TECHNOLOGICAL RISK AND FINANCIAL PERFORMANCE OF COMMERCIAL BANKS IN KENYA

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Abstract

Commercial banks are a key player in the financial industry and impacts greatly on any nation's economy. Banks operate in a very risky environment and their performance is of great interest to all stakeholders not just the shareholders. Technology is now referred as a necessary evil and a great business enabler. The aim of this research was to establish the relationship between technological risk and financial performance of commercial banks in Kenya. The study used number of branches, ATMs and Agents as key indicators for independent variable while ROE and ROA were used for dependent variable. The study was anchored on diffusion of innovation theory. The study population was the forty two (42) commercial banks in Kenya. Purposive sampling was used to pick 32 commercial banks. Data was analyzed using R

statistical software version 4.3.2. Linear mixed effects multiple regression allowing random effects to vary by banks was used. The study results showed that for ROE, (beta: 0.11,95% CI; p-value: 0.003) an increase in the total number of branches is associated with a positive effect. The number of ATMs and agents ranged from 0 to over 500. From the mixed effects regression model, a larger branch network contributes significantly to higher ROE (beta: 0.15; 95% CI: (0.06 – 0.24); p-value: 0.001). The study concluded that there is a statistically significant relationship between technological risk and the financial performance of commercial banks in Kenya. The study recommends that banks adopt and utilize technological innovations to become more efficient in serving a larger population of customers. The study findings may be beneficial to government and its agencies, commercial banks managers, technological experts and scholars alike in policy formulation and development of required technological software and hardware and advancement of knowledge and more research towards addressing technological risk and maximizing financial performance.

Keywords: Technological Risk, Risk Management, Financial Performance, Commercial Banks, Technology

INTRODUCTION

Technology is a huge promoter of business operations, yet it introduces omnipresent, potentially very high-impact risk. The current environment in which banks operate is marred with constant advancement in technology. This has attracted the attention of regulatory authorities in the banking industry to put in place measures and constantly warns the stakeholders in the industry of the dynamic technological environment that they operate in and the risks that come with it. Among the risks posed are cyber-crime which includes accounts which have been compromised, theft of data, damaged files and inactivated systems. CBK (2021) confirmed that technological advancements have led to a rise in cyber threats in the Kenyan banking sector.

Financial institutions face technological risks ranging from mismatch between business strategies and IT strategies together with cost and complexity of IT which is caused by management decisions, obsolescence, disruption and inadequacy and/or mismatched talent. This risk affects the image of the organization, its strategies and operational planning which in turn alter financial performance of commercial banks. Report by Deloitte shows that the key technological risks in commercial banks include strategic risk, cyber security and incident response risk, technological sturdiness and continuity risk, technology sellers and handlers risk, technology operations risk, IT program execution risk, data management risk and risk of ineffective risk, Deloitte (2018). Risk emanating from strategic technological perspective include

decision to adopt or watch new technology. Organizations are expected to make a choice between using modern technology or to neglecting it all together. FinTech solutions which focuses on inventions in financial services may destabilize status quo thus promoting higher competition and critical decisions on partnerships and adoption of technology. As posited by Andries, Carteau, Cornaggia, Ginolhac, Gruffat, & Le Maguer. (2018), there is a need for an institution to define its technological strategy or align it with the business needs in order to succeed in meeting its requirements. Misalignment, however, may end up compromising the realization of an organization's commercial and financial goals. Barret (2016) argues that the relationship that exists between performance of banks and technological risk is inverse. and used primary data. According to Sigey, (2018), technological risk significantly and detrimentally affects the performance of commercial banks in the Kenyan context.

According to Hirtle (2007) significant technological innovation in retail banking services delivery witnessed in the United States of America resulted in a steady growth of bank branch network and thus improved overall bank profitability. According to Buddhika (2021), ATM banking, internet banking, and mobile banking all majorly aided by technology affect financial performance of commercial banks.

According to Mallinguh, Wasike, & Zoltan (2020), the proportion of the capital budget allocated for the acquisition of technology positively and significantly influences sales.

Organizations are facing more business risks as a result of leakage of data, theft of assets and tainting of organizational image, due to the, social networking, proliferation of mobile computing, and cloud-based technology (Carcary, 2013). In the view of Jowi and Abade (2016) most commercial banks are aware of technological risks.

