

The nexus between technological financial innovation and financial performance of commercial banks in Zimbabwe

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Abstract

The paper examines the nexus between technological financial innovation and financial performance in banking sector. A positivist philosophical orientation approach guided this paper wherein an eight year quarterly panel data for a time period ranging from 2015 to 2021 for thirteen commercial banks in Zimbabwe was adopted for data collection. STATA software was used to analyse the impact of each dimension of technological financial innovation on commercial financial performance. The results showed that the use of automated teller machines and internet banking have strong positive relationship with financial performance, whilst a weak positive relationship was established between mobile banking and financial performance of commercial banks. Moreover, an insignificant association was established between electronic funds transfer and financial performance of commercial banks. The major implication was that banks should intensify the adoption of financial innovation as it enhances their operations.

Keywords: Commercial banks, financial performance, technological financial innovation, Zimbabwe.

Introduction

The major thrust of this paper was to determine the impact of technological financial innovation on financial performance of Commercial Banks in Zimbabwe. Akwam and Yua (2021) buttressed the notion that financial innovation has increased total income culminating in enhanced efficiency for Commercial Banks. This study therefore sought to determine the effect of technological financial innovation (internet banking, mobile, point of sale banking and electronic funds transfer banking) on the financial performance of Zimbabwean commercial banks. This study has been driven by a sharp decline in financial performance of commercial banks in

Zimbabwe despite an upsurge in the adoption of technology driven banking models. Mabwai (2016) attest to the fact that tests on the effect of innovation on financial performance have been minimal and there is shallow knowledge on innovation drivers. Currently most commercial banks in Zimbabwe are reporting losses with only a few making profits, this is despite huge investments in digital banking platforms. Ideally, huge investments in digital banking should be met by improved financial performance (Mabwai, 2016). Zimbabwean Commercial Banks have adopted various technological initiatives like Whatsapp banking, Virtual Banking and online Chatbots

to mention but a few as a conduit for increasing mobile revenue. Partnerships with mobile platforms like Ecocash and Net one has been on the rise with most banks using Ecocash for Bank to wallet and wallet to bank transactions.

A global analysis of the banking industry reveals accelerated unsettledness and increased red ocean competition which has left banks no option but to innovate to remain in business according to Harelimana (2017). Khalil, Khawaja and Sarfraz (2022) explained the strategic importance of innovation as a tool to attain, competitive advantage for banks. Financial innovation affects financial performance, expansion and customer adoption in a positive way according to Hui and Xie (2018). Ibekwe (2021) further noted that that financial innovation has emerged as a key component of performance and competitiveness and is the primary driver of profitability. Twentieth century banks have made huge investment on technological financial innovation improving performance and market share. Harelimana (2017) explained that the financial terrain has changed with the advent of Fintech based innovation like ATM, internet banking and mobile banking. According to Huang et al. (2018), banks have adopted innovation with the objective of widening and deepening their revenue channels and the need to better survive clients with myriad of needs.

Huang et al. (2018) define financial innovation as a novel and new thing which assists to lower costs and risks and lead to an enhanced product that meets the needs of all financial sector stakeholders satisfactorily. Khraisha and Arthur (2018) explain financial innovation as an activity that culminates in the evolution and acceptance of new products and radically

transformed processes and platforms. Isa-Olatinwo et al. (2022) alluded to the notion that performance is akin to productivity and efficiency of an institution putting emphasis on growth, bottom line, revenue and market share. Akyuz and Opsunju (2020) added that other parameters that can be used to measure performance are Return on Capital employed, competitiveness and survival. Santu, Mawanza and Muredzi (2017) expounded that performance is the major driver for organisational survival. According to Isa-Olatinwo et al. (2022), financial performance is the achievement of set financial goals for a firm. Goals are set at the start and performance will be compared with set standards at the end of the year.

ICT innovations in the form of Agency banking, mobile banking, internet banking and ATMs have transformed and revolutionised the financial sector. The leveraging of IT based technology in banking is known as financial innovation and has massively increased bank profitability according to Isa-Olatinwo et al. (2022). New delivery channels like agent and internet banking are now the buzzword and catchphrase of Zimbabwean commercial Banks with accelerated impact to reach the marginalised and rural population improving their lives. Radical transformation in the financial landscape coupled with globalisation and improved technology has liberalised the financial system with new and improved products being ushered in. According to Cainelli et al. (2019), this innovation through proliferation of new products and processes has impacted positively on financial performance.

