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Influence of Technology Adoption on Operational Performance of Medium Banks During Covid-19 Pandemic in Moshi Municipality, Tanzania

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A B S T R A C T

Information technology (IT) has transformed the banking industry and the outbreak of the Covid-19 accelerated the trend making the issue of IT adoption more relevant than ever. This study examines the influence of technology adoption on operational performance of medium commercial banks in Moshi Municipality in Tanzania to include Mkombozi Bank, Uchumi Commercial Bank and Akiba Commercial Bank. A concurrent research design with a mixed methods approach was used where utilization of the qualitative and quantitative data was employed. The population of the study was 63 employees of the three banks and the sample size was determined through census technique as the population size was small. Primary data was collected from the respondents while secondary data was collected from the annual report of the year 2019/20 to 2022/2023. For validity of the instrument, face to face and content validity was used while reliability was done through a test-retest process of the instrument. As for data analysis, descriptive statistics, correlation and regression analysis was done to test the influence of technology adoption during COVID 19 pandemic on the operational efficiency of commercial banks in the study area. Findings of the study has shown that debit cards, credit cards, mobile banking and Point of Sale (POS) has positive influence on net profit margin at p-values less than 0.05 while credit cards and debit cards has negative influence on operational efficiency of the studied banks. It is concluded from the study that debit cards, credit cards, internet banking, mobile banking and POS have a positive influence on the net profit margin. Similarly debit cards and credit cards have a negative influence on operating expenses ratio. It is recommended that; banks should take advantage of the technologies to expand their net profit margins while they should be careful with the debit cards and credit cards regarding the operational efficiency of the banks.

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1. INTRODUCTION

In recent years, information technology (IT) has transformed the banking industry and the outbreak of the Covid-19 accelerated the trend making the issue of IT adoption more relevant than ever. The pandemic caused severe economic impact worldwide, touching various industries and businesses. The banking sector, being a vital part of the financial system, has also been affected by the pandemic (Goel et al., 2021). Commercial banks, specifically, have faced significant challenges in maintaining their performance during this period, including liquidity management, credit risk, and operational efficiency (Anwar et al., 2021). These challenges have been compounded by the increased uncertainty and risk associated with the pandemic. As commercial banks play a critical role in promoting economic growth and development and ensuring financial stability, it is important to understand how technology adoption influenced banks' financial performance during this period, not only in Tanzania but also globally (Choudhury et al., 2021).

The operational efficiency of a bank, simply means the ability of a bank to provide all the banking services using its available resources to achieve its goals or objectives (Shair et al., 2021). Banks have largely implemented service delivery technology during the covid 19 pandemic as a way of enlarging the services during this period traditionally provided by bank personnel. Implementation results both from the need to reduce the cost of delivering service primarily through personnel, protecting the personnel against infection of the viruses and the corresponding need to meet the challenge posed by technologically innovative competitors (Rabiu et al., 2019). Changes in the banking industry such as those resulting from deregulation, rapid global networking, and the rise in personal wealth have made the implementation of sophisticated delivery systems like the use of online and telephone banking, remote site automated teller machines, etc.

In East Africa, the banking sector was being obstructed by the pandemic (Allen et al., 2021). In Kenya, the pandemic led to a decrease in loan growth and increased non-performing loans (Central Bank of Kenya, 2020). Uganda experienced a decrease in bank deposits and an increase in non-performing loans NPLs (Bank of Uganda, 2020). These trends indicate that the COVID-19 pandemic negatively affected the banking sector in the respective countries in the region.

It should be remembered that access to financial services in East Africa is increasing due to increased technologies which have increased financial inclusion level. Mostly the huge population in the rural areas are dependent on mobile banking (Allen et al., 2021). Participation in the formal financial institutions however vary between countries. In Tanzania whereby 80% of people are engaged in agricultural activity of the economy, only about half have banking accounts. This situation is similar to other members of east African countries for example less than a third of the population in Uganda, Rwanda, and Burundi do not have proper access to financial services. One of the reasons for this situation is that the majority of banks and financial institutions are more targeting commercial traders than farmers. Similarly, the majority of people in rural areas lack bank knowledge, also poor infrastructure discourages commercial banks and financial institutions from operating in rural areas. As a result, the few customers are very important for commercial banks' operations.

