

International Journal of Finance and Accounting (IJFA)

**THE EFFECT OF TECHNOLOGICAL INNOVATION ON THE FINANCIAL
PERFORMANCE OF COMMERCIAL BANKS IN KENYA**

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THE EFFECT OF TECHNOLOGICAL INNOVATION ON THE FINANCIAL PERFORMANCE OF COMMERCIAL BANKS IN KENYA

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Abstract

Purpose: The present study endeavored to determine the effects of technological innovation on the performance of commercial banks in Kenya.

Methodology: The study, which was a census, employed a descriptive cross sectional design and targeted all the commercial banks in Kenya. Secondary data in form of annual financial reports was obtained from Central Bank of Kenya. In addition, primary data was gathered from personnel from the customer care departments using a structured questionnaire. Data were analyzed using IBM SPSS Statistics 21.0 and involved computation of frequencies, descriptive statistics and multiple regression analysis.

Results: Most of the respondents affirmed the positive impacts of technological innovations including ease of access, convenience, user friendliness among others. The study showed that customer care employees at the banks valued technological innovations. Moreover, the results revealed a positive and significant relationship between banks' performance in terms of profitability and adoption of various technological innovations including customer independent technology, customer assisted technology and customer transparent technology. The combined effect of the predictor variables (customer independent technology, customer assisted technology and customer transparent technology) was positively correlated with profitability ($r=0.7$) with 50.8% of the variations in profitability of banks in Kenya being explained by the model.

Unique contribution to theory, practice and policy: The study underscored the need for banks to continuously invest in technological innovations for them to remain highly competitive

Keywords: *financial performances, technological innovation, Return on Assets*

1.1 INTRODUCTION

The world banking and financial system is in the throes of a transformation caused by increasing globalization and deregulation. Technological innovations such as those available in ATMs, phone banking, Internet banking, and smartcard applications are taking place at an overwhelmingly fast pace in the global banking industry. Banking can be traced back to the year 1694 with the establishment of the bank of England. The bank was started by a few individuals who were actually money lenders with an

aim of lending money at interest (Kariuki, 2005) Massive, rapid, technological innovations (Norton, 1995) are replacing the traditional branch teller. With greater competition brought by deregulation, globalization and widespread mergers and acquisitions taking place in the banking sector, more branches are being closed down and replaced by self-serviced banking (SSB) facilities like the ATMs as part of a larger rationalization exercise.

Even with the massive branch network, the use of phone banking and Internet banking is strongly promoted by the banks in addition to ATMs. In today's commercial banking environment information technology, effective service delivery and customer satisfaction are an indispensable competitive strategy. Furthermore, the stiff competition has forced banks to set up and put into effect all necessary decision supports technological systems. This enables them to dynamically plan new locations, evaluate their performance, forecast customers' attitude to new offered products and services, estimate clients' switching behavior, and finally provide marketing support to their geographically separate branches.

1.1.2 Financial Performance

Four useful measures of firm profitability are the rate of return on firm assets (ROA), the rate of return on firm equity (ROE), operating profit margin and net firm income. The ROA measures the return to all firm assets and is often used as an overall index of profitability, and the higher the value, the more profitable the firm business. The ROE measures the rate of return on the owner's equity employed in the firm business. It is useful to consider the ROE in relation to ROA to determine if the firm is making a profitable return on their borrowed money. The operating profit margin measures the returns to capital per dollar of gross firm revenue. Recall, the two ways a firm has of increasing profits is by increasing the profit per unit produced or by increasing the volume of production while maintaining the per unit profit. The operating profit margin focuses on the per unit produced component of earning profit and the asset turnover ratio (discussed below) focuses on the volume of production component of earning a profit (Crane, 2011).