Huge deployment and investment in innovative resources in innovative technologies have

been undertaken by Zimbabwe Commercial Banks. According to Reserve Bank of Zimbabwe Reports profitability for Commercial banks was USD 52.8 million in 2014, increased astronomically and reached a peak of USD 641 million by 2019 and fell to USD 342 million by 2020. Bank deposits fell from USD 4.4 billion in 2014 to a low figure of USD 2.08 billion by 2020. Total assets for commercial banks rose from USD 7.83 billion in 2015 to reach USD 60.64 billion in 2019. Electronic funds transfers, internet banking, POS and Mobile banking increased significantly with a 2020 RBZ report showing that there were 10.7 million transaction valued at 1.56 trillion Zimbabwean dollars which were processed in 2020.

There has been marked increased in the innovative technology by commercial Banks in Zimbabwe which has had varying effects on bottom-line. The correlation between huge and accelerated investment in technology (financial innovation) and financial performance needs an in depth study in Zimbabwe. Has the investment paid off or not is a paradox that needs unravelling which is the crux of this study?

Zimbabwean commercial banks have adopted various technological innovation initiatives which have seen tremendous impact on return on assets. A trend analysis on the return on assets for Zimbabwe commercial banks shows an upward trajectory with the ROA figure for all banks being 2.11 % in 2015 and reaching a massive peak of 12.04 % by the end of 2017 (Santu et al., 2017). This shows a significant improvement in terms of use bank assets. The trend has been attributed to investment in technology and greater use and adoption of digital channels by the banking public.

According to RBZ Annual reports (2015-2021), internet banking users increased six fold from 108 662 in 2015 to reach 607 246 users by 2021. Electronic funds transfer values increased by astronomic proportions for the period under review to reach a massive figure of ZW177 billion by 2021. The period also witnessed a jump in internet banking users with a third of the population being registered on Internet banking platforms as indicated by the 4.2 million users on internet banking at the end of 2021. Figure 1 shows the trend in ROA for the period 2015-2021.

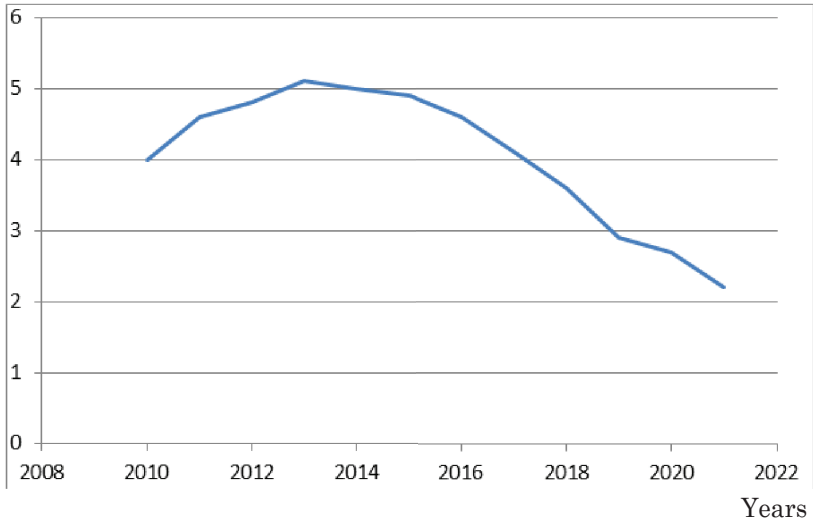
DeYoung et al. (2018) alluded to the fact that bank profitability hinges upon the institutions income and expenses. There alluded to the fact that there is a positive correlation between innovation and profitability which is necessitated by cut throat competition among banks. Banks need to develop new products and technologies to stay ahead of the pack in their quest to increase financial stamina and financial performance. The adoption of financial innovation has had mixed results on commercial Financial performance with some banks improving in profitability while others suffering losses. The major thrust was to dig deep into the issue and provide insight into the impact of financial innovation on financial performance and seek to provide answers on why others have failed even after investment in technology.

