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**Digital Lending and Technical Efficiency of Commercial Banks in  
Kenya**



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## Digital Lending and Technical Efficiency of Commercial Banks in Kenya

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### Abstract

**Purpose:** The financial sector is being revolutionized as a direct result of technological progress, with banks and other financial institutions embracing new technologies to better serve their customers online. Technological developments in the financial sector are simplifying access to financial services. The study set out to dissect the effects of Fintech on Kenya's commercial banking sector. The general objective was to establish the effect of digital lending on technical efficiency of commercial banks in Kenya. The study was anchored on Theory of Financial Intermediation.

**Methodology:** The entire study relied on collecting empirical data and evaluating hypothesis in a positivist way. A causal-comparative research design was used in this research. The study targeted population of Seventeen Kenyan commercial banks from the first and second tiers. The analysis relied on secondary sources of information. The gathered quantitative data was analyzed using both descriptive and inferential statistics. Numbers, medians, and standard deviations were used to characterize the data, and frequency distributions were used to determine the sample size. Models for analyzing correlations and regressions are inferential statistics. STATA was used for the data analysis.

**Findings:** The study established that digital lending has a positive and significant effect on technical efficiency of commercial banks in Kenya.

**Unique contributions to theory, practice and policy:** The results suggests that conventional banks might benefit from forming partnerships with FinTech firms that specialize in digital lending.

**Key Words:** *Digital Lending, Technical Efficiency and Commercial Banks*

## Background to the Study

Technology is slowly but surely reshaping the financial industry (Hurni, Palmié, & Miehé, 2020). Financial institutions are increasingly relying on financial technology (FinTech) platforms in an effort to provide customers with cutting-edge products and services. Traditional financial institutions, especially banks, are threatened by the rise of FinTech, which has been attributed to technological digitalization (Gerlach & Lutz, 2021). As a result of technological advancements, the financial sector has seen dramatic changes in service delivery, making previously inaccessible services readily available to consumers (Chanias, Myers, & Hess, 2019).

Fiat currency is being replaced by digital currency, traditional banks are being replaced by digital payment systems. Constant advancements are slowly but surely altering the financial industry (Risman, Mulyana, Silvatika, & Sulaeman, 2021). New digital trends are largely responsible for the dramatic rise in demand for FinTech services (Abbasi & Weigand, 2017), as well as for the radical transformation of financial institutions that has accompanied it (Beloke & AP, 2021; Khanboubi, Boulmakoul & Tabaa, 2019). While the incorporation of technology into banking is nothing new, the rapid expansion of Fintech over the past decade has caught the attention of many. Over the next decade, technology developments and shifting consumer tastes are expected to significantly alter bank operations (Koch & Siering, 2017). Because of this, the way services and products are sold, as well as customer interactions and satisfaction, may need to be rethought. Sub-Saharan Africa has made great strides in financial development over the past two decades, but fintech has the ability to speed up and enhance those advances (Thaker, 2019). Fintech's most notable impact has been the improvement of banking sector efficiency through the elimination of informational inequalities. Through financial intermediation and the most efficient allocation of financial resources, economic growth is facilitated by an efficient banking sector (KBA, 2021).

Technology employed in the back offices of banks and other financial institutions is known as "FinTech" (Chauhan, Akhtar, & Gupta, 2022). The meaning of the term has evolved greatly since then. There are now a variety of consumer-facing applications that it supports. Numerous programs have been affected by FinTech for banking, and the way in which customers gain access to their financial information has been completely transformed (Suryawati & Nurdana, 2021). It has far-reaching implications, affecting everything from mobile payment applications to the financial and insurance industries. FinTech's far-reaching effects are both an opportunity and a danger for legacy of financial institutions like banks (Achugamonu, 2020). Customers in today's digital era are less interested in using services offered by the conventional financial services sector in favor of those that are both convenient and secure (Gerlach & Lutz, 2021). Perhaps this is why FinTech is gaining traction and shaking up the banking and financial services industries. Banks and other financial institutions have been quick to embrace FinTech finance technology in response to its increasing popularity and the growing number of services it enables, such as online banking, mobile banking, and mobile payments.

Financial technology companies, or fintechs, provide numerous technological services with the goals of improving efficiency, speed, and ease. According to experts, the payments industry is the most developed part of the financial technology sector as a whole (Douglas & Janos, 2020). The financial services industry has seen the effects of fintech on several fronts. By streamlining processes, proposing algorithms to aid in decision making, and using AI to oversee investment portfolios, it has helped digital financial services for customers (Bagudu, Khan, & Roslan, 2017). It has also influenced the banking sector through innovations such as the ability to keep track of one's finances and the speed with which transactions can be completed due to circulation ledger technological advances, the use of digital currencies, and mobile lending to customers (KPMG, 2020).

