. Despite of the way it is perceived, its effect on bank profits is disputable. According to Vong et al., who discovered a favorable correlation between the tax components and profitability, the bank may be able to pass on the expense of the tax to its clients by increasing fees and the interest rate gap. Additionally, they highlighted that studies by Jiang et al. (2003) Demirguc-Kunt & Huizinga (1999) and Bashir (2000) found that there is a link between profitability and the tax element.

2.4 Review of Related Studies

This section will examine digital banking's impact on Kenya's financial performance which will draw on previously completed research.

Elisa (2016) tended to discover the importance of internal factors in obtaining high profitability in the European banking sector by examined the correlation between bank-specific characteristics and profitability. Using an uneven panel dataset of 175 observations of 35 renowned European banks, a regression analysis was performed over the period 2009-2003. An extensive collection of internal features was explored using Bankscope's empirical data. According to regression results, bank profitability in Europe is strongly influenced by company size and capital ratio, while more loan loss provisions result in poorer profitability.

Taking a more thorough approach to the implementation of mobile banking, Mendley (2016), carried out a study to examine the previously untouched (behavioral, contextual, and technological) components of mobile banking acceptability. Data from university students were analyzed using CFA and SEM analysis. The results of the research show that task technology fit

(TTF) is facilitated by both task (TAC) and technology features (TEC). Initial trust (IT) was also found to be facilitated by familiarity with the bank and structural assurance (SA). The statistical analysis's findings also demonstrated a substantial correlation between the willingness to utilize mobile banking and factors such as enabling conditions (FC), initial trust (IT), and task technology fit (TTF).

Customers' impressions of online banking, consumer satisfaction, contentment, trust, and financial performance (FP) were examined by Mbama (2018). An in-depth survey of UK bank customers was used to gauge their opinions on the aforementioned topics, as were FP ratios extracted from bank financial reports and analyses of variance tests to test the reliability of the researchers' assumptions about the connections between the variables under consideration. Customer contentment and the value of the services offered by online banking were found to be strongly correlated, as well as employee-customer interaction, perceived usability, and perceived risk, according to the findings. Customer experience, contentment, and loyalty all have a huge impact on FP.

A study by Farah (2018), focused on consumers' intent and behavior in adopting mobile banking. The responses to a questionnaire from clients were scored on a five-point Likert scale. To gather information from a random sample of 490 people in Pakistan, researchers utilized a convenience sampling technique. Using AMOS or SPSS, the results of the Cronbach's, CMV, Harmon's single variable test, AVE, modeling, and correlation of structural equations were obtained. The majority of the intention predictors, including perceived quality, performance expectation, habit, social influence, effort expectation, hedonic incentive (apart from enabling situation), perceived risk, and trust, were shown to be positive and significant, from the research results. All of the variables that can be used to anticipate a user's behavior are significant.

According to a study by Afolabi (2018), e-banking has had a major effect on bank performance, profit, and e-banking difficulties. The SPSS software was used to do the hypothesis testing using the Pair Sample t-test method. The study found that e-banking has boosted both customer happiness and the Nigerian economy. in order to safeguard both the system's operators and the general public, the report suggests comprehensive e-banking regulation.

A study was conducted by gari (2014), to look at the effects of digital banking in Kenya's commercial banks' financial performance, the influence of digital banking on those same

institutions' financial performance, and the effect of agency payment on banks' profitability. A total of forty-four Kenya's banks participated in the research. For the years 2008-2012, the bank's secondary data was used. Simple ratio counts and graphs were employed, along with frequency charts to summarize and illustrate the analyzed data. Several banks have adopted new financial technologies in Kenya, including credit cards, mobile-banking, the internet as well as the employment of agents. The banks' financial performance was greatly impacted by the financial developments.

Gogo (2020) conducted a study to ascertain the influence on digital banking on monetary achievement of the listed in commercial banks of Kenya. In this study, a descriptive statistical analysis methodology was used. The target group for the study consisted of every employee of Kenya's commercial banks that are publicly listed. The study participants were selected using a simple random selection procedure. SPSS was employed to generate graphs, charts, descriptive statistics, and inferential statistics from the collected data. Bank earnings, operating costs, and consumer deposits were positively impacted by internet banking as a main finding of the study, Kenya's 42 commercial banks' financial performance as well as innovation were analyzed in a study by Chipeta (2018). This article describes branchless banking systems, a change from the conventional branch-based banking. The innovations mentioned include automated teller machines, online payment, mobile banking, and agency banking. To calculate the relationship linking economic innovations and bank efficiency, the Koyck distributed lag model was employed. According to the findings, economic developments have a significant influence on banks profitability, and firm-resolute factors are more important than industry-specific factors in defining the firm's current financial performance.

Kenyan commercial banks' financial performance has been studied by Cherotich (2015) to determine the impact of financial innovations. Secondary data was used in this investigation. There was no sampling because the populace was so little, so the research used a census approach. According to the study's findings, financial inventions and performance were closely related. Financial innovations was also found to have a favorable impact on financial results. Based on these outcomes, the study advised that financial innovation information should be available specifically to regulatory and advisory authorities for recommendations to the commercial banks on the need.

A study by Mutua (2013) was conducted to assess the influence of mobile banking on Kenyan commercial banks. In the research, descriptive research was employed. During the study period the mobile cash transactions in 2007, increased unremittingly from 0.06 billion to 118.08 billion by the last month of analysis. The service's convenience sparked the company's rapid expansion. A weakly positive correlation was established between Kenyan commercial banks' financial performance and mobile banking, though electronic payment and the performance of the Kenyan banking industry were examined in research by Aduda (2012).

An association between consumer debit card issuance, the number of ATMs, investments in e-banking and effectiveness as evaluated by asset return was the main focus of the research. The research utilized qualitative information. Our data came from yearly reports of the organizations we chose as well as the Kenya in Central Bank. (KBC). The study's analysis of data used both inferential and descriptive statistics. Electronic banking has significant and minor impact on ROA in Kenyan banks, according to the findings of the research. As a result, e-banking has been linked to improved bank performance.

2.5 Conceptual Framework

The link between the autonomous and onward factors was diagrammatically represented in a conceptual model. The term "digital banking" was used in the research to describe a combination of agency banking, telephone banking, and internet banking. Innovation diffusion theory suggests that digital advances in financial intermediation improve performance while the theory of financial intermediation suggests that acceptance of these innovations by varied users improves the accessibility of financial services. Digital financial innovations are impacting bank performance as well as customer access to financial services without relying on traditional banking infrastructure, as evidenced by numerous studies. Figure 2.1 presented the conceptual model for this study.