According to the World Bank (WB), Commercial banks across the world are categorized as being large, medium or small banks (WB, 2016). The categorization normally is based on the threshold of the capital to invest in the banking business in a particular country under the regulation of the central bank of the respective countries (WB, 2019). The Bank of Tanzania for instance has rated CRDB Bank, NMB Bank, National Bank of Commerce, Standard Chartered Bank, Commercial Bank of Africa, Exim Bank, and Bank of Africa a few to mention as large banks. These banks offer a wide range of financial products and services, and have a

strong presence across the country in terms of branches and customer base. There are also 17 medium banks and 9 small banks (BOT, 2020) totaling 37 commercial banks in the country (BOT, 2021). In terms of branch networks and customer base, large banks have advantage in terms of operational efficiency compared to medium and small banks during economic shocks due to economies of scale they can make.

Technological advances facilitate rapid transmission of digitized information within and across borders, which is becoming increasingly important for successful banking transactions as financial services are largely informational in nature (Sunardi & Tatariyanto, 2023). The changes that new technologies have brought to banking and their impact on officers, employees, and customers of banks are enormous. Advances in technology during the pandemic have been said to allow for delivery of banking products and services more conveniently and effectively than ever before. Thus, creating new bases of competition, rapid access to critical information and the ability to act quickly and effectively in the process of serving clients who were in a critical situation (Fu & Mishra, 2022).

During the COVID 19 pandemic, banks adopted different technologies in their operations based on prior evidence in the scholars' community. According to Marcu, 2021) mobile banking is one innovation and an appropriate banking environment is one of the technologies that was efficiently used by banks during the pandemic. Likewise, the study by Wahito and Ngugi (2018) examines the contribution of mobile banking to operational efficiency of commercial banks in Kenya, their findings of the study indicated that, 70% of financial institutions in Kenya had adopted process innovation (mobile banking) which enabled them to serve more clients within a shorter time hence boosting the operational performance over time. Further findings indicated that mobile banking innovations had been statistically significant in explaining the operational performance of commercial banks in Kenya. Rabiu et al. (2019) found the use of mobile banking by the banks has improved the operational efficiency of Nigeria banks, in terms of providing efficient services to customers electronically. Based on it, the study develops the following hypothesis:

Internet banking allows a user to conduct financial transactions via the Internet. According to Naeem & Ozuem (2021) who investigated the customer perception of the impact of technology on service delivery in the banking sector, high scores on the ability to deliver service via technology appear to be correlated with high satisfaction with services deemed most important to customers. The study found that internet banking has a positive significant effect on the operational performance of the commercial banks. The chi-square results indicated that e-banking causes higher advantages to Iranians. As, the customers are deriving satisfaction with particular reference to the use of e-banking. Internet banking has been found to have significant positive contributions to the bank's performance and to the development of competition in the banking sector. Therefore, it is stated that internet banking practices strengthen banks' tendencies towards technological innovations. Internet banking applications increase the asset quality of banks and therefore increase the operational profitability and return on equity (ROE) performance directly.

A credit card is a financial services company that allows cardholders to borrow funds with which to pay for goods and services with merchants that accept cards for payment (Wu et al., 2020). The study found out that credit card lending specialization gives higher and more volatile returns than achieved by banks with conventional product mixes. The study stated that credit card services have a positive impact on firm performance and operational efficiency. Hovarth et al. (2023) studied the relationship between adoption of credit cards and credit card holders' satisfaction shows that credit cards contributed positively to satisfaction of credit card holders and adoption of credit cards improved commercial banks revenue and operational efficiency during the pandemic. Further findings by the study indicated that credit cards

contributed positively to satisfaction of credit card holders and adoption of credit cards improved revenue and operational efficiency of banks revenue.

Point on sale (POS) terminal is a computerized system used to record sales and handle payments. One of the most important tasks of banks is presenting services via modern technologies including ATM and POS. POS is a device which provides automatic transfer of purchasing price from a seller's account via telephone or network connection to bank systems. Kee et al. (2021) examined the effect of technology POS leads to sales increase and expenses reductions which positively impact profitability and customer satisfaction in Malaysia. Prihatiningtyas & Wardhani, 2021) stated that electronic banking such as mobile banking and POS banking are driven by the prospects of operating costs minimization and operating revenues maximization. And there is a positive relationship between POS and operational efficiency. Koulouridi et al. (2020) showed that the point of sale has a positive impact on customer satisfaction during the pandemic, firm performances and operational efficiency of banks. Dahlhaus & Welte (2021) found that there is no significant relationship between mobile banking, point of sale and electronic money with profitability and operational efficiency of banks.