### **Technical Efficiency of Commercial banks**

Efficiency is a relative phrase that can be determined by contrasting the actual ratio of outputs to inputs with the optimal ratio (Fried, Lovell, & Schmidt, 2008). Selecting the input set from the optimal input set is a measure of technical efficiency (Tutulmaz, 2014). It's the capacity to select an input mix that minimizes costs, given a range of relative input prices and a set of feasible technologies (Onour & Abdalla, 2010). To be allocatively efficient, a decision-making unit must use a combination of inputs that results in the lowest possible cost, and vice versa. Conversely, if increasing output necessitates decreasing another output or increasing another input, then the production is not technically efficient. One key indicator of a bank's success is the effectiveness with which it uses its resources (Vu & Turnell, 2010). An efficient bank, rather than increasing its worth to shareholders through the abuse of its dominant position in the market, could do it through more ethical means. The likelihood of failure is diminished by a banking industry that is stable, profitable, and efficient. To assess the influence of Fintech on Kenya's banking industry, The study used Data Envelopment Assessment (DEA) on Kenyan banks' technical efficiency. The DEA model was used to derive expected efficiency scores for technical effectiveness (TE), pure technical effectiveness (PTE), and scale effectiveness (SE). Banks have more sway over inputs to the DEA model's input-orientation and intermediation dimension. Reducing inputs as much as feasible while maintaining output levels is the goal of input-orientation (Banker, Charnes, & Cooper, 1984).

### **Statement of the Problem**

The technical efficiency of financial institutions has played a significant role in promoting access financial services as well as financial soundness of the commercial banks which is an integral component of the financial system (Kamau, 2011; Nasieku, 2014). However the evolution of digital lending has increased competition in the banking industry, thus creating a considerable interest in its efficiency. Given that there is increase in competition in the industry, there has been considerable interest in their efficiency. Despite the growth in digital technology between 2020 to 2021, technical efficiency still indicates stagnation only increasing marginally from 0.735 to 0.756%, thus fintech has failed to make significant contribution to growth in efficiency of commercial banks. This reflects ongoing disparities in

Fintech use across numerous groups, including age, education, sex, income, employment, and the rural-urban divide (CBK, 2021). Furthermore, concerns about safety continue to be raised about Fintech's widespread adoption. The protection of users' personal and financial information is the primary concern for any Fintech (KBA, 2021). Many researchers have examined Fintech and the technical efficacy of the financial sector. Ntwiga's (2020) research examined the impact of fintech on technical efficiency in Kenya's banking industry and found a positive correlation. Data Envelopment Analysis was utilized to quantify the impact of Fintech and technical efficiency in the banking sector, whereas the previous study measured technical efficiency before and after the introduction of Fintech. Despite the theoretical link between fintech and technical efficiency the nature of this relationship in context of the Kenyan banking industry still remains an issue of empirical investigation and therefore the motivation of the current study. Several studies have been conducted on Fintech and technical efficiency in the financial market.

The study by Alemu (2016) evaluated the technical efficiency of commercial banks in Ethiopia and established an insignificant relationship. However, the study did not expound on Fintech thus creating a research gap. Thalassinos and Le (2022) study on Fintech transformation on performance of banks and found that the digital transformation has a positive impact on the performance of commercial banks. Noteworthy the banking industry context in Ethiopia is significantly different from the Kenyan banking industry. However, the study adopted performance while the current study adopted a technical efficiency thus creating a conceptual gap. Ngalyuka (2021) study on relationship between Fintech utilization and fraud losses in banks in Kenya found that Fintech had led to a significant increase in fraud. The study focused on administrative issues from Fintech in commercial banks thus creating a contextual gap. The study by Ntwiga (2020) assessed technical efficiency in the Sacco's with the influence of fintech and established a positive relationship, whereas the study used Sacco's and Pre-Post Fintech period to measure the technical efficiency while the current study used commercial banks and a Data Envelopment Analysis technique to estimate the effect of Fintech and efficiency in the banking sector. This study therefore sought to bridge the gap by establishing the effect of digital lending applications and technical efficiency of Kenya commercial banks in Kenya.

### **Research Hypothesis**

**H<sub>01</sub>**; Digital loan applications do not correlate with commercial banks' technical efficiency in Kenya.

### **Theoretical Review**

#### **Theory of Financial Intermediation**

Gurley and Shaw (1960) proposed a theory of financial intermediation. According to the hypothesis, middlemen help lower prices and even out knowledge gaps. There would be inefficient resource allocation and reallocation without financial intermediaries and financial markets. Both the agency theory and the notion of informational asymmetry constitute the

foundation of the theory of financial intermediation. High transaction costs, insufficient information at the appropriate moment, and the approach to regulation all contribute to the need for financial intermediaries. Particular transactions and the associated costs are the direct result of informational inequalities in the market (Havrylchyk & Verdier, 2018). With the use of Fintech, financial intermediaries can engage heavily in screening, auditing, and debtor monitoring processes, mitigating the risks of adverse selection and ethical risk. However, faults in the market are caused by knowledge asymmetry between the surplus and deficit portions of the economy, which contradicts the hypothesis of perfect market. In contrast to the data asymmetry approach, this one is consistent with the notion of perfect markets in terms of transaction costs. It relies on variations in the technology employed by various market participants. Here, middlemen are tasked with working together to cut down on transaction costs by taking use of economies of scale and symbiotic relationships in the market (Bethune, Sultanum, & Trachter, 2019).