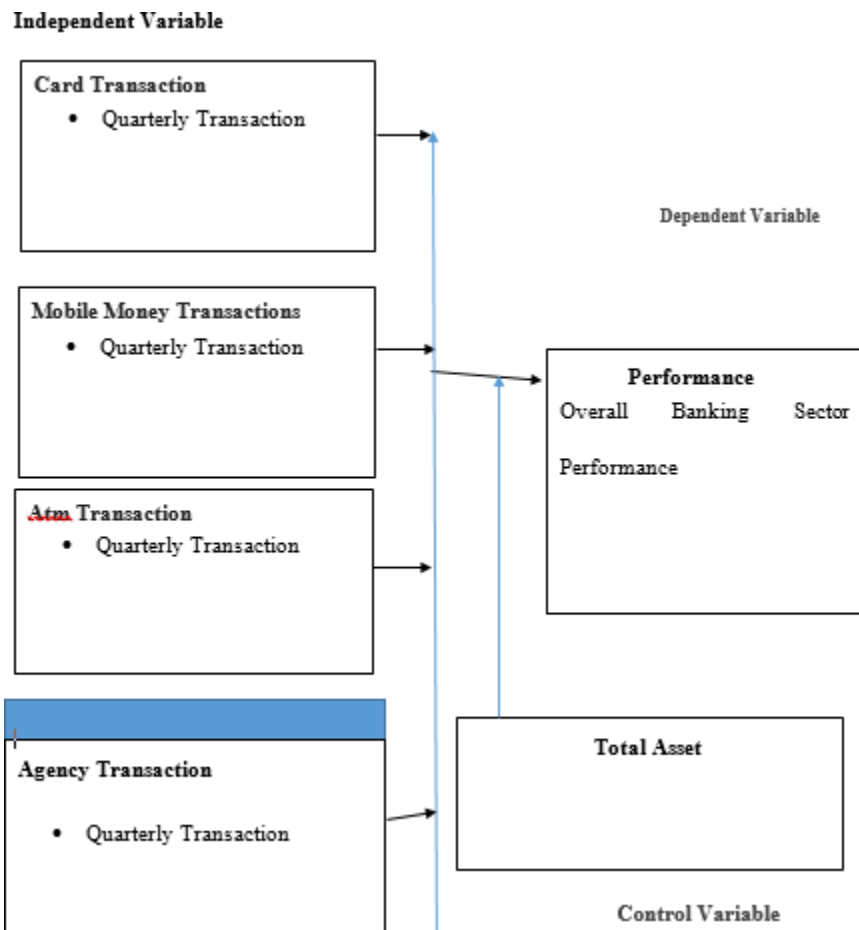


Figure 2.1: Conceptual Framework

2.6 Summary of Empirical Studies

These ideas have been thoroughly examined in this chapter so as to better understand the study's variables. intermediation in finance is mostly thought of as a process by which specialized financial products are created and marketed. Financial commodities are generated when there is a market imperfection, according to the authors.

If a concept, product or behavior that is new to social system members is defined as an innovation. Diffusion of innovation s, in accordance with the theory of innovation instrumentation, the technique by which an innovation emerges gradually through individuals within a social system. A new technology's adoption and success in banks are tended to be explained and described using the innovation diffusion theory. When it comes to the personal banking experience, modern

Economic theory shows that people can spend more time doing other things instead of going to the bank to transact business. That's especially true now that loans are so readily available.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The overview of this section is that it looked at the population that was used in the study, it also looked at the extracted sample size from the population, the best research design to use and the data analysis procedures that helped the research arrive at the desired results.

3.2 Research Design

A descriptive research design was used in this investigation. By observing current occurrences and then digging back through the available data, descriptive study design research suggests possible correlations between variables. The easiest way to identify if two variables are related or not is to use this study strategy. This will be proven by the use of sufficient data and information to examine the causal relationship. Digital banking in Kenya and the empirical research that aids in answering the research question are the primary focus of this study.

3.3 Data Collection

Using data collection sheets, the researcher gathered secondary data from the Central Bank of Kenya. Secondary data on bank profitability and digital banking was collected from the period between 2011 to 2020. It also took into account data on bank's total assets, ATM, POS, and electronic banking revenue which was obtained from the yearly CBK supervisory reports.

3.4 Diagnostic Tests

This test examined the association of the dependent and explanatory variables. The dependent variable's link to the independent variables was demonstrated mathematically. Regression models were used in this case. Assumptions underlie any regression model, and it is these assumptions that might lead to accurate results. The regression model had the following underlying assumptions.

3.4.1 Linearity Test

According to Hair et al., (2010) when two variables vary in relation to one another, they are said to be linearly connected. The linearity of each dependent variable was examined using the Pearson's Product Moment of Correlation (PPMC) Coefficient. The objective of this test is to evaluate how strongly the variables are related linearly.

3.4.2 Heteroscedasticity Test

Heteroscedasticity is a significant issue when applying regression analysis, including analysis of variance, because it can completely undermine statistical tests of significance that rely on the assumption that the modeling errors are uniform and uncorrelated, and that their variances do not change with the effects being modeled. When heteroscedasticity exists, the ordinary least squares estimator is still unbiased, but inefficient because of the underestimated variance and covariance. A similar assumption is made by certain standard tests when looking for variations among sub-populations via a geographical assessment. Heteroscedasticity is defined as a collection of dependent random variables (or heteroskedastic). Any statistical measure of dispersion, such as the variance, could be used to measure "variability." As a result, heteroscedasticity is defined as the absence of homoscedasticity. Heteroscedasticity is referred to as an unobserved heterogeneity of the second order, as a result of its impact on the assumptions for the second moment of errors (Oludhe, 2016).

3.4.3 Multi Collinearity Test

According to Leech et al. (2011), multicollinearity, also known as collinearity, is the circumstance in which one predictor variable in a multiple regression model may be linearly forecasted with a substantial level of accuracy from the other predictor variables. The estimations of the multiple regression coefficients may be significantly impacted by even minor changes in the model or data. Multicollinearity simply impacts the computations for parameter estimates; it does not reduce the model's predictive capacity or reliability, at least not in the sample data set. As a result, a multiple regression model with collinear predictors can reveal how well the complete set of predictor variables predicts the outcome variable, but it might not produce conclusive results about any one predictor or about which predictors are redundant in comparison to others. According to William et al. (2013), multi-collinearity is the presence of multiple correlations between dependent variables. In this study, multi-collinearity was assessed using the variance inflation factor (VIF) and tolerance thresholds.

3.4.4 Autocorrelation

Arranged in time autocorrelation is the correlation between members Hair et al., (2010), it was used to reduce the effective sample size as it complicates the statistical tests applications.