Financial performance is the capability of a commercial bank to efficiently utilize the available resources, operate in a profitable manner, grow with time and thrive in a competitive environment. Financial performance can be measured using several operational indicators. It is generally agreeable that financial performance is computed by use of return on equity (ROE) and return on assets (ROA) and as shown by (Paul and Musiega, (2020), Le, Shan, and Taylor (2020) and Nzuve, (2016). A healthy business shall have ROA of at least 1% while ROE should vary between 15 and 30 %. This study used ROE and ROA as the measure of the bank's financial performance.

Study objective

The general objective of the study was to establish the relationship between technological risk and financial performance of commercial banks in Kenya.

Research hypothesis

Ho: There is no statistically significant relationship between technological risk and financial performance of commercial banks in Kenya.

Justification of Study

Financial risk, customer retention, compliance, strategic risk, technological and legal risk are among the major challenges that face the banking sector in today's world. Technological risk may be a key threat since technology is an enabler of business and may be helpful to avert all other risks if well managed. Banks are a key player in an economy and their wellness is an indicator the economy could also be well. They are key mediators between savers and borrowers and this role is enormous. This study is especially necessary now with the great risks and competition facing the banking industry that threaten the survival and even ability of the industry to thrive.

Significance of the Study

The government, bank managers, technological experts and scholars alike stands to benefit from this study in addressing their roles in averting the risks associated with technology and thus upholding good financial performance of commercial banks either through policy or software and hardware developments together with expertise needed to operate them.

Scope and Limitations of the Study

The study analyzed the relationship between technological risk and financial performance of commercial banks in Kenya. Technological risks encompassed the number of ATMs, Number of branches and Number of Agency Banking. Financial performance included return on equity (ROE) and return on assets (ROA). The focus of the research was on all the commercial banks licensed to operate between 2016 and 2021, and of interest was their audited financial reports for the period under consideration. Secondary data from published annual and financial reports of CBK and commercial banks that were published between 2016 and 2021 were used in the study.

LITERATURE REVIEW

Information Technology (IT) risk is the inability to access computer software and computer hardware for reasons such as attacks that bring about denial of service, lack of competent IT manpower, data leakage; system malfunction and down time (Teilans, Romanovs, Merkuryev, Kleins, Dorogovs, & Krasts 2011). Organizations experience high risks due to

leakage of data, theft of assets, and damage of the corporate image due to influx of mobile computing, social networking, and cloud-based technology (Farah, (2011) and Carcary, (2013). Morales *et al* (2014) posits that IT is used to strengthen business strategies. Jackson (2012) is of the opinion that IT comes with both benefits and risks while Gill (2012) asserts that if IT risks remain unmanaged, the institution's income can be negatively affected.

Deloitte (2018) report laid a foundation on the technological risks facing financial institutions noting that technological risk holds strategic, financial, operational, regulatory, and reputational implications that affects financial performance of commercial banks. Strategic technological risk in a rapidly changing world is the risk emanating from an ineffective IT strategy and is among the top threats a financial institution faces. Risk emanating from strategic technological perspective include embracing versus watching new technology where institutions must balance the risk of adopting new technology against that of ignoring it or waiting for things to settle and FinTech solutions which focuses on innovation in financial services thus disrupting the status quo, driving increased competition and important decisions on partnerships and technology adoption. Oburu, (2018) studied the effect of agency banking on the financial performance of selected commercial banks in Kenya using secondary data transactions done by use of agents and the study results showed that there is a considerable positive effect on financial performance in agency banking. He recommended that commercial banks should invest in technological advancements that supports agency banking.

A study conducted by Sigey (2018), focused on the effect of information technology risk on performance of Kenyan commercial banks and the results revealed that IT risk has a significant negative effect on bank financial performance. Jowi and Abade (2016) covered a study to evaluate the risk of information security assessment for internet banking among commercial banks in Kenya and the study found out that most commercial banks are aware and use the risk management framework. Mallinguh, Wasike, & Zoltan Z. (2020) postulates that the ratio of the capital budget meant for the acquisition of technology positively and significantly influences sales. According to Hirtle, (2007) the technological invention in retail banking services delivery witnessed in the United States of America has not in any way reduced branches but instead a steady growth of bank branch network is being witnessed and the more the branches the better the financial performance of commercial banks. Baker, Kaddumi, Nassar, & Muqattash, (2023) investigated financial technologies adopted by banks in Jordan and the United Arab Emirates to improve their financial performance and the outcome of the study indicated that financial technology has a positive effect on both deposits and profits of commercial banks in Jordan and United Arab Emirates.