Literature review

The strategic role of technological innovation in the twenty first century for the banking industry need not be over emphasised. What spurs economic growth is patronising new clients and enhancing firm- performance

Figure1 Trend in ROA 2011-2021

ROA



Source: RBZ Bank Supervisory Report 2021

according to Ongore and Kusa (2013). Khrawish (2011) explained that innovation provides numerous benefits and financial institutions need to lurch to the industry 4.0 initiative to increase profitability technological financial innovation can be categorised into product, process and institutional innovation. Financial product innovation entails the introduction of new and improved financial products like bank assurance, leasing and credit cards to mention a few. Financial process innovation entails the ushering in of new business processes culminating efficiency and greater market reach. Examples include client customer relationship and data systems, increased use of online systems and automating of bank processes. Technological financial system innovation encapsulates structural system changes and transformation of the whole financial

intermediary field.

Theoretical framework

Silber's constraint theory of innovation

It was coined by Silber (1983) with the sole objective of offering a description of why firms undertake innovation. According to the theory, innovation is undertaken to improve bottom-line through seamless financial service delivery. Financial institutions have internal and external constraints and the aim of technology innovation is to ameliorate and circumvent these internal and external challenges. The constraints encompass external limitations like government policy and internal impediments like organisation management. Technology exploitation will improve efficiency and culminate in increased profitability by eliminating unnecessary costs. Innovation is beneficial in

two ways as it is a means to save costs and simultaneously acts as an excellent tool for marketing. Firms that innovate will always stay ahead of the pack and perform better than those that do not innovate. There are three possible forms of innovation which encompass internalising a remote balance sheet item, financial instrument ushering from another country or a mixture of the two in the context of transforming an existing instrument. Literature has revealed that institutions that have low profitability are not very innovative. The cutthroat competition and regulation will compel these firms to innovate to increase efficiency. Silber (1983) alluded to the fact innovation investment is a response to a competitive position that is not advantageous and the model explains about 60% of all innovations that have taken place. The theory is important as it elucidates on the notion that innovation leads to higher profitability. The relevance to the study is that financial institutions undertake various technological financial innovations and in this context they have various impediments and constraints. The theory reveals how these constraints can have an impact on profitability and how firms can circumvent such impediments.

Schumpeter theory of innovation

Schumpeter ushered in the concept of entrepreneurs who undertake investment and research to accelerate profitable opportunities. As a consequence of the opportunities, imitators would enter the market to eat a part of the market share and erode the profit. According to the theory, Kondratiev cycles would set in as a consequence of disequilibrium and the cycle will start over again. In other words, the innovation theory of profit proposes that an

entrepreneur's primary responsibility is to create innovations, and that he receives compensation for his efforts in the form of profit. A further point he made was that it is entrepreneurship that "replaces today's Pareto optimal with tomorrow's different new thing." Today, when modern capitalism is going through a significant crisis and has lost some of its lustre due to the recent subprime and euro-debt crises, Schumpeter's statement that "entrepreneurship is innovation" has never felt more pertinent. Schumpeter demonstrated the correlation between financial innovations and accelerated entrepreneurial growth which leads to profitability. Commercial banks need to take heed of continuous innovations that are taking place and need to embrace various innovations simultaneously to boost profitability. A good example is the simultaneous adoption of mobile banking, Agency banking and Internet banking by Zimbabwean commercial banks. It is imperative to note that innovation increases profits but has a downside in the context of exponential risk increases. Firms should have adequate risk mitigatory measures to counteract the risk posed by innovation.

The theory is relevant to the study as it shows the link between innovation and financial performance through entrepreneurship. It buttresses the stance that innovation is important as it improves a firm's financial performance by making it competitive on the financial terrain. Excellent competitiveness coupled with accelerated innovation would ensure that the firm stays ahead of the pack and remains competitive for the foreseeable future.