3.4.5 Normality

Assumption: The continuous variable's values are regularly distributed around the mean, that is, the distribution is normal. A smooth curve is commonly used to depict this. The entire under-curve probability is almost equal to one (Thereon et al., 2007). In order to assess the dependent variables' normality, we shall employ mathematical methods, such as Scenes and Kurtosis. The Kolmogorov-Smirnov test was adopted to verify the normality of the distribution, which is referred to as kurtosis.

3.5 Empirical Model

A multiple regression model in time series was utilized to analyze the data using SPSS Version 22. The model was used to analyze the effect of digital banking on banking sector performance in Kenya and was presented as follows;

$$Y_t = \beta_0 + \beta_1 X_t + \beta_2 Z_t + \epsilon_t \text{-----(1)}$$

Where;

Y_t represents ROA_t, return on assets for all commercial banks in the calendar year t

β_0 is the intercept

β_1 and β_2 represents the co-efficient of X_t and Z_t

X_t represents B_t , the internet banking, as determined by the bank's on-funded income to total internet banking revenue ratio

Z_t represents the other determinants of commercial bank profitability. They will include;

POS_t to represent the point of sale, as determined by the bank's on-funded revenue to point of sale revenue ratio.

ATM_t is the automatic teller machine, which was evaluated by comparing the bank's total on-funded revenue to the income generated by ATMs.

MB_t is the mobile banking which was measured by the ratio of total non-funded revenue for the bank over revenue generated from mobile banking.

LOGTA_t is the bank size which was measured using the natural log of total assets for bank in year t

ϵ_t represent the error term.

Therefore; this will mean that;

$$ROA_t = \beta_0 + \beta_1 B\ IT + \beta_2 POS\ IT + \beta_3 ATM\ IT + \beta_4 MB\ IT + \beta_5 LOGTAt + \epsilon_t \text{ ----- (2)}$$

The significance of the regression model was assessed using 95% confidence interval and 5% level of significance.

3.6 Test of Significance

At 95% confidence level and 5% level of significance the analysis of variance (ANOVA) was used to test the study model of significance.

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND INTERPRETATION

4.1: Introduction

This chapter presented the research results that were discovered through the analysis of secondary data that was gathered from the Central Bank of Kenya between 2011 to 2020. The findings were conveyed using tables, charts and graphs since they offer a clear perspective of the study's outcomes and are simple to read. The results were also organized according to topics that mirrored the objective of the study.

4.2: Descriptive Statistics

The descriptive findings in table 4.1 showed the total mean, standard deviation, minimum and standard deviation of the study variables between the year 2011 to 2020. These results revealed that the mean of point of sale (POS) of the banking sector in Kenya was Ksh 8872.13 billion with a standard deviation of Ksh 3353.59B. The maximum value of POS was Ksh 17048.33B while the minimum value was Ksh 4228B.

The findings of the descriptive statistics also indicated that the mean of mobile banking was Ksh 252.59B and the standard deviation was Ksh 108.46B. The maximum value of mobile banking reported was Ksh 553.8B while the minimum value reported was Ksh 80.26B. In addition, the mean of internet banking was Ksh 2259.09B with a standard deviation of Ksh 400.26B. The maximum value recorded was Ksh 3007.71B while the minimum value recorded was Ksh 1571.08B.

Further, the study also found that the mean of ATM transactions was Ksh 401.86B with a standard deviation of Ksh 100.70B. The maximum value reported was 663.47B while the minimum value reported was 217.91B. The study outcome also noted that the mean of total assets was Ksh 3567.66B with a standard deviation of Ksh 1080.52B. The maximum value recorded was Ksh 5571.67B while the minimum value was Ksh 1928.67B.

Moreover, the mean value of the ROA was 0.1202 with a Std dev of 0.02626. The greatest value recorded was 0.1542 while the smallest value was 0.0504.

Table 4.1: Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
POS Machines (Value in Ksh billions)	40	4228.0000	17048.3333	8872.125000	3353.5858121
Mobile banking (Value Ksh billions)	40	80.2553	553.8000	252.593204	108.4614676
Internet banking (Value in Ksh billions)	40	1571.0767	3007.712	2259.0899	400.260
ATM transactions (Value in billions)	40	217.9058	663.4733	401.8611	100.7006
Total Assets (Value in billions)	40	1928.6667	5571.6667	3567.660687	1080.5162483
ROA	40	.0504	.1542	.120194	.0262586
Valid N (listwise)	40				

4.3: Trend Analysis

This section analyzed the demographic characteristics/summary statistics for the banking sector in Kenya in the period between 2011 to 2020 on a quarterly basis using the trend analysis. The outcome in figure 4.2 unveiled that the mean POS ratio in 2011 was 0.87% followed by 0.93% in 2012 then it increased to 1.15% in 2013. In 2014, the mean ratio increased steadily to 1.95% and then rapidly increased to 6.28% in 2015 and 8.23% in 2016. From 2017 to 2020, the mean POS ratio had an almost constant increase of 8.43%, 8.71%, 8.94% and 9.15% respectively.