Banks and other financial institutions have been forced to cooperate together in order to survive the ongoing disruption of the financial markets brought on by the development of FinTech companies due to the availability of asymmetrical information. To keep up with the times and maintain their competitive edge in the modern technology landscape, they have incorporated some of the FinTech technologies. Credit risks, like default risk, can be mitigated if investors have easier access to market data, which will lower the costs associated with adverse selection and moral hazard. As a result, the financial industry will be more profitable and the economy as a whole will improve (Bethune, Sultanum, & Trachter, 2019). The theory's detractors state that it requires a big number of institutions to issue a wide range of securities for it to be valid. So, the hypothesis might not stand without the heterogeneity in securities issued by different institutions. The lack of appreciation for the function of lenders as risk managers in the banking relationship is a major critique of the present state of financial intermediation theory (Scholtens & Wensveen, 2000).

The concepts of digital loans and digital investments are integral to the theory of financial mediation. Digital lending institutions provide financial intermediary services through the adoption of digital financing and digital investments, therefore the theory is relevant to this research. In the long run, this improves the banks' technical efficiency. The notion of financial intermediation describes the connection between more conventional financial institutions like banks and insurance companies and newer, more innovative ones like FinTechs. FinTechs have embraced electronic lending and digital investments to provide more financial services at significantly reduced transaction costs, more efficiently, and with greater accessibility, banks and other traditional financial intermediaries have incorporated technology to remain competitive. This theory therefore sought to anchor and supports the relationship between digital lending applications and technical efficiency of commercial banks.

## **Empirical Review**

### **Digital lending and technical efficiency of Commercial Banks**

Thaker's (2019) research on investments on digital lending platform in Malaysia concluded that, with the development of information and internet technologies, digital lending platforms have experienced rapid expansion in recent years. Since digital lending platforms are growing in significance and popularity, it is important to understand what motivates potential investors to make a financial commitment to one. According to the findings, trust is a key factor in determining investment intent. Investors' choices are proven to be unaffected by other variables including perceived risk, perceived simplicity of use, and security.

Yeo and Jun (2020) compared two scenarios to examine the effect of digital lending on banks; one in which banks are the only players in the loan market, and another in which the market is segmented according to the reliability of borrowers, with digital lending platforms operating only in the low-credit market segment, and banks operating in both the low and high credit market segments. We demonstrate that in the divided market example, banks face less risk than they would in the reference case, notwithstanding an upsurge in insolvency risk and a drop-in illiquidity risk. The results indicated that for digital lending to succeed in the long run, there must be a distinct separation of roles between traditional financial institutions and online lending platforms. Digital lenders, such as those serving the subprime market, and banks, which participate in digital lending only to a limited extent, keep the risk of digital lending growth to a minimum for the financial stability of the banking system.

The effects of digital lending on economic growth in Indonesia were studied by Suryawati and Nurdana (2021). The study looked at the costs, revenues, employees, product sales, and profits of businesses before and after they took out a digital lending loan, as well as the factors that contributed to the subsequent growth in revenues. Descriptive analysis, paired t-test, and ordinary least square (OLS) analysis were all employed. Comparing costs, revenues, labor hours, product sales, profits before and after applying for and receiving a digital loan yielded significantly different outcomes, as shown by a paired t-test. Using the OLS technique, we find that a company's length of operation and its level of spending are both significantly related to how its revenue grows over time.

According to Loureiro and Gonzalez's (2019) analysis, digital platforms encourage a competitive spirit among financial institutions. A lower loan amount is granted to borrowers under the age of 35 in the study, even when controlling other factors, because lenders view them as a higher risk and less likely to repay the loan on time. Intriguingly, however, this study found that lending decisions are influenced by competitive relationships when age is not a strong indicator of experience; loan applicants of the same gender as lenders who are more attractive and financially successful are probably taken into account as a personal threat, decreasing lenders' confidence, ultimately leading to lower amounts being invested into loans.

Fintech has found a major distribution channel in digital lending due to its low transaction costs and ability to cut out middlemen. The United States digital market is controlled by institutional investors (Derayah Financial, 2017). Low-value, short-term, unsecured loans are all that are available to borrowers. This is according to a recent study (Yum, Lee, & Chae, 2012). Due to the sector's tremendous development over the years, investors can now reap substantial benefits from the market. Long-term secured loans for businesses and consumers have been added to the market (Derayah Financial, 2017).

### **Technical efficiency**

Banking sector efficiency enhances economic growth by facilitating the transfer of funds and directing capital where it is needed most. To be technically efficient, a bank needs to generate a predetermined number of results while expending the minimum amount of resources. The financial institutions that are more efficient at what they do are better able to weather economic storms, boost growth, eliminate informational inequalities, and smooth out economic swings (Fried, Lovell, & Schmidt, 2008). Using Japanese data, Homma et al. (2018) examine the aforementioned assumptions to discover that Japanese banks expand in size, and this is consistent with the efficient organization hypothesis. According to the findings (Homma et al., 2018), market concentration reduces bank efficiency, which is consistent with the quiet life theory. However, Yin et al. (2019) discovered that smaller banks, in particular, had a negative link between the number of employees and efficiency. According to Rosman et al. (2019), larger banks are able to lower their input costs because of their dominant market position. Returns to scale from a more specialized workforce and economies of scale from spreading fixed costs across a larger volume of services have been hypothesized to explain the positive correlation between size and productivity (Hauer, 2020). The quiet-life argument, on the other hand, suggests that larger organizations tend to be less productive. Recent research (Al-Gasaymeh, 2016, epková, 2015, and Singh, and Fida, 2015) demonstrate no statistically significant relationship between bank size and TE. In essence, there can be different ways of looking at the question of whether or not size and TE are related.