Net firm income comes directly off of the income statement and is calculated by matching firm

1.1.3 Relationship between Technological Innovation and Financial Performance

Kenya banking sector has witnessed many changes since the beginning of e-banking. Today, customers of banks have efficient, fast and convenient banking services. In line with rendering qualities and acceptable services, most banks in Kenya are investing large sum of money in information and communication Technology (Aduda & Kingoo, 2012). While the rapid development of information technology has made some banking tasks more efficient and cheaper, technological investments are taking a larger share of bank's resources. Currently, apart from personnel costs, technology is usually the biggest item in the budget of a bank, and the fastest growing one. Another problem associated with this financial innovation is plastic card fraud, particularly on lost and stolen cards and counterfeit card fraud. Banks need to manage costs and risks associated with electronic banking. It is therefore important that e-banking innovations are made by sound analysis of risks and costs associated so that to avoid harms on the bank performance. On one hand the bank performance is directly related to efficiency and effectiveness of electronic banking, but on the other hand tight controls and standards are needed to prevent losses associated with electronic banking. The banks have to balance these two options in order not to

impair its overall prosperity. This is only possible if overall effects of electronic banking on the banks and its customers are understood.

1.2 Research Problem

Despite the potential benefits of ICT and e-commerce, there is debate about whether and how their adoption improves bank performance. Use of and investment in ICT requires complementary investments in skills, organization and innovation and investment and change entails risks and costs as well as bringing potential benefits. The impact of ICTs and e-business strategies on bank performance are positive overall, but that ICTs are not a panacea in themselves.

Kenya banking sector has witnessed many changes since the beginning of e-banking. Today, customers of banks have efficient, fast and convenient banking services delivered through technological innovations such as ATMS, Online Banking, and Mobile banking. The managerial and practical problem that this study wishes to address originates from the observation that technological innovations are risky ventures which are prone to failure, increased fraud and are also prone to exposure inform of litigations and they may therefore have a resounding positive or negative effect on bank performance depending on the way they are managed.

Aduda and Kingoo (2012) investigated the Relationship between Electronic Banking and Financial Performance among Commercial Banks in Kenya and concluded that there exists positive relationship between e-banking and bank performance. However, the study had a research gap since it did not distinguish between the three categories of technology innovation, namely customer independent, customer assisted and Customer transparent technology. Nyamwembe (2011) conducted a study on factors hindering the adoption of technological innovation by commercial banks in Kenya and took a case study of Kenya commercial bank (KCB). The author concluded that resistance to change, internal politics and fear of cannibalizing existing products hindered adoption. However, he failed to investigate the effect of technological innovation on financial performance of commercial banks. The research question, therefore, is; what is the effect of technological innovations on the financial performance of commercial banks in Kenya?

1.3 Research Objective

To investigate the effect of technological innovation on the financial performance of commercial banks in Kenya

2.0 LITERATURE REVIEW

2.1 Theoretical Foundations of the Study

2.2.1 Disruptive Innovation Theory

The disruptive innovation is probably one of the most important innovation theories of the last decade. The core concepts behind it circulated so fast that already in 1998, one year after the publication of the theory, people were using the term without making reference to Harvard professor Clayton Christensen or to his book *The Innovator's Dilemma* (Harvard Business School Press). The term disruptive innovation as we know it today first appeared in the 1997 best-seller *The Innovator's Dilemma*. In the book Harvard Business School professor Clayton Christensen investigated why some innovations that were radical in nature reinforced the incumbent's position

in a certain industry, contrary to what previous models (for instance the Henderson – Clark model) would predict. More specifically he analyzed extensively the disk drive industry because it represented the most dynamic, technologically discontinuous and complex industry one could find in our economy. Just consider that the memory capacity packed into a square inch of disk increased by 35% per year, from 50 kilobytes in 1967 to 1, 7 megabytes in 1973, 12 megabytes in 1981 and 1100 megabytes in 1995.

Disruptive theory is relevant in that it explains the type of technology banks adopt. The banking technology is disruptive because it does away with traditional banking

2.2.2 Types of Banking Innovations

According to Fisher (1998), technology when applied in today's banking environment falls into three specific categories: customer independent (a technology that involves a customer conducting and completing a transaction with a bank entirely independent of any human contact with the institution e.g. ATMs, phone banking and Internet banking); customer assisted (a bank employee will use customer-assisted technology as a resource to complete a transaction e.g. call centre's customer service officers will use a Customer Relationship Management (CRM) System to understand a customer's profile and provide instant responses to customers' queries on the banking transactions and up-to-date billings (Gutek & Welsh, 1999)); and customer transparent Customer technology which represents the real core of bank operations and customers never see it but expect it.