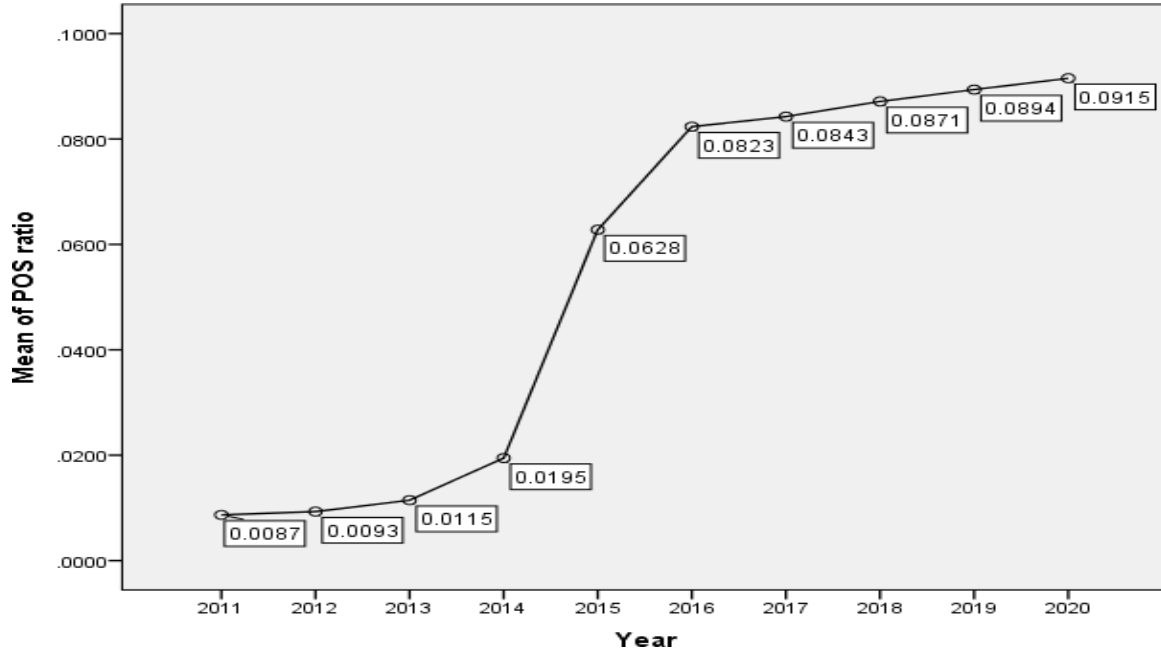


Figure 4.2: POS Ratio between Year 2011 to 2020

The trend analysis findings in figure 4.3 also noted that the mean of the mobile banking ratio in 2011 was 2.98% which increased to 3.44% and 3.65% in 2012 and 2013 respectively. As from 2014 to 2019 the mean of mobile banking ratio increased gradually from 3.81% in 2014 to 4.05% in 2015 to 4.48% in 2016, 5.03% in 2017, 5.76% in 2018 and 6.4% in 2019, then the mean increased rapidly to 8.41% in 2020.

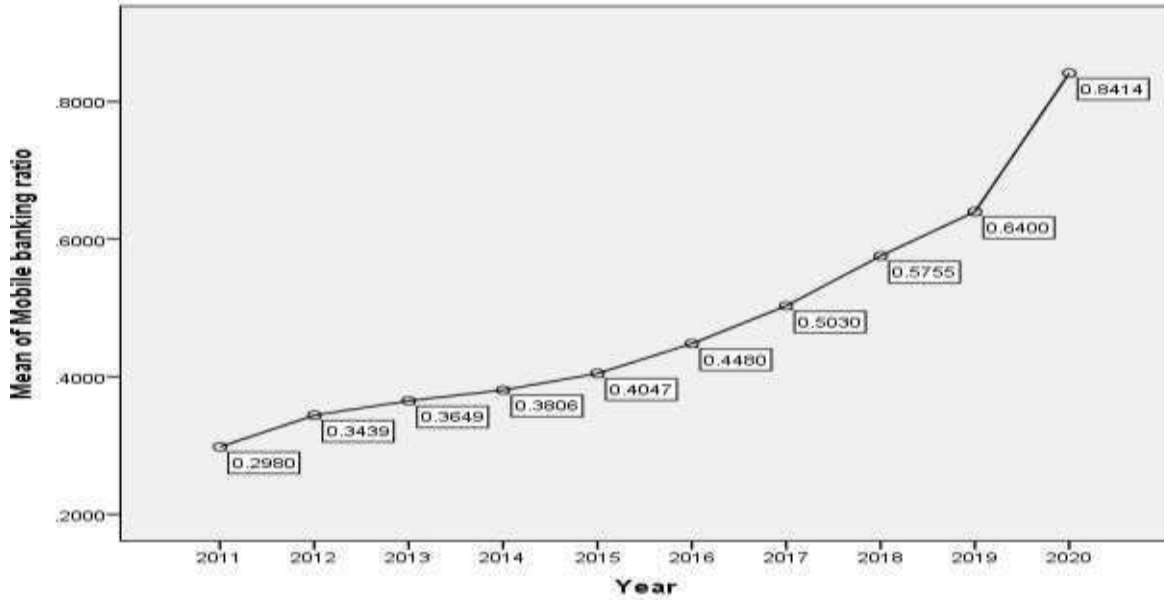


Figure 4.3: Mean of the Mobile Banking Ratio between Year 2011 to 2020

In addition, the results in figure 4.4 also found that the mean of the internet banking ratio experienced a gradual increasing trend between 2011 to 2020 where in 2011 the mean was 3.52% followed by 3.81% in 2012, 3.89% in 2013, 4.16% in 2014, 4.28% in 2015, 4.35% in 2016, 4.65% in 2017, 5.07% in 2018, 5.68% in 2019 and lastly 6.74% in 2020.

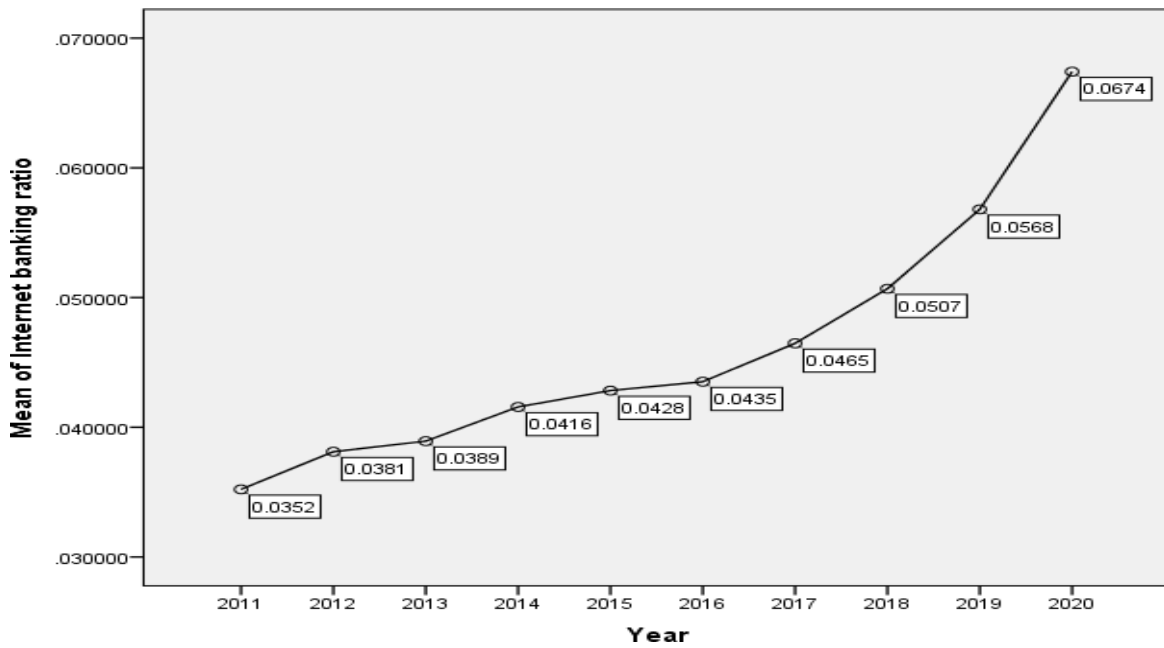


Figure 4.4: Mean of Internet banking ratio between year 2011 to 2020

On the other hand, the trend of the mean of ATM ratio as observed in figure 4.5 increased steadily throughout the entire period between 2011 to 2020 with a substantial difference between years. In 2011, the mean was 0.23% which later increased to 0.26% in 2012 to 0.28% in 2013 to 0.31% in 2014, 0.34% in 2015, 0.37% in 2016, 0.43% in 2017, 0.49% in 2018, 0.53% in 2019 and 0.57% in 2020.