The banking sector in Kenya has embraced new technologies including use of agency banking, automated teller machines, electronic funds transfers, mobile banking (M-banking) real time gross settlements in offering banking services to its customers. Wanalo, Mande, & Ngâ, (2020) in their study found out that technological financial innovations had positive effect on financial performance of commercial banks. Kemboi (2018) after undertaking his research came to a conclusion that financial performance of banks greatly improved with adoption of M-banking, internet banking and agency banking thus banks need to put more money in the area of technology.

Theoretical Framework

The study heavily borrowed from diffusion of innovation theory which explains the generation of a new idea, how it gains momentum over time and eventually spreads through a social system Rogers, (1995). Diffusion in information technology is, characterized by risks associated with technology and internet penetration. technological risk has heightened costs associated with risk management process whereby financial institutions including commercial banks have to incur huge amount of funds to implement strong IT risk management techniques. It is only those commercial banks which are considered large in terms of the capital base and market share that are capable of implementing the strong IT risk management techniques.

RESEARCH METHODOLOGY

Cross-sectional and longitudinal research designs that utilized panel data were employed. The study was carried out in all the forty-two registered and licensed commercial banks operating in Kenya in the years between 2016 and 2021 allowing an understanding of the degree and direction of technological risk change over the period and how it affected financial performance of the commercial banks. The study picked on the time series 2016-2021 owing to the challenges that had faced the industry resulting into some banks going under, others being merged and some put under receivership a clear indication of a threat of survival even as others continually posted excellent financial performance. The study used purposive sampling where only 34 commercial banks that met the threshold requirements to be included in the study were picked. The study utilized secondary data collected using a data extraction tool and analyzed the data using inferential statistics and descriptive statistics with the help of R statistical software version 4.3.2.

RESULTS AND DISCUSSION

Descriptive analysis of the dependent and independent variables showed varied results with some banks having zero ATMS and zero agents while others had more than 500 agents and ATMs.

Mixed effects regression analysis to determine the relationship between the technological factors and financial performance is as summarized in Table 1.

Table 1: Mixed effects regression model fitted to determine the relationship between economic risk and financial performance

Predictors	ROE			ROA		
	Estimates	CI	P	Estimates	CI	P
(Intercept)	8.58	1.91 – 15.24	0.012	0.33	-1.07 – 1.72	0.646
Number of ATMS	0.68	-1.12 – 2.47	0.459	0.38	-0.02 – 0.78	0.062
Number of agents	0.00	-0.06 – 0.07	0.935	0.00	-0.01 – 0.02	0.864
Total number of branches	0.15	0.06 – 0.24	0.001	0.00	-0.02 – 0.03	0.635

ROE model Interclass correlation (ICC)-0.54
ROA model ICC- 0.47

From the mixed effects regression analysis with random effect for different banks, the intercept for ROE is 8.58, with a 95% confidence interval spanning from 1.91 to 15.24. This suggests that, without considering other factors, the baseline ROE falls within this range. Similarly, for ROA, the intercept is 0.33, with a confidence interval of -1.07 to 1.72, indicating that the baseline ROA hovers around this interval. The p-values for both intercepts are relatively low with return on assets recording p-value of 0.012, implying that these baseline values are statistically significant.

The number of ATMs was included as an economic risk predictor for both ROE and ROA. For ROE, the estimate is 0.68, suggesting a positive relationship between the number of ATMs and ROE. However, this effect is not statistically significant, as indicated by the relatively high p-value of 0.459. Likewise, for ROA, the estimate is 0.38, implying a positive relationship between the number of ATMs and ROA. This effect is nearly significant, with a p-value of 0.062,

suggesting that the relationship between the number of ATMs and ROA approaches statistical significance but does not reach the conventional threshold.

The number of agents was another predictor considered in the model. For both ROE and ROA, the estimates are close to zero (0.00), indicating that the number of agents does not have a substantial direct impact on either financial performance indicator. Additionally, the p-values for both ROE and ROA are relatively high (0.935 for ROE and 0.864 for ROA), reinforcing the notion that the number of agents is not a statistically significant predictor of financial performance.