Sharma (2018) investigates the link between productivity and financial success in the market. Conclusions Statistically significant correlation between operational efficiency and the market performance of Indian banks was confirmed. Additionally, banks with streamlined operations result in more money for their shareholders. In addition, Meles et al. (2016) discover that US banks' financial performance improves when their use of intellectual capital is optimized. Personnel effectiveness, a subcomponent of IC effectiveness, has also shown to have a greater effect on financial performance. Thus, the advancement of efficient methods of knowledge management, enabling banks to amass the resources necessary to adjust to a dynamic and ever-shifting market. In their 2020 study, Afsharian et al. analyze how efficiency influences the success of European banks that are open to the public. The findings corroborate the hypothesis that technical efficiency is positively related to banks' overall success. Aguenau et al. (2017) use the CAMEL framework to analyze the financial success

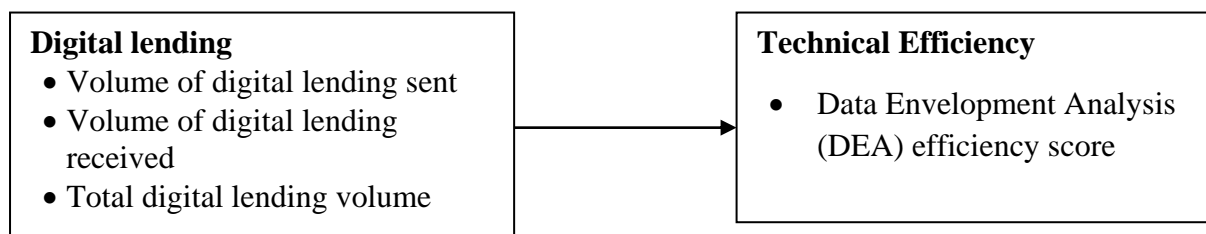


of Moroccan banks between 2004 and 2014. The findings demonstrate that the efficiency of banks is positively associated to factors including capital sufficiency, asset quality, profits performance, and liquidity, but it is negatively related to management efficiency.

Adusei (2019) analyzed the factors that affect rural and community banks' technical effectiveness in Ghana. Using the binary logistic regression method and the data envelopment analysis assumption of a variable's return to scale, we have analyzed the data. Only 20 of the sampled rural and community banks met the criteria for technical efficiency. The binary logistic regression study shows that the technical efficiency of rural banks in Ghana is significantly influenced by factors like bank size, profitability, and quality of bank funding. Increasing a rural bank's profitability enhances its technical efficiency, whereas expanding the bank's size or improving its funding quality reduces the bank's technical efficiency. These findings suggest that many rural and community banks in Ghana have poor resource usage and that a rural bank's success in this area can be evaluated by looking at its size, profitability, and financing quality.

Kumar (2018) looked into how the technical efficiency of Indian public sector banks affected their bottom lines. If public sector banks are efficient, they can increase output by 1.13 times relative to the same inputs. Thirteen banks in the "lucky" and "underdog" quadrants of an efficiency-profitability matrix based on effectiveness ratings and Return on Assets (ROA) have a technical effectiveness score below the industry average.

### Conceptual Framework



**Independent Variable**

**Dependent Variable**

**Figure 1: Conceptual Framework**

### Research Methodology

### Research Philosophy

Research philosophies are approaches to studying society with the goal of providing an explanation based on the knowledge gained (Padilla-Daz, 2015). A study's critical assumptions and presuppositions can be traced back to the researcher's underlying research philosophy. Positive (or scientific), realist, and interpretivist phenomenology are the primary research philosophies (McLachlan & Garcia, 2015). Knowledge, according to positivist philosophy (Singh, 2015), is based solely on empirical data, with no room for theoretical speculation or personal bias. The social entity is the starting point for the positivist

philosophical approach. Knowledge, according to positivist thought, is based on hard data and objective reality, rather than on theoretical constructs or personal valuations (Alakwe, 2017). Distinction is highlighted by looking at how different things like prescriptions and leading research on individuals compare. Data collection and theoretical development form the basis of this study's methodology (Potrac, Smith, & Nelson, 2017). Therefore, positivism was used in this study because it is centered on collecting data and testing hypotheses. The results of the experiments validated the hypotheses and will be useful for future studies. Since positivism is founded on empirical evidence, the field of statistics arose to analyze it. This study is a deductive inquiry into the impact of digital lending on the technical efficacy of commercial banks since the researcher examined the premise and established a conclusion. Many believe that the logical method is the only valid one for scientific research.