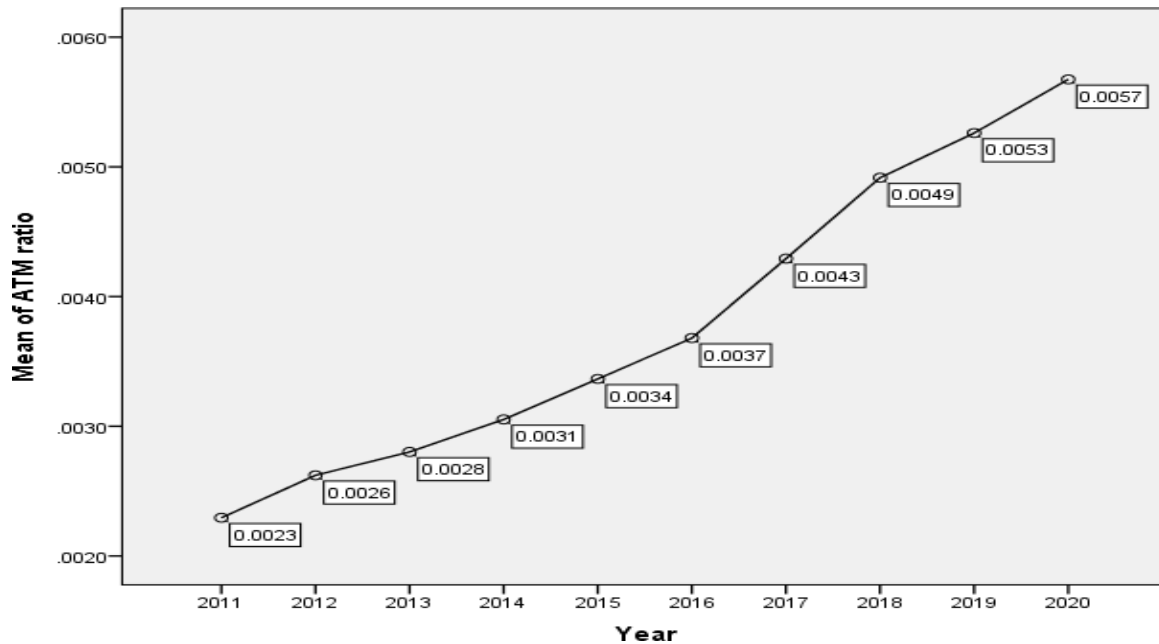


Figure 4.5: Mean of ATM ratio between year 2011 to 2020

Moreover, the mean of the natural log of total assets in figure 4.6 increased gradually with a slight difference between the years 2011 to 2020. In 2011 the mean recorded was 7.6015 which increased to 7.7325 in 2012, 7.8754 in 2013, 8.0387 in 2014, 8.1107 in 2015, 8.1947 in 2016, 8.3 in 2017, 8.3996 in 2018, 8.487 in 2019 and 8.5952 in 2020.

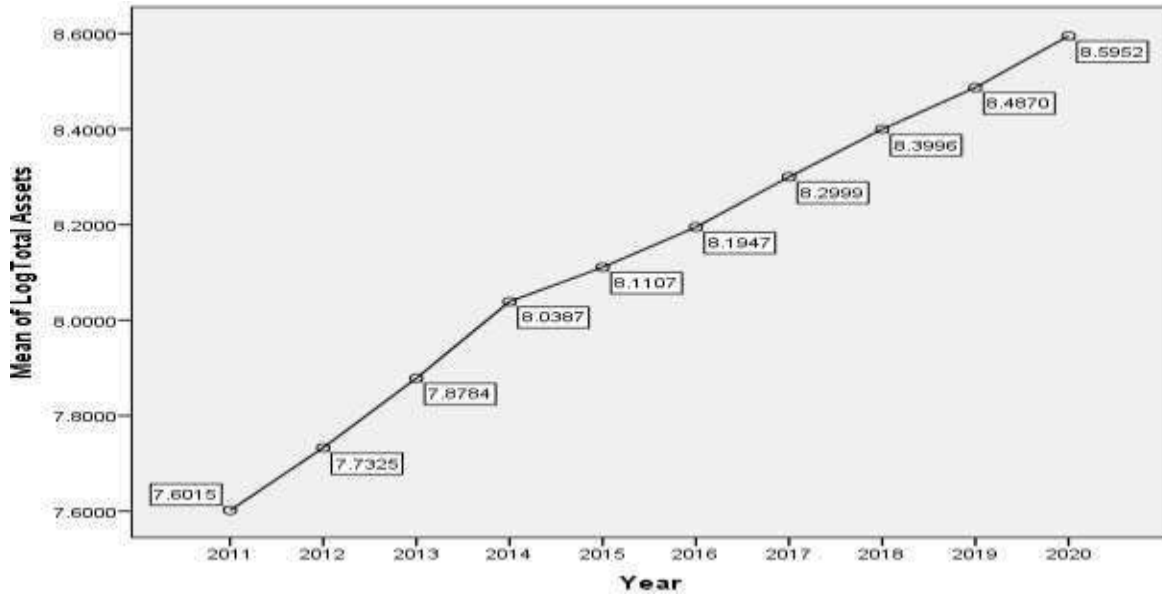


Figure 4.6: Mean of Ln Total Assets between year 2011 to 2020

Further, the trend analysis in figure 4.7 noted that the mean of ROA began by increasing rapidly from 5.33% to 10.82% in 2011 and 2012 respectively then a gradual increase was noted from 2013 to 2020. The mean of ROA in 2013 was 11.09% which increased to 11.42% in 2014 to 12.23% in 2015, 13.12% in 2016, 13.38% in 2017, 13.69% in 2018, 13.91% in 2019 then it shot to 15.22% in 2020.