The total number of branches maintained by financial entities was the final predictor in the model. This variable is a statistically significant positive impact on both ROE and ROA. For ROE, the estimate is 0.15, indicating that an increase in the total number of branches is linked with a positive effect on ROE. This effect is statistically significant, with a low p-value of 0.001, suggesting that a larger branch network contributes significantly to higher ROE. Similarly, for ROA, the estimate is 0.00, implying a positive relationship between the total number of branches and ROA. However, this effect is not statistically significant, as the p-value stands at 0.635. This shows that, within the model's scope, the total number of branches has a statistically significant impact on ROE but not on ROA.

DISCUSSION

The regression analysis provided baseline values of ROE and ROA in the absence of other predictive data as far as technological risk and financial performance is concerned. The intercept for ROE is 8.58, with a 95% confidence interval ranging from 1.91 to 15.24, while the cut off ROA is 0.33, with a confidence interval ranging from -1.07 to 1.72. This intercept indicates that if the factors are not considered, basic ROE and ROA fall within these areas. The p-values of ROE (0.012) and ROA (0.646) show statistical significance for initial ROE but not ROA. For technological risk, the number of ATMs and the number of agents do not exhibit substantial direct effects on either ROE or ROA, as their estimates are not statistically significant. However, the total number of branches emerges as a statistically significant predictor with a positive impact on ROE but not on ROA.

Technological risk had three indicators. The first of those indicators was number of ATMs and financial performance of commercial banks in Kenya. The study includes the number of ATMs as an indicator of both ROE and ROA. ATM volume estimates showed a positive correlation with both ROE (0.68 estimate) and ROA (0.38 estimate). However, these effects were not statistically significant, with p-values of 0.459 for ROE and 0.062 for ROA. The relationship between the number of ATMs and ROA is close to statistical significance but falls

short of the traditional threshold. These findings are however not statistically significant, are similar to what previous studies have found including Mwai et al (2018) and Buddhika (2021) who found a positive and significant relationship between ATMs and financial performance.

A recent report by Statista indicated that over 63.9 million sim cards were registered by January 2024 in Kenya. This implies that the use of mobile banking is most likely increasing and thus reducing the use of ATMs. Mobile banking has been shown to contribute significantly to the growth of commercial banks (Buddhika, 2021).

The second indicator of technological risk on financial performance of commercial banks in Kenya was the number of branches and financial performance of commercial banks in Kenya. The estimates for ROE and ROA were close to zero (0.00), indicating that the number of representatives does not have a significant direct effect on any of the financial performance indicators. Besides, the p-value was quite high for ROE (0.935) and ROA (0.864), Which again indicates that representativeness is not a statistically significant predictor of economic performance.

In summary, the findings show that the number of ATM, as a measure of technical risk, did not show a statistically significant direct effect on financial performance metrics (ROE and ROA) in this sample, although a positive relationship was found with number. The ATM and ROE relationship failed to reach statistical significance, indicating that these technical factors may not play a significant role in the variation in the financial performance of commercial banks in Kenya. Thus, based on this study, there is no relationship between economic performance (ROE and ROA) and technical risk (number of ATM) and financial performance (ROE and ROA) of commercial banks in Kenya.

The third and final indicator of technological risk was the number of agents and financial performance of commercial banks in Kenya. From the results, the number of agents for both ROE and ROA, the estimates are close to zero, indicating that the number of agents does not have a substantial direct impact on either financial performance indicator. This is in contrast with what has been found previously by other studies. For instance, Oburu (2018) found that agency banking improved the performance of commercial banks contributed by 33%. The insignificant impact reported by the current study could be explained by the current rise in the use of mobile and internet banking.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The study results found evidence against the null hypothesis which states that there is no statistically significant relationship between technological risk and financial performance of commercial banks in Kenya and therefore concluded that there is a statistically significant

relationship between technological risk and financial performance of commercial banks in Kenya. This is exhibited by the finding that the total number of branches maintained by commercial banks had a statistically significant positive impact on both ROE and ROA.

The study recommends a continuous technological embrace and transformation in banking industry for efficiency and effectiveness which will bring about better financial performance. Future research should focus on the direct financial impact of technological advancement on banking institutions, the adoption rates and the possible challenges the technology can bring to the banking field, specific operational benefits from the stable branch network that considers customer accessibility and improved market penetration and the regulatory landscape in Kenya by exploring the impact of the regulatory framework in facilitating embracing of technological innovation in the banking sector. This study provided an adequate foundation for further studies to identify the specific mechanism of the utilization of technology to enhance the commercial banks financial performance.

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