### **Research Design**

The term "research design" is defined as the "plan or structure" used to address the researcher's issues and inquiries (Malterud, Siersma, & Guassora, 2016). For this study, the researcher took a causal-comparative strategy. This is due to the fact that causal-comparative research designs aim to pinpoint the causes of variation in study outcomes (Rahi, 2017). Because it compared how different types of digital banking services affected the efficiency of commercial banks technically, this research lent itself well to a causal-comparative methodology. Multiple tests were performed on the study's variables to confirm or refute the hypothesis.

### **Population and Sampling**

The study's population consists of all the entities that have enough in common to be either included or excluded. The 17 commercial banks in Kenya make up the number of the study's sample. The banks in Kenya are divided into two different size categories by the Central Bank: big (>5%) and medium (1%-5%) of market share index. Tier 1 and 2 banks were the analyzed unit from 2010 to 2021. To learn about a population as a whole by looking at a small subset of that group is known as sampling (Bryman & Bell, 2013). For the years 2010-2020, this research focused on 17 of Kenya's top and middle tier commercial banks. Since it is throughout these time periods that digital lending has expanded and evolved, a causal-comparative approach provides the clearest picture.

### **Data Collection Methods**

The study used secondary data for the analysis. The data was acquired from CBK reports and the banks' annual financial reports.

### **Data Analysis**

According to Kothari (2012), data analysis consists of a series of interconnected procedures that are carried out to summarize the gathered data and arrange it so that it answers the research objectives. Data was scrubbed, modified, double-checked, and coded before analysis. The data was analyzed using both inferential and descriptive statistics. Data were

described using percentages, averages, and standard deviations, while the sample size was described using frequencies. Correlation and the panel regression model were used as methods of inference. STATA was used for the data analysis.

The impact of Fintech on commercial banks' technical efficiency in Kenya was determined using a panel regression model. This allowed for a more accurate assessment of the correlations between the study's dependent and independent variables. The model of regression was:

$$Y = \beta_{0it} + \beta_{1it}X_{1it} + \varepsilon$$

Where;

Y = Technical Efficiency

X<sub>1</sub> = Digital Lending Apps

β<sub>0</sub> = Constant Term;

β<sub>1</sub>, β<sub>2</sub>, β<sub>3</sub>, β<sub>4</sub> = Beta coefficients;

i = bank

t = time period

ε = Error Term.

Hypotheses was tested at a 0.05 significance level. A null hypothesis was rejected if the P-value >0.05 and not rejected if the P-value <0.05.

## Results

### Descriptive Statistics

The descriptive statistical analysis of the data gathered for all variables from 2010 to 2021 is presented in this section. The use of descriptive statistics includes indicators of distribution (skewedness and kurtosis) as well as measures of central tendency, such as the mean and standard deviation, as well as measures of dispersion and minimum and maximum observations. Digital lending (shillings), and technological efficiency (ratio) were used to offer descriptive data. The analysis helps make it possible to display and visualize raw data meaningfully. The outcomes are shown in Table 1. The results shows that the mean digital lending amounts to \$23,789,071 in this market, suggesting that this is the typical amount of loan in this sector. There may be a wide range in the amounts borrowed or lent across different borrowers and lenders in the digital lending market, as indicated by the standard deviation value of \$8,216,236. If we look at the least amount of digital loan that has ever been sent in this market or industry, we find that it is equal to \$10,309,960. In contrast, the greatest amount of digital loan to date is \$39,975,063. This shows the presence of a heterogeneous group of borrowers and lenders, each with differing degrees of financial stability and access to credit. When looking at the distribution of digital loan amounts, a skewness of 0.21 suggests a little rightward bias, suggesting that more lending may occur at

the higher end of the range. A kurtosis of  $-0.85$  indicates that digital lending amounts follow a relatively flat distribution compared to a normal distribution, with frequencies of loan amounts more equally distributed than they would be in a more peaked distribution.

The average amount of digital financing is \$36,228,228. This indicates that this is the typical amount lent via online lending marketplaces to borrowers. Some borrowers received more than the average amount, as indicated by the standard deviation of 12,650,040 from that mean. Some borrowers have received substantially less than the minimum sum of \$8,170,615. Contrarily, the greatest amount received is \$65,000,000, indicating that some borrowers have gotten far bigger sums. There are more borrowers who have gotten bigger sums than those who have received lesser amounts, as indicated by the data's minor rightward skewness (skewness = 0.23). The data is platykurtic, meaning it has less of a peak and thinner tails than a normal distribution (kurtosis =  $-0.59$ ). This suggests that there are a greater number of borrowers whose loan amounts are relatively near to the mean, and a smaller number of borrowers whose loan amounts are relatively far from the mean.

In the provided data set, the average amount of digital loans was 60,017,100, with a mean of \$60,017,100. Spreading the data out from the mean, the standard deviation is 14,452,503. The large standard deviation of the sum of all digital loans suggests that these values can take on a wide variety. The data set ranges from a low of 34,333,461 to a high of 79,820,882. This demonstrates a wide range in the overall values of digital loans, with more than 45 million units separating the lowest and highest values. The data is somewhat symmetric and equally distributed around the mean, with a minor bias toward the right ( $-0.09$  skewness), as shown by the skewness value. The data has a flatter population than a normal distribution, as indicated by the kurtosis value of  $-1.68$ . What this means is that the distribution is not as typical as one may anticipate it to be. In sum, the data set's information on the range and distribution of total digital lending is useful.