A debit card is a payment card that deducts money directly from a consumer's checking account when it is used. Andersen et al. (2022) identified that usage of debit cards during the pandemic were leading to the significant relationship with operational efficiency of banks. Mistrean (2021) found that the increased usage of debit cards has significantly reduced transaction costs and enhanced convenience among credit and debit card users. This has attracted prospective customers leading to increased sales and profitability. Debit cards improve efficiency and flexibility to customers. Dahlhaus & Welte (2021) found that debit cards were not statistically significant towards improving the operational efficiency of banks due to their association with fraud incidences, causing financial institutions to incur losses. Wu et al. (2020) investigated the effect of debit card usage on the operation of the banking industry. The results showed that increases in debit card usage enhance the profitability and efficiency of the banking industry. Based on it, the study develops the following hypothesis:

1.1. Statement of the Problem

Commercial banks in Tanzania are expected to maintain or improve their performance and continue to play a vital role in promoting economic growth and development (Mikael & Sholte, 2020). By doing so, they would help ensure the stability of the financial system, support customers and communities, and enable businesses to access critical financial services. This would require banks to familiarize themselves with the new operating environment and manage risks effectively. However, the reality is that the COVID19 pandemic stacked the operations of commercial banks in Tanzania (Mayala, 2021). Banks faced increased uncertainty, risk, and operational challenges, leading to a decline in performance (Jallow & Samba, 2021). As a result, some banks have faced challenges to maintain liquidity and capital adequacy ratios, while others have experienced operational inefficiencies and lower employee productivity. This created challenges for businesses and individuals seeking access to financial services.

Previous studies have investigated the impact of macroeconomic factors, such as inflation and interest rates, on the performance of banks in Tanzania (Iddi and Daud, 2020; Gazi et al., 2022; Mashindano and Kazi, 2022). However, there is a gap in the literature on the specific aspect of technology adoption that influenced performance of medium commercial banks during the COVID-19 pandemic. This is important as their number is big compared to the large commercial banks but also having less capital to operate the banking business (Lotto, 2019). For that matter, when there are potential shocks in the business environment like COVID -19, these banks are prone to be more affected than the large banks (Mligo and Maseko, 2022).

This study therefore investigated the effects of technology adoption on the performance of medium banks during the COVID-19 pandemic in Moshi Municipality.

1.2. Objective of the Study

The objective of the study is to assess the influence of technology adoption on operational efficiency of medium commercial banks during COVID-19 Pandemic in Moshi Municipality, Tanzania.

1.3 Hypotheses

To measure the influence of technology adoption for the medium commercial banks during the pandemic, the following hypotheses was developed for the study:
H_1: There is no significant relationship between mobile banking and operational efficiency.
H_2: There is no significant relationship between Internet banking and operational efficiency.
H_3: There is no significant relationship between Credit card and operational efficiency.
H_4: There is no significant relationship between POS and operational efficiency.
H_5: There is no significant relationship between Debit card and operational efficiency.

1.4 Theoretical Literature Review

This study is informed by the Diffusion of Innovation Theory (DIT). The Diffusion of Innovation theory was developed by Everett Rogers (1962), as a framework that explains how new ideas, products, technologies, or innovations spread and are adopted by individuals or communities over time. This theory provides insights into the process of adoption and the factors that influence it. The diffusion process typically involves five stages: knowledge, persuasion, decision, implementation, and confirmation.