Transaction cost innovation theory

The main pioneer is Niehans (1983). According

to this theory, the major factor for adopting financial innovation is to reduce transaction costs. This transaction cost reduction will accelerate financial innovation and improve provision of financial services. The far reaching objective of innovation is the institute's aim of earning profits. The theory used the link between financial innovation and performance from a transaction's stance. Transaction cost reduction as a consequence of financial innovation will lead to improvement in financial performance. The reply to advancement in technology is the powerful force for financial innovation which lowers costs. Cost effective innovations like the use of debit and credit cards for payments, Magnetic Ink Character Recognition (MICR) line in processing cheques, Internet and Mobile banking will increase profitability for banks. Transaction costs play a paramount in the context of innovation as the downstream effects of financial innovation is to drastically reduce costs. The use of ICT drastically reduces bank costs as it provides offsite connection to bank database and lowers costs. Cost containment is one of the major objective and metric for Retail Banking Managers to achieve. The relevance of this theory is that it shows the nexus between financial innovation and performance through cost containment. In this regard, financial innovation leads to lower transaction costs which have a transmission mechanism of increasing bottom-line.

Disruptive innovation theory

Pioneered by Christensen (2006) describes a process where a service takes incremental applications and grows through the market ranks eliminating rivals. Success by firms is facilitated by consistent and continuous

innovation of products culminating in strong competitive advantage. Profitability is increased by charging premium price for consumers as disruptive innovation allows access to sophisticated products by all customers that were only the preserve of premium customers. Disruptive businesses are characterised by niche markets, lower profits and inferior products which are unattractive to existing products. This unattractiveness is not good for established firms but is a good market for disruptors. The theory is relevant as it shows how disruptive innovation undertaken by financial players increase profitability. The advent of Chatbots, Unstructured supplementary service data (USSD) banking and Whatsapp banking was a result of disruptive innovation in an effort to increase profits for commercial Banks.

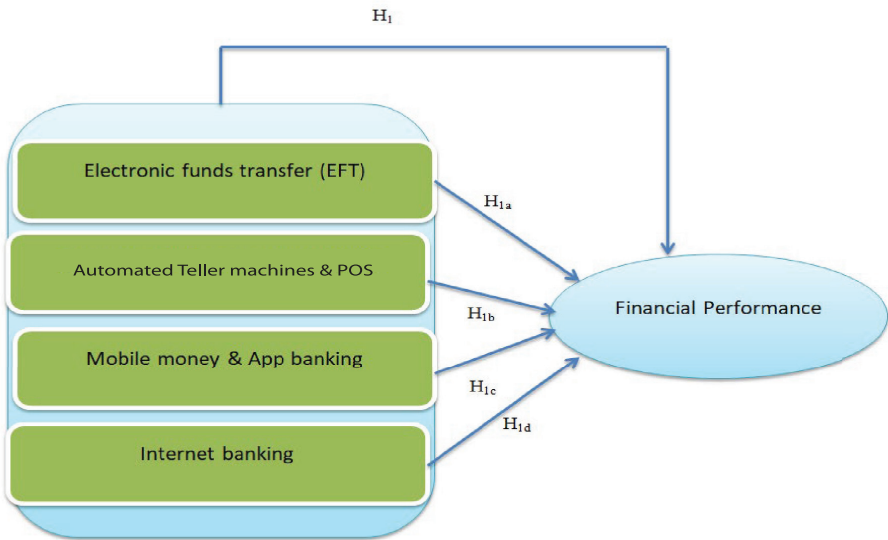
Financial innovation and financial performance

Sujud and Hashem (2017) studied the impact of innovation on the financial performance of banks in Lebanon. Structured questionnaires were used for data collection and SPSS was used to analyse the data. Their variables were POS, EFT, Debit and Credit cards and ATM. The results showed a positive and significant between return on Assets and the independent variables. It was concluded that bank innovation boosts profitability for Lebanese Banks. Gichungu and Oloko (2015) investigated the impact of innovation on the performance of Banks in Kenya. The study focussed on the effect of E banking on efficiency ratio of banks and a total of 23 Banks for the period 2007 to 2016 was used. Secondary data was collected from the State Bank of Pakistan and the data was analysed using the E Views Statistical