2.2 Empirical Studies

Aragba-Akpore (1998) wrote on the application of information technology in Nigerian banks and pointed out that IT is becoming the backbone of banks' services regeneration in Nigeria. He cited the Diamond Integrated Banking Services (DIBS) of Diamond Bank Limited and Electronic Smart Card Account (ESCA) of All States Bank Limited as efforts geared towards creating sophistication in the banking sector. Ovia (2000) discovered that banking in Nigeria has increasingly depended on the deployment of Information Technology and that the IT budget for banking is by far larger than that of any other industry in Nigeria. He contended that On-line system has facilitated Internet banking in Nigeria as evidenced in some of them launching websites. He found also that banks now offer customers the flexibility of operating an account in any branch irrespective of which branch the account is domiciled. Cashless transactions were made possible in our society of today.

In a study conducted by Irechukwu (2000) in Nigeria, he lists some banking services that have been revolutionized through the use of ICT as including account opening, customer account mandate, and transaction processing and recording. Unlike the aforementioned studies, Mantel (2000) focuses on the demand-side of electronic/online bill payment – empirically analyzing the demographic characteristics of users. Among other things, the author finds that electronic bill payers tend to be: older, female, higher income, and homeowners. Agboola (2001) studied the impact of computer automation on the banking services in Lagos and discovered that Electronic Banking has tremendously improved the services of some banks to their customers in Lagos. The study was however restricted to the commercial nerve center of Nigeria and concentrated on only six banks. He made a comparative analysis between the old and new generation banks and discovered variation in the rate of adoption of the automated devices.

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3.0 RESEARCH METHODOLOGY

Methodology: The study, which was a census, employed a descriptive cross sectional design and targeted all the commercial banks in Kenya. Secondary data in form of annual financial reports was obtained from Central Bank of Kenya. In addition, primary data was gathered from personnel from the customer care departments using a structured questionnaire. Data were analyzed using IBM SPSS Statistics 21.0 and involved computation of frequencies, descriptive statistics and multiple regression analysis.

4.0 RESULTS AND DISCUSSIONS

4.1 Response Rate

Among the 43 questionnaires distributed, 34 were duly filled and returned for analysis. This represented a response rate of 79%. According to Mugenda and Mugenda (2003), a response rate of 50% or more is adequate. Babbie (2004) also asserted that return rates of 50% are acceptable to analyze and publish, 60% is good and 70% is very good. Based on these assertions from renowned research academicians, the responses rate for this study of 79% was considered to be adequate in forming conclusions and generalization of the study population. The response rate matrix is presented on Table 1 below. **Table 1: Response Rate**

Response			Frequency	Percent
Returned	34	79%		
Unreturned			9	21%
Total			43	100%

Source: Research Findings

4.2 Effect of Customer Independent Technology and Financial Performance

The study sought to establish the effect of technological innovation on performance of commercial banks in Kenya. This section focused on customer independent technology such as ATMs, credit cards and online banking.

4.2.1 Effect of ATMs on Financial Performance

The study sought to determine the effect of ATMs on the bank performance. Table 2 shows that

82% of the respondents agreed that the ATMS are at convenient places, 73% agreed that the ATMS are user friendly and 85% agreed that bank clients find ATMS easy to use. All the respondents agreed that the ATMS have helped ease congestion in banking halls. The mean score of the responses for this section was 3.96 which indicates that majority of the respondents agreed with the statements regarding the effect of ATMs on bank performance. These results imply that the respondents were happy due to the introduction of ATMs as they would access the banking services at their own time.