The first stage which is actually the innovation stage, explains the knowledge part. This is the idea, product, or practice that is being introduced. Innovations can range from tangible products to intangible concepts, such as new technologies, practices, or ideologies. The second stage explains the persuasion aspect where adopters are recognized. These are the individuals or organizations that decide to take up and use the innovation. Rogers (1962) classified adopters into five categories based on their readiness to adopt: innovators, early adopters, early majority, late majority, and laggards. The third stage is on the decision aspect where the means through which information about the innovation is transmitted. This includes mass media, interpersonal communication, social networks, and other channels that influence the diffusion process. Implementation is the fourth stage of the DIT where the rate at which the innovation is adopted. The diffusion process is not uniform, and different innovations may take varying amounts of time to be widely adopted. Lastly, is the confirmation aspect where the social context in which the innovation is introduced, including cultural norms, social networks, and the structure of communities. The social system influences how individuals perceive and adopt innovations.
The DIT however has been criticized that the theory often presents a linear and simplistic model of the diffusion process, assuming that innovations progress uniformly through a series of stages (Min et al., 2021). In reality, the adoption and diffusion of innovations can be much more complex, influenced by various factors such as social, cultural, economic, and political forces. The theory also assumes a homogenous population, overlooking the diversity within social groups (Yuen et al., 2021). Different individuals or communities may adopt innovations at different rates due to variations in education, socioeconomic status, cultural values, and other

contextual factors. The theory tends to overlook the role of social disparities and the differential access to resources. Furthermore, the focus of the theory is primarily on the characteristics of innovations and adopters, often neglecting the significance of communication channels (Benhabib et al., 2021). In modern societies, the medium through which information is transmitted plays a crucial role in shaping the diffusion process, and this aspect is not adequately addressed in the theory. Despite these criticisms, the DIT remains a valuable framework for understanding the general patterns of innovation adoption.

1.5. Empirical Literature review

1.5.1 Technology Adoption and Performance of Banks During COVID-19 Pandemic

The COVID-19 pandemic has significantly influenced technology adoption in various industries, including the banking sector and acted as a catalyst for technological innovation (Guang-Wen & Siddik, 2023). While it presented challenges, it also accelerated the adoption of digital solutions, transforming the way banks operate and interact with customers. The extent to which these technological advancements positively or negatively impacted a bank's performance may depend on factors such as the speed of implementation, the quality of technology solutions deployed, and the ability to adapt to changing customer expectations (Sunardi & Tatariyanto, 2023).

Kwan et al (2021), observed that, Covid-19 pandemic increased the pace of change in clients' relationships with the banking sector, with mobility restrictions forcing banks to make better use of information technology to accommodate the increasing demand for digital financial services. The study further acknowledged that ICT adoption in banks facilitated lending and other services being advanced to bank clients since the outbreak of the pandemic. It was further explained that intermediaries with a higher degree of digital readiness provided more credit to non-financial entities. The study also concluded that proximity to a physical bank branch increased the positive impact of ICT on the amount of credit granted to bank clients. The study however was not specifically on the factors which influenced performance of commercial banks but rather on the pace that ICT increased interaction with clients. The current study will look into the influence of technology adoption on Mkombozi Bank Uchumi commercial Bank and Akiba Commercial Bank performance during COVID 19 pandemic in Moshi Municipality.

Pierri and Timmer (2020), in their study on increasing adoption of digital innovations in the financial system found that there is a need of pushing the academic discussion about technology adoption and its potential benefits or drawbacks to look for a solid foundation of empirical evidence during Covid 19 in the banking sector. While prior studies have investigated the effects of information technology (IT) adoption on different banking outcomes (Beccalli 2007, Koetter & Noth 2013), findings so far have been inconclusive and apart from a few exceptions have not yet been tested during periods of crisis like covid -19. In the current study, some conclusions are expected to be made on how technology adoption was influential on the financial performance of the medium commercial banks in the study area.

Branzoli et al. (2021), in the study exploited Covid-19 pandemic as an unpredictable event that is likely to have enhanced the importance of digital prowess as a source of competitive advantage to analyze variations in credit across Italian banks associated with different ex-ante levels of IT adoption. The study found that IT-intensive banks increased their lending to non-financial corporations (NFCs) more than others in the months following the

outbreak of the pandemic. The study further indicated that the increase was economically sizable even when nationwide mobility restrictions were lifted and public health conditions improved. However, this study did not categorically come out with the effects of financial performance but rather the effects that were presented were those with immediate effects to banks including access and lending. The current study is enhanced to include the key aspects of performance for medium banks.