package. Efficiency ratio was the dependent variable and the independent variable was MB (mobile banking), POS (point of sale), IB (internet banking) and ATM (automated teller machines) transactions. The results show that there was a significant and positive relationship between efficiency and IB. The results were non-significant for MB, POS and ATM. When granger causality was applied, there was no correlation between the variables. They advocated more investment in POS and ATM as they reduce operating expenses. Proper and effective use of IB and MB should be maintained rather than investing in more of these platforms. Hu & Xie (2018) focussed on the effect of financial innovation on the performance of Japanese Commercial Banks. They adopted Log method and panel regression analysis. Their study revealed that innovation increases bottom line and banks should innovate to survive and increase profitability. Mutahar et al. (2018) reached the same conclusion when analysed banking institutions in Yemen. A questionnaire was used and snow ball sampling was adopted. Structural equation modelling was used and data was analysed using Analysis of moment Structures Software and SPSS. Waiganjo (2018) on the effect of mobile banking services and profitability concluded that as the number of mobile banking users increases, profitability also increases in that respect. Structured questionnaires targeting six banks with a sample of 190 was used to collect primary data. Secondary data was obtained from Annual Bank statements for Kenyan Banks for the period 2013 to 2017 and multiple regression analysis was used to analyse the data. Financial performance was proxied by ROA (return on asset) and the independent variables were value of MB transactions and number of MB users.

Yao et al. (2018) did a Chinese study to determine how investment and adoption of payment technology affects financial performance. The period under consideration was 2007 to 2014 and a vector model which applies auto regression techniques was adopted. Data was obtained from a most credible source which is the China Stock Market dealing with research. independent variable was Third Party payments which encompass all payments related to the use of mobile and internet banking. The dependent variable was average economic value added per share which was used as a proxy for profitability (financial performance). The results showed that third party payments affect profitability of institutions in the short run and in the long run they have a positive effect on the whole industry by contributing to synergy in the service sector. The study recommended cooperation among all stakeholders in the payment structure spectrum. Gayathri and Suvitha (2018) study show how Indian Banks are affected by information technology. Time series data for the period 2011 to 2015 for 21 banks was used which consisted of 12 national banks with the other nine being private. Profit after tax was used as a measure of performance and the independent variables encompassed expenses related to Information technology, salary, depreciation, printing and marketing and distribution related expenses. The study revealed that investment in information technology and marketing has a positive impact on profitability with Information technology having the strongest effect of them. They recommended that financial institutions should invest more in technology and government should create an enabling environment for firms to be encouraged to invest. Guided by studies and key theories informing this study the researchers proposed the conceptual frame

Figure 2: Research model



Source: Researchers (2022)

work presented in figure 2 below with four sub-hypotheses.

Research Gap

Innovation and its expected effect on financial of commercial banks are limited especially in least developed economies like Zimbabwe. Studies by Waiganjo (2018) although coming closer to the current work as it explores the subject financial innovation (in general) and commercial bank performance used a qualitative cum quantitative approach through use of close ended questionnaires by using Analysis of Moment Structures (AMOS) extension module of SPSS to measures the direct effects between financial innovation and commercial bank performance. The current paper uses purely quantitative data on technological

financial innovation parameters as related to commercial bank financial performance which is a departure to Waiganjo (2018). The paper is also unique to Zu et al. (2019), Wadesango and Magaya (2020) whose studies focused on commercial bank performance which may capture other performance indicators other than financial performance and focuses on technological financial innovation rather than innovations in general and its effect on financial performance as opposed to general bank performance and adopts a narrow and specific view to innovation as it pertains to financial performance of commercial banks.

Methodology

The paper is guided by a positivist philosophical orientation which focuses on testing hypotheses as guided by hypothetico-deductive methodology. The paper focuses on causal

effects between variables in order to test whether there exist nexus between financial innovation and commercial financial performance in Zimbabwe. Secondary panel data on proxy variables for different technological financial innovations and performance indicators were collected and analysed using Stata package from thirteen commercial banks. The commercial banks studied were CBZ bank, FBC bank, ZB Bank, Eco bank, Steward bank, POSB, First capital bank, AFC bank, Banc ABC, NMB, Standard Chartered bank, Stanbic bank and Nedbank. The researchers collected data on ROA, IB, MB, ATM AND EFT on the seven year quarterly data.