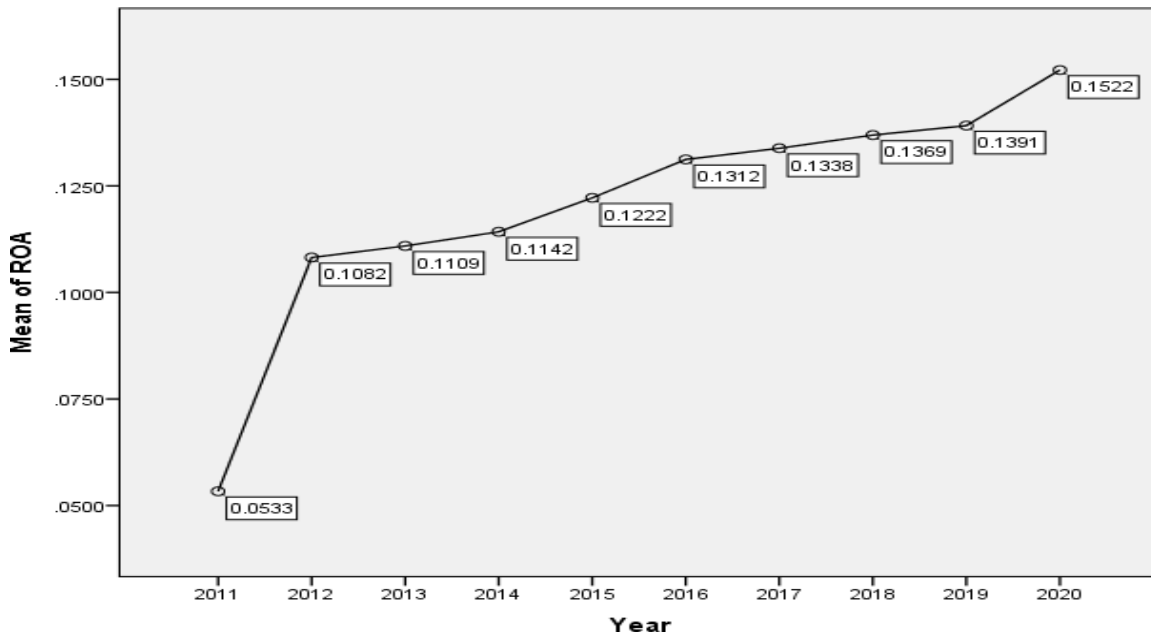


Figure 4.7: Mean of ROA between year 2011 to 2020

4.4: Inferential Statistics

The findings of the correlation and regression analyses were provided in this section. The correlation analysis that was carried out to ascertain the link between the independent and dependent variables research was first presented.

4.4.1 Correlation Analysis

The results of the correlation analysis were presented in table 4.2.

Table 4.2: Correlation Analysis

		Correlations					
		POS Machines	Mobile banking	Internet banking	ATM	Ln Total Assets	ROA
POS machines	Pearson Correlation	1	.753**	.755**	.879**	.908**	.785**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	40	40	40	40	40	40
Mobile banking	Pearson Correlation	.753**	1	.981**	.937**	.886**	.752**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	40	40	40	40	40	40
Internet banking	Pearson Correlation	.755**	.981**	1	.948**	.904**	.765**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	40	40	40	40	40	40
ATM	Pearson Correlation	.879**	.937**	.948**	1	.967**	.821**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	40	40	40	40	40	40
Ln Total Assets	Pearson Correlation	.908**	.886**	.904**	.967**	1	.898**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	40	40	40	40	40	40
ROA	Pearson Correlation	.785**	.752**	.765**	.821**	.898**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	

N	40	40	40	40	40	40
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** . Correlation is substantial at the 0.01 level (2-tailed).

The outcome of this analysis revealed that the POS had a favorable and substantial association with ROA ($r = 0.785, p= 0.000$) while mobile banking had a favorable and substantial association with ROA ($r = 0.752, p= 0.000$). Furthermore, internet banking and ROA were found to be favorably and substantially correlated to each other ($r = 0.765, p= 0.000$) and a similar case it was noted that ATM had a favorable and substantial association with ROA ($r = 0.821, p=0.000$). The Ln of total assets was also found to be favorably and substantially correlated to each other ($r = 0.898, p=0.000$).

4.4.2: Regression Analysis

The regression analysis was then carried out to assess whether digital banking (POS, mobile banking, internet banking and ATM transactions) had a statistically substantial effect on the ROA of the banking sector in Kenya. According to the regression analysis results shown in Table 4.3, the coefficient of determination (R squared) was 0.848. This meant that 84.8% of the variations in ROA were accounted for by the independent variables (mobile banking, POS, ATM, and internet banking) and the control variable total assets, while 15.2% of the variations in ROA were caused by other variables not included in the model.

Table 4.3: Coefficient of Determination

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.921 ^a	.848	.826	.0109474

a. Predictors: (Constant), Ln Total Assets, Mobile banking, POS ratio, ATM, Internet banking

The regression coefficients of the multiple regression model employed in this investigation, along with the corresponding p-values and t-statistics, were provided in table 4.4. Regression study results showed that POS has a favorable and substantial impact on ROA. These findings were supported by the regression coefficient of 0.150 and the p-value of 0.000 which was less than the

critical p-value of 0.05. This suggests that an increment of one unit in POS transactions will result in an escalation of 0.150 units in ROA.

On the other hand, mobile banking was found to have a favorable and substantial effect on ROA since the regression coefficient for mobile banking was 0.044 and its p-value was 0.000, which was also below the cutoff p-value 0.05. Thus, a unit rise in mobile banking transactions will result in a 0.044-unit boost in ROA. The results of the study also revealed that internet banking had a favorable and substantial effect on ROA. This is according to its reported regression coefficient of 0.880 and the p-value of 0.000. This suggests that a unit increment in online banking will cause a 0.880-unit boost in ROA.

Similarly, the ATM transactions were also found to have a favorable and substantial effect on ROA. This was backed by the regression coefficient of 1.604 and the corresponding p-value of 0.000. This means that a unit increase in ATM transactions will lead to a rise in ROA by 1.604 units. Further, the Ln of total assets was used in the study as a control variable and was also found to have a favorable and substantial effect on ROA. This is according to the regression coefficient of 0.151 and the p-value of 0.000.

Table 4.4: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.015	.018		5.593	.000
POS ratio	.150	.013	.209	11.195	.000
Mobile banking ratio	.044	.006	.277	7.851	.000
Internet banking ratio	.880	.114	.319	7.703	.000
ATM ratio	1.604	.090	.699	17.771	.000
Ln Total Assets	.151	.026	1.807	5.902	.000

Therefore;

$$ROA = 1.015 + 0.880 IB_t + 0.150 POS_t + 1.604 ATM_t + 0.044 MB_t + 0.151 LOGTAt$$

4.4.3: Analysis of Variance (ANOVA)

The findings from table 4.5 showed that the entire regression model was statistically substantial and the independent variables (internet banking, mobile banking, ATM and POS) were reliable indicators of ROA. This was confirmed by the reported F-statistics of 38.076 that was lower than the F critical (tabulated) and the p-value of 0.000 i.e. ($p < 0.05$).