Table 2: Effect of ATMs on Financial Performance

Statement	strongly disagree	disagree	neutral	agree	strongly agree	Likert Mean
The ATMS are at convenient places	18%	0%	0%	58%	24%	3.71
The ATMS are user friendly	18%	9%	0%	35%	38%	3.68
Bank clients find ATMS easy to use	15%	0%	0%	35%	50%	4.06
The ATMS have helped ease congestion in banking halls	0%	0%	0%	62%	38%	4.38
Overall Likert mean						3.96

Source: Research Findings

4.2.2 Effect of Credit Cards on Financial Performance

The respondents were asked to indicate the effect of credit cards on the bank performance. Results on Table 4.3 indicates that 82% of the respondents agreed that the credit cards are user friendly, 67% agreed that bank clients find credit cards easy to use and 79% of the respondents agreed that credit cards are convenient to use and carry around. The mean score of the responses for this section was 3.85 which indicates that majority of the respondents agreed with the statements regarding the effect of credit cards on bank performance. These results imply that the respondents were happy due to the introduction of credit cards as they would do shopping at any place without liquid cash.

Table 3: Effects of Credit Cards on Financial Performance

Statement	strongly disagree	disagree	neutral	agree	strongly agree	Likert Mean
The credit cards are user friendly	18%	0%	0%	56%	26%	3.74
Bank clients find credit cards easy to use	15%	15%	3%	32%	35%	3.59
Credit cards are convenient to use and carry around	0%	9%	12%	29%	50%	4.21
Overall Likert mean						3.85

Source: Research Findings

4.2.3 Effect of Online Banking on Financial Performance

The study sought to establish the effect of online banking on the bank performance. Results on Table 4 reveals that majority (79%) of the respondents agreed that customers did not fear internet banking due to fear of hacking of their accounts by web hackers, 85% agreed that customers were provided with encrypted passwords in order to protect their information and transactions and 65% agreed that internet service was operated in a restricted and controlled environment in order to safe guard customer information. Sixty-seven percent of the respondents agreed that their bank always ensured security of data and information that was operated on the internet banking platform. The mean score of the responses for this section was 3.89 indicating that more employees agreed that on line banking was a key driver of bank performance.

Table 4: Effects of Online Banking on Financial Performance

Statement	strongly disagree	disagree	neutral	agree	strongly agree	Likert Mean
Customers do not fear internet banking due to fear of hacking of their accounts by web hackers	3%	12%	6%	35%	44%	4.06
Customers are provided with encrypted passwords in order to protect their information and transactions	3%	6%	6%	41%	44%	4.18
Internet service is operated in a restricted and controlled environment in order to safe guard customer information	8%	15%	12%	27%	38%	3.71
Our bank always ensures security of data and information that is operated on the internet banking platform	15%	15%	3%	32%	35%	3.59
Overall Likert mean						3.89

Source: Research Findings

4.3.2 Effect of Customer Assisted Technology on Financial Performance

The study sought to establish the effect of customer assisted technology on the bank performance. Table 4.5 indicates that 76% of the respondents agreed that customer's call customer care Centre's for assistance, 82% agreed that customer service officers use customer relationship management system to understand customers profile and provide instant responses and 76% agreed that banks have set customer care section for all customer assistance. The mean score for the responses was 4.09 which indicate that many employees agreed that customer assisted technology was a key driver of bank performance. The results revealed that customer assisted technology influenced bank performance.

Table 4.5: Effects of Customer Assisted Technology on financial Performance

Statement	strongly disagree	disagree	neutral	agree	strongly agree	Likert Mean
Customers call customer care centre's for assistance	0%	9%	15%	29%	47%	4.15
Customer service officers use customer relationship management system to understand customers profile and provide instant responses	0%	12%	6%	47%	35%	4.06
Banks have set customer care section for all customer assistance	0%	15%	9%	32%	44%	4.06
Overall Likert mean						4.09

Source : Research Findings

4.3.3 Effect of Customer Transparent Technology on Financial Performance The study sought to establish the effect of customer transparent technology on the bank performance. Table 4.6 indicates that 85% of the respondents agreed that the system was user friendly, 97% agreed that the system was easy to use and 82% agreed that the system added competitive advantage to the bank. Seventy nine percent of the respondents agreed that the system has reduced operation costs for the banks and 85% agreed that the system had helped ease congestion in the banking halls. The mean score for the responses was 4.13 which indicate that many employees agreed that customer transparent technology was a key driver of bank performance. The results revealed that customer transparent technology influenced bank performance.