Variable description

The panel data multiple regression model used in this paper adopted five variables, being proxy measures for the independent variables and one being the dependent variables. The method had been used by Akwam and Yua (2021) and Ibekwe (2021) though their focus was not on technological financial innovation. Table 1 presents the variables and the operationalisation of such variables.

All the five proxy variables were ratio scaled thus allowing such panel data to be modelled together without challenges.

Results

Descriptive statistics results

Descriptive statistics focuses on mean, maximum, minimum and standard deviation of the variables by providing a contextual analysis of the data. According to Hussey and Hussey (1997), it provides a picture of the major features and physiognomy of the variables

under consideration. It is imperative as it puts into perspective, dispersion, distribution and central tendency measure of the data. Descriptive statistics summary outcomes are presented shown in Table 2 as derived and extrapolated by the data used in the study.

According to Table 2, the mean ROA was 9.18654 with a standard deviation of 5.547874, the minimum was -6.9 and the maximum ROA was 19. From this we can interpret that performance of Commercial Banks during the period was low as witnessed by the fact that some banks were in a loss making position during the period. The performance, although low, it is positive which is commendable since it shows significant and considerable profits being made. ATM had a mean of 17.6, a standard deviation of 0.81, and minimum value of 0.08 and a maximum of 98 which shows that ATM use was growing over the period under review. The results show lower means, standard deviation maximums and minimums for EFT, IB and MB. This points to the notion that usage of these technological innovation devices was low and banks need to do more to educate and acclimatize clients on the need to adopt these technological innovation tools. It is good to have technological innovation tools but it is imperative that clients are quickly on-boarded and encouraged to use these tools.

Robustness check

Heteroscedasticity test

To test for Heteroscedasticity, we undertook tests through the Breusch Pagan- Godfrey test. We obtained a p-value of 0.8193 which is greater than 0.05 concluding that the model was homoscedastic and as per norm, we reject the alternative hypotheses.

Table 1 Variables operationalisation

Variable	Meaning	Dependent / independent	Measurement	Studies	Scale
Yi	Financial performance which is a measure of the comprehensive income over time	Dependent	Return on Assets	Akwam and Yua (2021)	ratio
ATM	Automated teller machines (ATM) are Machine that offers banking services electronically by dispensing cash via a card system	Independent	Investment in ATM over time, in relation to annual expenditure	Ibekwe (2021)	ratio
IB	Internet Banking (IB) which involves transfer of funds using electronic means via the internet	Independent	Investment in Internet banking over time	Lasmini et al., 2020	ratio
MB	Mobile banking (MB) which involves transacting using mobile phone	Independent	Investment in mobile banking over time	Akani and Obiosa (2020)	ratio
EFT	(EFT) Electronic funds transfer through POS	Independent	Investment in EFT platforms over time	Zu et al., 2019	ratio

Table 2 Summary results of descriptive statistics

Variable	Observations	Mean	Std dev	Minimum	maximum
ROA	91	9.18654	5.547874	-6.9	19
ATM	91	17.61949	0.8145373	0.07	98
EFT	91	19.75574	4.871968	18.08	20.85
IB	91	34.353673	5.93446	0.6	76.7
MB	91	7.39647	4.381332	3.4	17.5

Homoscedasticity entails that variances are constant among the error terms (Gujarati & Porter, 2004). The table 3 illustrates the results. There was no issue with heteroscedasticity because the data reveal constant variances among the variables.

Table 3: Test results for heteroscedasticity

Chi-2(1)	Prob> chi 2
0.08	0.8193

Hausman specification test results

This test was conducted to make a choice between the fixed effects model or the random effects model. H0 was for the random effects model while H1 was opting for the fixed effects model. The decision criterion was stanchied towards the random effects model as the p (0.1267) value is greater than 0.05. Table 4 shows the test results.

Table 4: Test results for hausman specification

Chi-2(6)	Prob> chi 2
11.41	0.1267

Results of panel unit root test

Unit root test was performed by applying the Levin-Linchi Test. The data was skewed towards the alternative hypotheses as the condition of stationarity. According to Table 5's findings, all variables were stationary at level I (0). Result shows that the data was integrated of the first order for the predictors which were used in the analysis of the data.