Table 4.5: Analysis of Variance

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.023	5	.005	38.076	.000 ^b
	Residual	.004	34	.000		
	Total	.027	39			

a. Dependent Variable: ROA

b. Predictors: (Constant), Ln Total Assets, Mobile banking ratio, POS ratio, ATM ratio, Internet banking ratio

4.5: Interpretation of the Study Findings

The trend analysis of all the variables were observed to have an increasing trend which was either gradually, steadily or rapidly increasing between the selected years 2011 to 2020. This means that the revenue generated from the digital banking practices and its financial performance where in this case study we look at the ROA have been increasing from 2011 to 2020.

The study outcome also unveiled that POS had a favorable and substantial association with ROA ($r = 0.785$, $p=0.000$) and it also had a favorable and substantial effect on ROA ($\beta=0.150$, $p=0.000$). These findings could also be linked to those in a study by Cherotich (2015) who noted that financial innovations have a favorable impact on financial results. Based on these outcomes, the study advised that financial innovation information should be available specifically to regulatory and advisory authorities for recommendations to the commercial banks on the need. Chipeta (2018) study also affirmed that financial innovations such as use of credit cards, internet banking and employment of agents have a substantial influence on banks profitability and firm's performance.

Further, mobile banking had a favorable and substantial association with ROA ($r = 0.752$, $p=0.000$) and was also found to have a favorable and substantial effect on ROA ($\beta=0.044$, $p=0.000$). These findings were similar to those of Mbama (2018) who noted that there is a strong association between customer satisfaction and the intensity of the service provided by mobile banking, as well as employee-customer interaction, perceived usability, and perceived risk. In return, good customer experience, contentment, and loyalty were established to have huge effect on fiscal performance. In addition, the study by Mutua (2013) also discovered a weakly favorable correlation between Kenyan commercial banks' fiscal performance and mobile banking.

Furthermore, internet banking had a strong favorable and substantial association ($r = 0.765$, $p=0.000$) and the regression results also noted that internet banking had a favorable and substantial effect on ROA ($\beta=0.880$, $p=0.000$). Similarly, a study by Afolabi (2018) also noted that e-banking had a substantial impact on bank performance and profits. It has also boosted both customer happiness and the Nigerian economy. Thus, to safeguard both the system's operators and the general public, the study recommended comprehensive e-banking regulation.

Additionally, the study by Ngari (2014) which investigated on the effects of digital banking in Kenya's commercial banks' financial performance and the impact of internet banking on those same institutions' financial performance, also revealed that several banks have adopted new financial technologies in Kenya, including credit cards, mobile-banking, the internet as well as the employment of agents. These financial developments have had a great impact the banks' financial performance.

Moreover, the relationship between ATM and ROA was relatively strong favorable and substantial association with ROA ($r = 0.821$, $p=0.000$) and was also observed to have a favorable and substantial effect on ROA ($\beta=1.604$, $p=0.000$). This findings were in disagreement with those of a study by Aduda (2012) which examined the association between consumer debit card issuance, the number of ATMs, investments in e-banking and effectiveness as evaluated by asset return was the major concern of the research. According to the assessment, the proportion of ATMs and the use of electronic banking had substantial but not major impacts on the assets returned by commercial banks.

Lastly, total assets and ROA were found to be favorably and substantially correlated ($r = 0.898$, $p=0.000$) and its effect on ROA was observed to be favorable and substantial ($\beta=0.151$, $p=0.000$). The study by Yakubu (2016) confirmed these findings by indicating that the ROA and liabilities of commercial banks in Jordan were substantially correlated with total assets.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1: Introduction

This chapter covered the overview of the major outcomes obtained in chapter four, conclusions and the recommendations of the study which are drawn from the summarized study results. The chapter also addresses the study's limitations and offers ideas for future research topics.

5.2: Summary of Findings

The study's goal was to determine how digital banking has affected Kenya's banking industry's financial performance. The growing desire of Kenyan banks to minimize high labor costs through bank digitalization, which is an excellent technique to control, develop, and raise efficiency of the organization's operational procedures, served as the impetus for this study.

The results of the trend analysis for the mean of POS ratio revealed that the lowest mean (0.87%) reported was in 2011 while the highest mean (9.15%) was reported in 2020. The trend increased steadily between year 2011 to 2014 then rapidly increased from 2015 to 2020. The findings of the trend analysis for the mean of mobile banking ratio indicated that the lowest mean (2.98%) was in 2011 whereas the highest mean (8.41%) recorded was in 2020. The trend increased gradually from 2011 to 2019 then rapidly increased from 2019 to 2020. The findings of the trend analysis also noted that the mean of internet banking ratio was lowest in 2011 (3.52%) while the highest mean was recorded in 2020 (6.74%). In this case, the trend increased gradually throughout the years 2011 to 2020.

Moreover, the trend analysis for the mean of ATM ratio revealed that the lowest mean (0.23%) was recorded in 2011 while the highest mean was recorded in 2020 in (0.57%). Similarly, the trend increased steadily throughout the entire period between 2011 to 2020 with a significant difference. The trend analysis for the mean of Ln total assets also indicated that the lowest mean (7.6015) was reported in 2011 and the highest mean (8.5952) was reported in 2020. The trend also increased gradually with a slight difference between the years 2011 to 2020. Further, the trend analysis for the mean of ROA noted that the lowest mean (5.33%) was recorded in 2011 whereas the highest mean (15.22%) was recorded in 2020. The trend was observed to increase rapidly between 2011 and 2012 then increased gradually between 2013 to 2020.

While the regression results showed that POS had a favorable and substantial impact on ROA ($r=0.044$, $p=0.000$), the inferential results, which included the correlation results, showed that POS had a favorable and substantial association with ROA ($r = 0.785$, $p=0.000$). The correlation results likewise showed a favorable and substantial relationship between mobile banking and ROA ($r = 0.752$, $p=0.000$), while the regression results showed a favorable and substantial relationship between mobile banking and ROA ($r=0.044$, $p=0.000$).

Additionally, the correlation results revealed a favorable and substantial correlation between internet banking and ROA ($r = 0.765$, $p=0.000$), and the regression results demonstrated a favorable and substantial impact of online banking on ROA ($r=0.880$, $p=0.000$). Additionally, the results showed that ATM transactions had a favorable and substantial correlation with ROA ($r = 0.821$, $p=0.000$), and that ATM had a favorable and substantial impact on ROA ($r=1.604$, $p=0.000$) in the regression results. In contrast, total assets and ROA were discovered to have a favorable and substantial correlation ($r = 0.898$, $p=0.000$), as well as a favorable and substantial impact on ROA ($r=0.151$, $p=0.000$).

5.3: Conclusion

The study came to a conclusion that the trend analysis of all the study variables in the period between 2011 to 2020 reported an increasing trend. This means that the banking sector have adopted the different digital banking practices so as to reduce labour costs and improve their customer experience and in return, its performance has increased as shown by the increasing trend in ROA.