Keil and Ongena (2020), measured banks' level of IT adoption using unique data on IT-related costs reported in the income statement and survey information on the use of digital technologies at the bank level. The study, costs incurred for the purchase of hardware (e.g. personal computers, servers, mainframes) or software, the compensation of IT specialists (e.g. computer support engineers) and the outsourcing of IT services to external providers. The study found that IT costs are normalized by the total operating costs of the bank. To assess whether a greater share of IT costs is related to a higher degree of IT adoption, the study explored the relationship between banks' IT expenditures and the use of digital technologies. Further findings indicated that, controlling for a rich set of bank characteristics (including size, funding structure, and profitability), is actually related to banks' degree of digitization and propensity to innovate: the higher the IT expenditures, the greater the likelihood of offering digital services and engaging in innovative processes during crisis. The current study is focused on the factors that influenced performance of medium commercial banks during the pandemic.

Basten and Ongena (2020), investigated the dynamics of credit and its allocation across NFCs in Italy. Using a difference-in-differences identification strategy, the study found that the effect of IT on credit growth was larger for borrowers hardest hit by the pandemic. NFCs located in the areas of the country most affected by the pandemic experienced a greater increase in lending from higher-tech lenders. The study further found a positive variation in credit for businesses operating in sectors deemed non-essential during the lockdown and consequently forced to close their physical locations. Small and medium-sized enterprises (SMEs) were more exposed than larger firms to liquidity shortfalls and benefited the most from the growth in loans fueled by technologically advanced banks. The study did not come out with any findings which are specific to factors that influenced performance during COVID 19 pandemic. The current study is very specific to medium commercial Banks on the factors that influenced performance.

2. METHOD

The study used a concurrent research design with a mixed methods approach as the study used both qualitative and quantitative data (Cresswell & Cresswell, 2018). A mixed approach was adopted as it helps to provide a more comprehensive understanding of the research problem by the researcher. By combining two approaches, the study was able to get a more complete picture of the research problem. The target population of study were all relevant employees for the study at Mkombozi Bank (18); Uchumi commercial bank (28) and Akiba Commercial bank (17) making a total of 63. By relevant staff means only those who are regarded as able to respond to the research questions. In research, the population of the study refers to the entire group of individuals or objects that the researcher is interested in studying (Banerjee et al., 2020).

As the population of the study was small (63), a census sampling technique was used to determine the sample size. This is a statistical research method that involves collecting data from every member of a population (Cresswell and Cresswell, 2018). Both primary and

secondary data were collected to accomplish the objectives of the study. In obtaining primary data, a questionnaire for the bank staff was used. A documentary review guide was used to collect data from audited reports of the banks, specifically financial statements from 2019/2020 to 2022/2023 which comprised four (4) years of operation during the pandemic. The study was based on primary and secondary data which were collected from the respondents of 3 medium commercial banks as well as from the annual report of the year 2019/20 to 2022/2023. The data were collected from the 63 respondents through a questionnaire. Table 1 shows the number of commercial banks along with the number of respondents selected for the study.

Table 1: List of Medium Commercial Banks with Corresponding Number of Respondents

S/N	Bank Name	Number of Respondents
1.	Mkombozi Bank	18
2.	Uchumi Commercial Bank	28
3.	Akiba Commercial Bank	17
	TOTAL	**63**

Source: Field Data, (2024)

2.1 The model

The models used in this study analyze the relationship between the technology adopted by medium commercial banks and their operational efficiency during COVID 19 pandemic. The dependent variables are net profit margin and operating expenses ratio being operationalized in model one and two respectively. The selected independent variables in this study are mobile banking, internet banking, credit card, POS, and Debit card. Therefore, the model takes the following form:

Operational Efficiency = f (debit card, internet banking, mobile banking, POS, and credit card).

More specifically,

The multivariate regression equation was:

Model 1: $NPM= \beta 0+ \beta 1DC+ \beta 2IB+ \beta 3MB+ \beta 4POS+\beta 5CD + e$

Model 2: $OER= \beta 0+ \beta 1DC+ \beta 2IB+ \beta 3MB+ \beta 4POS+\beta 5CD + e$

Where;

NPM = Net Profit Margin is the ratio of net profit to gross income in percentage

OER = Operating Expenses Ratio is the ratio of operating cost to operating income in percentage

DC =Debit card is the number of customers using Debit Card services

IB = Internet banking is the number of customers using Internet Banking services

MB = Mobile banking is the number of customers using Mobile banking services

POS = Point of sale is the number of customers using Point of sale (POS) machine services

CD = Credit card is the number of customers using Credit card services “e” is the stochastic disturbance error term.