For stationarity to exist under panel unit root

test under a one tailed test criterion, the p value should have a value less than 0.1. From the results presented, the P values are all less than 0.1 and the integration were of the order zero for all variables. Thus the conclusion is rejection of H0 and all variables are considered to be stationary. The interpretation is that the variables are co integrated and they move in

tandem with each other. In such instances, variable equilibrium and consistency in the long-run is established.

Multicollinearity test results

The correlation matrix was adopted to check whether the model exhibits characteristics of strong and severe multicollinearity or the opposite is also true. Table 6 shows the results obtained from the correlation matrix will ensure that the regressors do not have a relationship within

themselves which would make the model suspect.

From the table presented above, it is revealed that all the correlation matrix figures and coefficients are below the threshold of 0.8 and therefore we can safely deduce that the model did not suffer from severe and austere multicollinearity. This implies that the estimated coefficients are precise and the statistical power of the regression model is enhanced which makes the model robust. In this regard, we can trust with absoluteness the P-values to determine the

Table 5 results of unit root test

Innovation modes	t-distribution stats	p-distribution stats	Intergration order
ROA	-4.7643	0.0001	I(O)
ATM	-20.5604	<0.0001	I(O)
EFT	-13.0654	<0.0001	I(O)
IB	-5.4793	<0.0001	I(O)
MB	-4.0828	0.0033	I(O)

Table 6: Correlation matrix

	ROA	ATM	EFT	IB	MB
ROA	1.000000	-0.354279	0.208870	0.059027	0.500997
ATM	-0.354279	1.000000	0.132066	0.123543	-0.270292
EFT	0.208870	0.132066	0.084936	0.084936	0.247042
IB	0.059027	0.123543	0.084936	1.000000	0.137202
MB	0.500997	-0.270292	0.24702	0.137202	1.000000

statistically significant independent variables. This will ensure we have a correctly specified model.

Results presentation, interpretation and analysis

The regression was carried using Stata statistical package after all the diagnostic tests had been done and data abnormalities have been regularized. The approach adopted to determine significance was the common P value approach with the null hypotheses being coefficient is not statistically significant and the alternative being coefficient is statistically significant. If a p Value is greater than 0.05, the variable is statistically significant and the null hypotheses is dropped. Table 7 reveals the panel regression results.

$$ROA = 0.32MB + 0.93IB + 0.86ATM - 17.28$$

Equation 1

$$R^2 = 0.8226$$

$$\text{Adjusted } R^2 = 0.7993$$

$$F(6,84) = 25.62$$

$$\text{Root MS} = 5.5538$$

The model's explanatory power is denoted by the adjusted R^2 which is given as 0.7993 (0.8), this means that 80% of variability in commercial banks financial performance is explained by different technological financial innovations as captured by the model and the remainder 20% is explained by factors outside the model. This is a significantly higher explanatory power as it is way above 60% which was recommended by Gujarati and Porter (2004). The root MSE of 5.56 measures the standard deviation of residuals. Given that it is small, it means that the model can be relied upon as the variability residual is small. Of the four proxies of technological financial innovations only one (Electronic funds transfer) was found to be not statistically significant in explaining variability

Table 7: Panel regression results

Variable	Coefficient	Std. Error	t-Statistic	Prob
ATM	0.86481	0.7991431	2.96	0.004
EFT	0.64158	0.7052371	1.56	0.129
IB	0.93572	0.804811	2.89	0.006
MB	0.3229294	0.0815643	3.95	0.002
CONS	-17.27562	3.499499	-4.94	0.001

in financial performance of commercial banks in Zimbabwe as its probability value was found to be greater than 0.05 (0.129). Use of point of sale/ Automated teller machines was found to be positively related to financial performance of banks as a 10% improvement in the technology is associated with an 8.6% increase in financial performance of commercial banks in Zimbabwe as reflected by a beta coefficient of 0.86. Similarly, a beta coefficient of 0.935 for internet banking imply a very strong positive association with financial performance of banks as a 10% change in investment in internet banking will be met by a massive 9% increase in financial performance. However, a weak positive association was established between use of mobile banking (whatsapp, SMS, app banking) given a beta of 0.32, as a 10% increase in investment in mobile banking is likely going to be met by a 3% increase in financial performance of commercial banks in Zimbabwe.