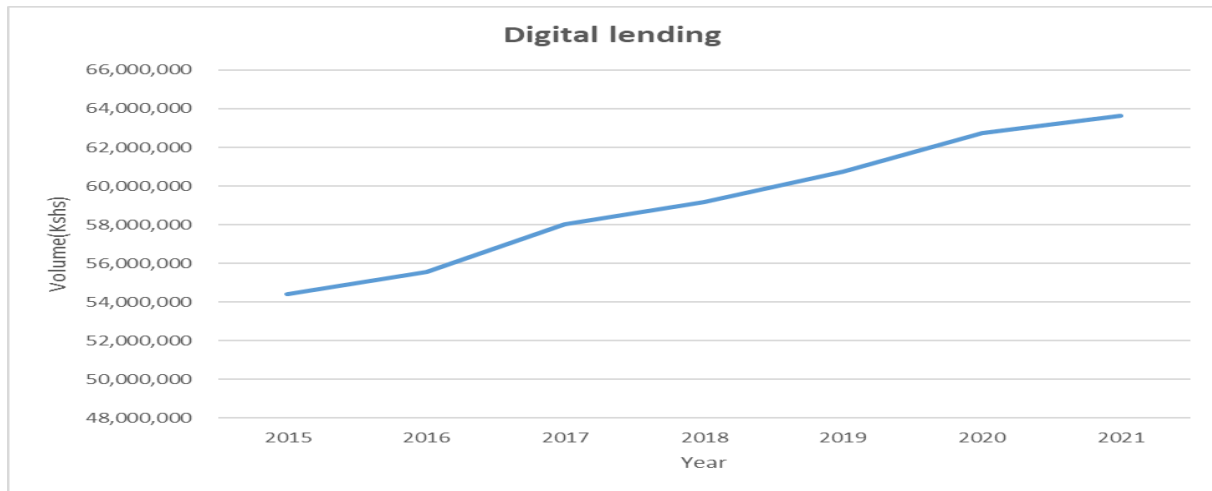
The provided information under technical efficiency relates to banks' technical efficiency as measured by three metrics: variable return to scale efficiency (VRSE), constant return to scale efficiency (CRTE), and SCALE. The median VRSE score is 0.693, which indicates that banks are, on average, only using around 70% of their potential in their day-to-day operations. With a standard deviation of only 0.080, we can infer that most banks' VRSE values fall within a small band. Some banks are far less efficient than others, as shown by the least VRSE value of 0.510, and others are highly efficient, as shown by the maximum VRSE value of 0.820. When output is held constant, the mean CRTE value of 0.700 is slightly higher than the VRSE value of 0.650, showing that banks, on average, are slightly more efficient. As with VRSE, the standard deviation of 0.080 for CRTE suggests that there is not much in the way of diversity amongst different financial institutions. The range of CRTE values is also extremely small, with maximum and minimum values that are very close to those of VRSE. Finally, SCALE indicates whether or not a financial institution is performing at its maximum potential. According to the median size value of 0.733, financial institutions are typically performing at about 73% of their potential size. There is more variance in scale

between different banks, as indicated by the standard deviation value of 0.118, which is more than that of VRSE and CRTE. If a bank's SCALE score is below 0.500, it is running well below its optimal scale; if it is above 0.920, it is functioning extremely close to its optimal scale. It appears from the data that most banks are working at a comparable degree of technical efficiency, while there is considerable variation. Nonetheless, there is greater diversity in the amount to which banks are functioning at their optimal scale of manufacturing, with some banks operating considerably below or above this level.

**Table 1 Descriptive Statistics**

		Mean	Std. D	Minimum	Maximum	Skew	Kurts
	Volume of digital lending sent	23,789,071	8,216,236	10,309,960	39,975,063	0.21	-0.85
Digital Lending	Volume of digital lending received	36,228,028	12,650,040	8,170,615	65,131,989	0.23	-0.59
	Total digital lending	60,017,100	14,452,503	34,333,461	79,820,882	-0.09	-1.68
	VRSE	0.693	0.080	0.510	0.820	-0.56	-0.41
	CRTE	0.700	0.780	0.520	0.820	-0.57	-0.40
Technical Efficiency	SCALE	0.733	0.118	0.500	0.920	-0.28	-0.94