The following section describes the independent variables used in this study:

3. RESULTS AND DISCUSSION

3.1 Descriptive statistics

Table 2 consists of the descriptive statistics of the selected dependent and independent variables based on primary and secondary data which were gathered from the respondents of 3 medium

commercial banks as well as data gathered from the annual report of the year 2019/20 to 2022/2023. The table presents the mean, and standard deviation including minimum and maximum values of variables.

Table 2: Descriptive Statistics

Variable	Minimum	Maximum	Mean	Std. Deviation
DC	3.25	5.00	3.97	0.41
IB	3.33	5.00	3.88	0.37
MB	3.67	5.00	4.32	0.39
POS	3.55	4.73	4.05	0.32
CC	3.11	5.00	3.89	0.41
NPM	3.98	33.89	17.22	8.21
OER	28.67	59.99	39.87	8.35

Source: SPSS output of field data, (2024)

Table 2 shows the descriptive statistics of dependent and independent variables for the medium commercial banks in the study area. Clearly, net profit margin ranges from minimum of 3.98 percent to maximum of 33.89 percent, leading to an average of 17.22 percent and operating expenses ratio ranges from minimum of 28.67 percent to maximum of 59.99 percent leading to an average of 39.87. This implies that a net profit margin of 3.98% means that the bank is earning around TZS 0.0398 in net profit for every dollar of revenue generated. Conversely, a net profit margin of 33.89% indicates that the bank is generating an estimated net profit of TZS 0.3389 for each dollar of revenue invested in the banks' operations. A higher net profit margin typically signifies more profitability, efficiency, and effectiveness in the management of expenses in relation to income. On the other hand, a decreased net profit margin could indicate increased expenses compared to revenue or reduced effectiveness in generating profits (Sukmadewi, 2020).

The operating ratio is a financial statistic that assesses the efficiency and profitability of a company's operations. An operational ratio between 28.67 percent to 59.99 percent suggests that a lower ratio (28.67%) shows efficient bank operations, with lower expenses compared to revenues. This implies efficient cost control and the possibility of increased profitability. Conversely, the higher end of the range (59.99%) indicates that operational expenses are relatively higher compared to revenue, which predicts lower efficiency and profitability. This could be a matter of concern as it may suggest operational inefficiencies or higher costs compared to revenue (Mrindoko et al., 2020). The findings of the study also was supported by the key informants where one of them reported that;

> *During the COVID 19 Pandemic, there was a big variation in terms of profit margins and operating expenses. It was logical for the technologies to be used in a full swing so that compensation of the ratio mismatch is balanced. Interview conducted on 19th February, 2024.*

The testimony given by the key informants confirms that there was a mismatch in terms of expectations for the profit margins and the operating expenses for the medium commercial banks in the study area.

3.2 Correlation analysis

In order to examine the relationship between dependent and independent variables, a Pearson correlation coefficient was computed and results are presented in Table 3.

This table shows the descriptive statistics of the selected dependent and independent variables based on which were gathered from the respondents of 3 commercial banks as well as collected

from the annual report of four years. The dependent variables are NPM (Net Profit Margin is the ratio of net profit to gross income, in percentage) and OER (Operating Expenses Ratio is the ratio of operating cost to operating income, in percentage). The independent variables are Debit Card (Debit card is the number of customers using Debit card services), Internet banking (Internet banking is the number of customers using internet banking services), Mobile banking (Mobile banking is the number of customers using Mobile banking services), Point of Sale Machine (Point of sale is the number of customers using Point of sale (POS) machine services), and Credit card (credit card is the number of customers using Credit card services).

Table 3: Pearson's Correlation Coefficients Correlation Matrix

Variables	NPM	OER	DC	CC	IB	MB	POS
NPM	1						
ORR	0.059	1					
DC	0.216	-0.039	1				
CC	0.194	-0.114	0.564**	1			
IB	0.299	0.087	0.367*	0.299	1		
MB	0.293	0.046	0.613**	0.389*	0.623**	1	
POS	0.056	0.166	0.589**	0.391*	0.652**	0.698**	1

Source: Data Results, (2024)

(**) and (*) indicates the results are at 1 percent and 5 percent level of significance respectively.