Discussion of results

The positive association between mobile banking and financial performance dovetails with other studies that were undertaken before. Akwam and Yua (2021) in their Nigerian study on the effect of financial innovation on

financial performance concluded that the mobile banking was significant and showed a positive relationship with Return on Assets. This was also buttressed by Torki et al. (2020) in their Islamic study whose result pointed to the same result though the results differ on strength of association. In Zimbabwe the weak association can be explained by high charges by mobile money companies as well as tax on electronic transfers.

On another note, the positive relationship between internet banking and financial performance is in line with studies by Lasmini et al. (2020) who found a positive relationship between internet banking and ROA. However, the current study established a very strong positive relationship with financial performance which represents a departure from Lasmini et al. (2020). Nwobodo (2011) in his study of Turkish banks concluded that banks which had internet banking platforms performed better than those that were not on those platforms. From a Zimbabwean perspective banks are charging one percent internet fee commission on the amount transacted which is adding significantly to profitability which justifies the current results. This goes a long way to show how this revenue source contributes significantly to bank profits. Most banks in Zimbabwe have been advocating for a paper

less office through elimination of manual transfers through their digital transformation thrusts. Through straight through process, transfers which previously took two days to credit now only take a few hours. This has improved confidence in the transacting public especially corporates who move huge funds every-day and would want a seamless and efficient process that will ensure service providers are paid in time.

The results are in line with the same conclusion reached by Nwakoby et al. (2020), in his Nigerian study revealed a positive relationship between POS and bank profits. However, the results contradict Nwobodo (2011) whose findings revealed that POS was insignificant in explaining bank profits. Zimbabwe is unique in that due to high inflation rate, and continuous loss of value of the local currency, most clients now prefer to use POS as the model is convenient.

Conclusions, implications limitations and future research suggestions

The millennial clients are techno savvy and the demand for technology in the banking sphere has taken an upward trajectory and hence banks need to redesign products and services to cater for these needs. Banks in Zimbabwe have taken significant strides with the advent of Chatbots, WhatsApp Banking and Virtual Banking to mention but a few of the technologies being adopted by Banks. Digital only banks known as Neo Banks are fast replacing traditional banks, Artificial intelligence, application programme interfaces, block chain technologies and internet of things need to be embraced by local banks as these will go a long way in addressing not only clients' needs but also profit goal of banks. In this regard, it is imperative that Commercial Banks in

Zimbabwe latch into this bandwagon as technology is fast gravitating to these technologies by 2025. This will go a long way in increasing income and accelerate profit generation potential.

There is need to acquaint customers with digital products since most of the population in Zimbabwe are not well versed with technology and bank applications. First time customers can take part in digital competitions where prizes can be won. This will increase digital awareness and increase mobile revenue income for banks. We recommend that Banks should partner with Government to penetrate rural areas to introduce digital technologies. The Government rural computerization programme can see banks donating computers, electrifying schools and create internet Kiosk through partnership with government. The technological thrust has been mostly in urban areas and hence penetrating the rural areas would see more digital on boarding of clients. Banks could take this opportunity to educate clients in the rural areas about digital banking by creating digital innovation centers in those remote and marginalized areas.

Slow uptake of digital technologies by the Banking clients has had to do with lax cyber security by banks, weak consumer protection laws that trample on financial integrity and transparency, and unsatisfactory grievance resolution which led to lack of trust by the banking public. Banks and the government need to invest massively in this area to address low uptake of new models of banking.

Limitations and future research suggestions

This paper explored the nexus between technological financial innovations and financial

performance of commercial banks in Zimbabwe, thus its application is limited to the commercial banks. This therefore means that future studies can be explored in building societies, finance houses. This nexus can also be explored using categorical dimensions as proxy measures using structural equation modeling. Commercial bank financial performance can also be pursued from use of other digital technologies such as block chain technologies, cloud computing and 3D technologies. These fourth industrial revolution technologies can be explored in the context of financial institutions.

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