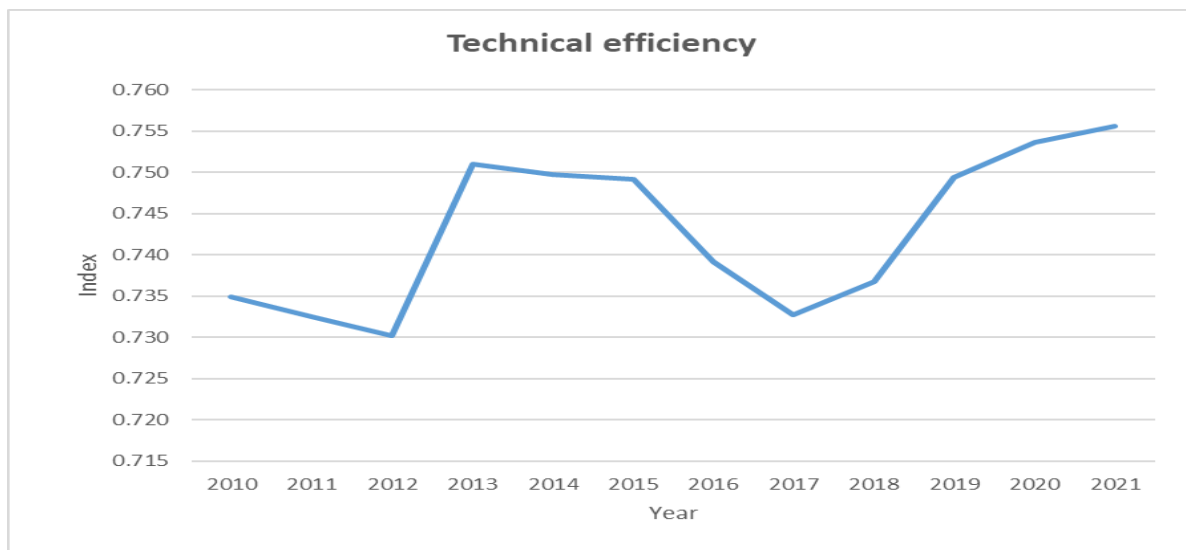
### Trend Analysis on Digital Lending



**Figure 2: Trend Analysis on Digital Lending**

Based on the data provided, we can conclude that the prevalence of digital lending has been on the rise over time. In 2015, online loans totaled 54,393,769; in 2016, that number jumped to 55,557,987, an increase of 1,164,218. In 2017, the number of digital loans increased by another 2,483,412 to reach 58,041,399. The number of loans made electronically increased by 1,117,725 in 2018 to a total of 59,159,124. In 2019, digital lending increased by 1,595,696, bringing the total to \$60,754,820. In 2020, the number of digital loans rose by another 1,982,359 to a total of 62,737,179. In the final year of the projection, 2021, digital lending grew by a more modest 892,016 to a total of 63,629,195. The examination of trends reveals that digital lending will increase steadily between 2015 and 2021, at a rate of about 2% per year on average. This indicates that digital lending has grown in popularity over time and is expected to do so going forward.

### Trend analysis for Technical Efficiency



### Figure 3: Trend Analysis on Technical Efficiency

The graph shows the technical effectiveness of Kenyan banks from 2010 to 2021 on a scale from 0 to 1, with 1 indicating the most efficient performance possible. The trend analysis indicates that the technical effectiveness of banks in Kenya has varied over time, but has improved steadily on the whole. Kenyan banks have a mean technical efficiency of about 0.744, with a standard deviation of about 0.010. Banks in Kenya saw a gradual deterioration in their technical efficiency from 2010 to 2012, with that number falling from 0.735 to 0.730. The technical effectiveness increased dramatically in 2013, reaching 0.751, and then remained constant for the following two years, at 0.750 and 0.749, respectively. Technical efficiency dropped to 0.739 in 2016 and continued its slow fall to 0.733 in 2017. In 2018, however, things turned around as the technical effectiveness rose to 0.737. The level of technical efficiency has increased steadily from 2019 to 2021, rising to 0.749 in 2019, 0.754 in 2020, and 0.756 in 2021. There appears to have been some variation in the technical effectiveness of Kenyan banks over the years, with efficiency dropping between 2010 and 2012 and then rising again between 2013 and 2018. Banks in Kenya are getting more technically efficient over the course of 2019–2021, a trend that bodes well for the country as a whole. This development bodes well for Kenya's economy as a whole, as it indicates that the country's banking system is evolving toward a more viable and effective model.

### Correlation Analysis

The researchers looked for a connection between the variables by conducting a correlation analysis. Pearson's correlation was used to determine the mean score for each independent variable. A statistically significant correlation has a p-value of less than or equal to 0.05. However, a correlation that has a p-value of more than 0.05 is not considered to be statistically important (Statistics Solution, 2018). There is a positive correlation between the two variables when both are growing, and a negative correlation when both are shrinking. Table 2 shows the outcomes of the correlation study.

**Table 2: Correlation Results**

	Technical Efficiency	Digital Lending
Technical Efficiency	1.000	
Digital Lending	0.712	1.000
	0.000	

The results shows that digital lending have a positive and significant relationship with technological efficiency ( $r= 0.712^*$ ,  $p=0.000.05$ ). That meant that 71.2% of the time, digital lending was more technically efficient than traditional lending.

### Regression Analysis

Using regression analysis, the study looked for a statistically significant relationship between independent and dependent variables. Digital lending was used as independent variable while Technical Efficiency was taken as the dependent variable. The results are shown in Table 3.