Table 4.6: Effects of Customer Transparent Technology on Financial Performance

Statement	disagree	neutral	strongly agree	strongly	Likert
disagree agree Mean					
The system user friendly	0%	15%	0%	35%	4.21
The system easy to use	0%	0%	3%	62%	4.32
The system added competitive advantage to the bank	0%	18%	0%	56%	3.91

The system has reduced operation costs for the banks	0%	21%	0%	35%	44%	4.03
The system has helped ease congestion in the banking halls	0%	12%	3%	41%	44%	4.18
Overall Likert mean						4.13

Source : Research Findings

4.4 Interpretation of Findings

In order to establish the statistical significance of the independent variables on the dependent variable (profitability) regression analysis was employed. The regression equation took the following form.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \mu$$

Where;

Y = Profitability (ROA)

X₁ = Customer Independent Technology

X₂ = Customer Assisted Technology

X₃ = Customer transparent technology

In the model, β_0 = the constant term while the coefficient $\beta_i = 1 \dots 3$ was used to measure the sensitivity of the dependent variables (Y) to unit change in the predictor variables. μ is the error term which captures the unexplained variations in the model.

Table 4.7 shows that the coefficient of determination also called the R square is 50.8%. This means that the combined effect of the predictor variables (Customer Independent Technology, Customer Assisted Technology and Customer transparent technology) explains 50.8% of the variations in profitability of banks in Kenya. The correlation coefficient of 71.3% indicates that the combined effect of the predictor variables has a strong and positive correlation with banks profitability. This also meant that a change in the drivers of technology has a strong and a positive effect on profitability.

Table 4.7 displays the regression coefficients of the independent variables. The results indicated that customer independent technology, customer assisted technology and customer transparent technology are statistically significant in explaining profitability.

Customer independent technology was positive and significantly related to profitability (B=4.859, pvalue=0.000). This implies that an increase adoption and use of customer independent technology by one unit leads to an increase in profitability by 4.859 units. Customer assisted technology were also positively and significantly related to profitability (B=1.330, pvalue=0.011). This implies that an increase adoption and use of customer assisted technology by one unit leads to an increase in profitability by 1.330 units. Customer transparent technology

were also positively and significantly related to profitability ($B=1.625$, $pvalue=0.014$). This implies that an increase adoption and use of customer transparent technology by one unit leads to an increase in profitability by 1.625 units

The findings agree with those in Ovia (2000) discovered that banking in Nigeria has increasingly depended on the deployment of Information Technology and that the IT budget for banking is by far larger than that of any other industry in Nigeria. He contended that On-line system has facilitated Internet banking in Nigeria as evidenced in some of them launching websites. He found also that banks now offer customers the flexibility of operating an account in any branch irrespective of which branch the account is domiciled. Cashless transactions were made possible in our society of today.

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The findings agree with those in Yasuharu (2003) who argued that implementation of information technology and communication networking has brought revolution in the functioning of the banks and the financial institutions. It is argued that dramatic structural changes are in store for financial services industry as a result of the Internet revolution; others see a continuation of trends already under way.

The findings agree with those in a study conducted by, DeYoung, Lang, and Nolle (2007) who reported that Internet adoption improved U.S. community bank profitability – primarily through deposit-related charges. In a related study, Hernando and Nieto (2007) find that, over time, online banking was associated with lower costs and higher profitability for a sample of Spanish banks.