The study also revealed that ROA and utilization of ATMs, point of sale terminals, online banking, and mobile banking are favorably and substantially correlated. The study came to the further conclusion that POS, mobile banking, internet banking, and ATM all significantly and favorably affect ROA. The study came to the realization that digital banking has a favorable and substantial implication on the fiscal productivity of Kenya's banking system. This suggests that when the banking industry works harder to enhance the customer experience, streamline operational processes, and lower labor costs, these efforts will also transfer into better financial performance, particularly in the ROA of the banks.

5.4: Recommendations for Policy and Practice

The study advised bank management to look for innovative strategies to increase the efficiency of the different digital banking practices and ensure customer satisfaction.

The management of banks should also expand and develop better organizational structures that will accommodate the rapid growth of the different financial innovations.

The study also recommended that the bank regulatory agencies should implement comprehensive digital banking regulations so as to enable banks invest more on digital banking and other financial innovations.

Information regarding bank digitization should be made available to both the regulatory authorities and employees so as to sensitize on its importance and significant impact on bank's profitability.

5.5: Limitations of the study

The CBK's supervision summaries were the only source of supplementary information considered in this investigation. Therefore, the researcher relied on the data provided by CBK and it is not clear whether the data provided was in any way exposed to biasness.

The data collected was similarly restricted to a time period of between 2011 to 2020 (10 years), however, in case the research consider a longer time period perhaps the trends yielded would provide better results with significant variations.

5.6: Areas of Further Studies

The study suggested that additional research be done on metrics for fiscal performance other than ROA. This includes; Return on Equity, net profits, Return on Investment etc. On the other hand, since the independent variables of this study did not explain 100% of the variations in ROA, further studies should investigate on the other factors that may explain the remaining 15.2% of the variations in ROA. Other researchers may conduct further studies on a comparative analysis between the digital banking practices adopted and fiscal efficiency between commercial banks and microfinance banks in Kenya, so as to determine the extent difference of adoption in bank digitization.

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APPENDICES

Appendix I: Data Collection sheet

	Name of the Bank						
			Revue Generated From				
		ROA	Internet Banking	Point of Sale	ATM	Mobile Banking	Total Assets
2011	Quarterly						
2011	Quarterly						
2011	Quarterly						
2011	Quarterly						
2012	Quarterly						
2012	Quarterly						
2012	Quarterly						
2012	Quarterly						
2013	Quarterly						
2013	Quarterly						
2013	Quarterly						
2013	Quarterly						
2014	Quarterly						
2014	Quarterly						
2014	Quarterly						
2014	Quarterly						
2015	Quarterly						
2015	Quarterly						
2015	Quarterly						

2015	Quarterly						
2016	Quarterly						
2016	Quarterly						
2016	Quarterly						
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2017	Quarterly						
2018	Quarterly						
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2018	Quarterly						
2018	Quarterly						
2019	Quarterly						
2019	Quarterly						
2019	Quarterly						
2019	Quarterly						
2020	Quarterly						
2020	Quarterly						
2020	Quarterly						
2020	Quarterly						

Appendix II: Descriptive Data (2011-2020)

Quarter	POS Machines (billions)	Mobile banking (Ksh billions)	Internet banking (Ksh Millions)	ATM (billions)	Total Assets (billions)	ROA
2011Q1	4329	80.25533	1605987	39689.8	1928.667	0.0504
2011Q2	4298.667	91.0346	2212177	31465.34	1968.667	0.05333 3
2011Q3	5950.333	105.2498	1913700	37541.12	2026.667	0.05433 3
2011Q4	6929.667	113.177	1652557	33648.61	2084.333	0.0553
2012Q1	7593.333	118.948	1571077	28811.43	2224.333	0.10660 9
2012Q2	8071.333	123.261	1621499	31101.96	2246.667	0.108
2012Q3	10275.33	130.45	1758504	33816.83	2289.777	0.1086
2012Q4	11184	142.2767	1693114	37223.95	2367.667	0.1096
2013Q1	12318.33	139.4083	1729964	21790.78	2525.333	0.11036 7
2013Q2	8953	151.293	1896657	37356.61	2591	0.1107
2013Q3	6690	165.43	1984733	39540.23	2646.5	0.1109
2013Q4	6778.667	177.6683	1930209	41493.39	2784	0.11160 6
2014Q1	6775	181.3233	1940110	44448.01	2915.333	0.11293 3
2014Q2	4228	191.5687	2169819	33594.4	3062	0.11403 3
2014Q3	4866	194.9108	2331289	27965.61	3076.448	0.11372 5
2014Q4	5216	213.0217	2156780	26969.61	3226.667	0.11539 2
2015Q1	4899	216.836	2204768	26968.11	3247.667	0.12056 7
2015Q2	5500.667	223.9397	2480691	33554.43	3282.667	0.12139 7
2015Q3	6272	244.8413	2936861	35732.93	3343.333	0.1228
2015Q4	6900.333	253.0827	2239285	38171.9	3449.333	0.124
2016Q1	6964	257.714	2286248	38558.33	3495.88	0.13043 3
2016Q2	7173	272.911	2147009	38855.33	3574	0.13095 6
2016Q3	7842	287.7127	2163263	38105.93	3661.647	0.1314
2016Q4	8613.667	300.0307	2365465	39966.84	3761.667	0.13206 7
2017Q1	7976.667	299.684	2333776	38774.63	3883.667	0.13263 3
2017Q2	8448.667	304.2247	2385023	39694.07	3964.58	0.13376
2017Q3	8212	298.717	2469334	38930.7	4090.333	0.13416 7
2017Q4	8950.667	310.199	2526121	40864.1	4161.667	0.13476 7
2018Q1	9346.333	320.3153	2209428	39456.37	4276.667	0.13599 1
2018Q2	9904.667	319.88	2442892	40446.83	4441.197	0.13668 9

2018Q3	10761	336.309	2459666	38476.67	4501	0.13723 3
2018Q4	11006.33	351.619	2685401	43223.33	4568.667	0.13776 7
2019Q1	13230.33	354.8523	2430815	54639.33	4721.333	0.1382
2019Q2	13348	357.1057	2512846	61245	4821.467	0.13883 3
2019Q3	15458.67	366.9327	2893292	56154	4908.667	0.1395
2019Q4	17048.33	369.6973	3002966	62364.67	4958.333	0.14003 3
2020Q1	15071.67	362.2973	2767524	55187.75	5235.333	0.15023 3
2020Q2	9683.333	352.511	2412884	39108.67	5378.267	0.15116 7
2020Q3	12610	469.2393	3007712	56159.67	5443.333	0.15309 9
2020Q4	15207	553.8	2832152	66347.33	5571.667	0.15423 3