**Table 3 Regression Outputs**

Technical Efficiency	Coef.	Std. Err.	z	P> z
Digital Lending	0.0264	0.0062	4.2500	0.000
_cons	0.1512	0.0492	3.0700	0.002
F-statistic	238.63			
Prob > chi2	0.000			
Rsquared	0.6297			

The results shows that existence of a positive and statistically significant effect of digital lending on technical efficacy of commercial banks in Kenya ( $=0.0264$ ,  $p=0.000$ ).

### Discussion of Results

The study aimed at researching commercial banks' technical efficacy and the impact of digital lending apps in Kenya. The descriptive statistics revealed a mean total digital lending of \$60,017,100, which is representative of the norm for digital lending in the sample set. Spreading the data out from the mean, the standard deviation is 14,452,503. The large standard deviation of the aggregate value of all digital loans indicates that these parameters can take on a wide range of values. The results showed a positive and statistically significant correlation between digital lending and technical efficiency ( $r=0.712^*$ ,  $p=0.000.05$ ). That percentage equated to 71.2% of the instances where digital lending was technically superior to its analogue counterpart. The regression results reveal a favourable and statistically significant connection between technical efficiency and online lending ( $=0.0264$ ,  $p=0.000$ ). A p-value of less than.05 indicates that the non-significant effect of digital lending on the technical efficiency of Kenya's commercial banks cannot be accepted. These numbers illustrate the meteoric rise of both data and online technologies, and they corroborate the



research conducted by Thaker (2019) on the financing of digital lending platforms in Malaysia. The findings highlight the significance of trust in understanding the drivers of investment. In line with the findings of Yeo and Jun (2020), whose research suggested that sustainable digital lending requires a suitable distinction of duties between banks and platforms for lending digital which depend in the low-credit section and banks' participation is limited to ensure that the growth of digital lending does not adversely affect bank stability. Suryawati and Nurdana (2021) compared the spending, turnover, labour input, unit sales, and net revenue of businesses before and after they received a digital loan and discovered significant variations.

### **Interpretation of Results**

The goal was to research commercial banks' technical efficacy and the impact of digital lending applications in Kenya. The descriptive statistics revealed a mean total digital lending of \$60,017,100, which is representative of the norm for digital lending in the sample set. Spreading the data out from the mean, the standard deviation is 14,452,503. The substantial standard deviation of total digital loans indicates a high degree of variability in these figures. Digital lending was positively associated with technical efficacy ( $r=0.712^*$ ,  $p=0.000.05$ ), as shown by the data. That percentage equated to 71.2% of the instances where digital lending was technically superior to its analog counterpart. A positive and statistically significant correlation between digital lending and technological efficacy was discovered using regression coefficients ( $=0.0264$ ,  $p=0.000$ ). Since the p-value is smaller than .05, we cannot accept the null hypothesis that digital lending does not affect the technical efficiency of commercial banks in Kenya. The results suggest that banks can benefit from utilizing these digital lending tools. Technical efficiency, or the capacity to make efficient use of resources to get desired results, appears to increase in financial institutions. By implementing digital lending applications, financial institutions can expedite the loan application, underwriting, and funding procedures. Quicker loan approvals, less paperwork, less mistakes, and more quickly accessible funds are all possible thanks to these applications. As a result, banks may better meet the needs of their consumers, leading to improved efficiency. Banks can save money thanks to digital lending apps since they cut down on the amount of time and money spent on paperwork, manual processing, and other administrative costs. The bank's bottom line and ability to compete in the market may benefit from this efficiency boost.

### **Conclusion**

According to the findings of this research, digital lending has a sizable effect on the technical efficacy of Kenya's commercial banks. Rejecting the null hypothesis, which predicts no significant effect, demonstrates that the availability and use of digital lending platforms significantly affect the operational efficacy and efficiency of commercial banks in the Kenyan scenario. The results of this study provide evidence that digital lending—which includes mobile lending, online lending platforms, and automated loan processing—contributes significantly to the enhancement of commercial banks' technical efficiency. Banks are able to improve the effectiveness of credit allocation, as well as the speed at which

loans can be applied for, thanks to the incorporation of digital lending solutions. The study's rejection of the null hypothesis sheds insight on the significance of digital lending in Kenya's banking system. It demonstrates how banking may be revolutionized and efficiency increased through the use of technology-driven financial services. The results suggest that commercial banks that adopt and successfully implement digital lending programs will benefit from increased technological efficiency, which in turn may boost the banks' profits, customer satisfaction, and competitiveness.

### Recommendations

According to the research, traditional banks could think about teaming up with digital lending-focused FinTech companies. Banks can get new lending methods, data analytics tools, and customer-centric solutions through partnerships with Fintech firms. By utilizing the knowledge and nimbleness of Fintech firms in digital lending operations, such collaborations can improve banks' technical efficiency. Investment in strong digital infrastructure is a must for commercial banks if they want to reap the benefits of digital lending. This means doing things like modernizing their IT infrastructure and making sure they have constant access to the internet and safe ways to store their data. Banks will be better able to manage rising loan volumes and online transactions if sufficient resources are allocated to improving their digital infrastructure.

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