The findings agree with those in a study conducted by Roselyn and Ngumi (2013) who conducted a study on influence of bank innovations on income of commercial banks in Kenya and concluded that bank innovations have a moderate influence on the income of commercial banks in Kenya

Table 4.7: Regression Coefficients

Variable	Beta		Std. Error		t	Sig.
(Constant)	-6.982	2.037	-3.428	0.002		
Customer Independent Technology	4.859	1.068	4.55	0.000		
Customer Assisted Technology	1.330	0.488	2.726	0.011		
Customer Transparent Technology		1.625	0.621		2.618	0.014
R		0.713				

R Square	0.508	
Std. Error of the Estimate	0.54816	
F	10.33	0.000

Source : Research Findings

5.0 DISCUSSION CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussion

5.2 Summary

The current study aimed to explore whether customer independent technology improved bank performance. This was demonstrated by the mean score of responses and also the regression coefficient. The regression results indicated that there was a positive and significant relationship between profitability and customer independent technology. One of the key findings was that customer care employees at the banks valued technological innovations. This was demonstrated by the extent of agreement with the statements in the questionnaire in support of technological innovations. The results also revealed ATMs, credit cards and online banking were a key determinant of banks performance.

The study also sought to establish whether customer assisted technology influenced performance of banks. Results showed that customer assisted technology influenced bank performance. In addition, customer assisted technology was found to be positively related to banks performance but was found to be statistically significant in influencing banks profitability.

The study also explored the influence of customer transparent technology on bank performance. The study findings showed that employees value core banking system as an ingredient of bank performance. However, it was found to be positively related with profitability and statistically significant.

5.3 Conclusions

Based on the objective and the findings of the study the following conclusion can be made:

Technological innovation is a key driver to banks performance. This kind of finding is a familiar as it has been supported by other scholars and hence highlighting the intensity of technological changes in driving banks profitability.

Customer independent technology was found to influence profitability of banks in Kenya. ATMs, credit cards and online banking are therefore important despite it being an expensive investment.

Customer independent technology is important in customer retention due to its intrinsic value and also being a deferred consumption.

Customer assisted technology influences banks' performance, the employees overwhelmingly agreed with its positive effect on profitability. It can therefore be concluded that the customers are always happy to call customer care which has been set aside by the banks for their queries and assistance.

Customer transparent technology was found to be effective in driving banks' performance. It can be concluded that customer transparent technology was statistically significant with profitability. It can be concluded that the core banking system has a great influence on retention of customers and delivering services to all customers.

5.4 Recommendations for Policy

Based on the results, findings and conclusions the following recommendations have been deciphered.

It was found that customer independent technology drives profitability. It is recommended to the bank management to regularly conduct system checks to avoid breakdown of the ATM machines which helps decongest the banking halls. It is recommended that the management conducts a market survey to ensure that the credit card services being offered are acceptable in major shops and organizations are also embracing the use of new technological innovations. It is also recommended that the bank management ensures that internet banking is fully secured with encrypted passwords to avoid hacking of important information for the clients.

Customer assisted technology was found to be a key driver on profitability. It is recommended to the management that they review the existing customer care department and the customer relationship management system to ensure that all customers are attended to at the right time and as per their needs. The bank management should also ensure that the employees in the department have good remunerations to avoid harassing the customers.

Customer transparent technology was found to be a driver in profitability of banks. It is recommended to the bank management to ensure that the systems are well maintained to avoid system error and failures hence avoid major downfall of the banks. It is also recommended that the ICT department should always be up to date on the system upgrade and changes so as to alert customers in advance and avoid putting customers under unnecessary stress and pressure.

5.5 Limitations of the Study

Some of the targeted study participants declined to divulge information by not responding to the questionnaires sent to them. There is a possibility that some crucial information may have been missed from the non-respondents thus introducing a response bias in the current study.

5.6 Areas for Further Study

A study on factors affecting use of internet banking may be done to develop more insight on consumers in order to help commercial banks put these factors into consideration as they develop products which rely on the internet as a key delivery platform.

A study should also be conducted to determine the perceptions of customers on the technological innovations in banks. The study may employ the Technology Acceptance models (TAM) to understand whether customers consider perceived benefits in making a choice of whether or not to

use technology which has been sponsored by a bank. For instance, ATM Technology, and Mobile technology.

Comparative studies for Kenyan banks, Ugandan banks and Tanzania banks should be conducted as far as the effect of technological innovations on banking profitability is concerned.

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