Table 3 shows that debit cards are positively correlated with net profit margin which indicates that with the increment in the use of debit cards, the net profit margin increases. In a similar way, there is also a positive relationship between credit card and net profit margin meaning that increase in the user of credit card that will increase the net profit margin. Likewise, internet banking is also positively related to net profit margin indicating that increment in internet banking users will increase the net profit margin. Mobile banking is also positively related with net profit margin which indicates that more the mobile banking user bank has; more would be the net profit margin. In the similar way, POS is also positively related with net profit margin indicates that higher the user of POS machine in, higher would be the net profit margin. The findings are also supported by the key informants where one of them said that;

> *During COVID 19 Pandemic, the Management of the bank made a decision that clients should mostly be served using the different digital platforms available. Credit cards and Debit cards contribute a lot to the profit margin that the banks reported in the different quarters of the financial years affected by the pandemic. Interview conducted on 22nd February, 2024.*

Furthermore, the result also shows that debit cards are negatively correlated with operating expenses ratio which indicates that with the increment in the user of debit card, the operating expenses ratio decreases. In the similar way, there is also a negative relationship between credit card and operating expenses ratio meaning that increase in the user of credit card that will decrease the operating expenses ratio. Likewise, internet banking is also positively related to operating expenses ratio indicating that increment in internet banking users will increase the operating expenses ratio. Mobile banking is also positively related with net operating expenses ratio which indicates that more the mobile banking user bank has; more would be the operating expenses ratio. In the similar way, POS is also positively related with operating expenses ratio indicates that higher the user of POS machine in, higher would be the operating expenses ratio.

5.3 Multivariate Regression Analysis

Taking the indicated Pearson correlation coefficients, the regression analysis was carried out and the results are presented in Table 4. More precisely, the table shows the regression results of debit card, credit card, internet banking, mobile banking and point of sale (POS), on operational efficiency (net profit margin and operating expenses ratio) for the medium commercial banks in Moshi Municipality.

Table 4 shows the descriptive statistics of the selected dependent and independent variables based on which were gathered from the respondents of 3 medium commercial banks as well as collected from the annual report of the year of 2019/20 to 2022/2023 using linear regression. The model is

NPM= β0+ β1DC+ β2IB+ β3MB+ β4POS+β5CD + e,

Where;

The dependent variables is NPM (Net Profit Margin is the ratio of net profit to gross income, in percentage).The independent variables are Debit Card (Debit card is the number of customer using Debit card services), Internet banking (Internet banking is the number of customer using internet banking services), Mobile banking (Mobile banking is the number of customer using Mobile banking services), Point of Sale Machine (Point of sale is the number of customer using Point of sale (POS) machine services), and Credit card (credit card is the number of customer using Credit card services).

Table 4: Regression Results on Net Profit Margin

Financial Planning Practices	B	Std. Error	t	Sig.
(Constant)	0.056	0.453	-0.167	0.552
DC	0.122	0.045	2.276	0.002
IB	0.143	0.071	2.522	0.003
MB	0.176	0.067	2.661	0.000
POS	0.142	0.051	2.662	0.000
CD	0.122	0.033	2.217	0.001
NPL	0.397	0.061	3.672	0.000

Source: Field Data, (2024)

From Table 4, the study indicates that debit cards have a positive impact on net profit margin. It reveals that more the number of customers using debit card services, more would be the net profit margin. This finding is similar with the findings of Ichsan et al. (2021) who found that debit cards have positive effects on net profit margins of the studied banks in Indonesia. Likewise, the result reveals that the beta coefficient for the credit card is also positive with net profit margin indicating that higher the number of customers using credit card services, higher would be the net profit margin. This finding is similar to the findings of Dahlhaus & Welte, (2021) who also found that credit cards in the studied commercial banks with high frequency data during COVID 19 indicated that credit cards had positive effects on profit margin for the European banks.

Similarly, the result shows that the beta coefficient for internet banking is positive meaning that more the number of customers using internet banking services, more the net profit margin. This finding is similar to the findings of Branzoli et al. (2021). The beta coefficients for mobile banking are positive with operating expenses ratio in studied commercial banks. It indicates

that increase in use of mobile banking services leads to increase in net profit margin. This finding is similar to the findings of (Dahlhaus & Welte (2021) who found that mobile banking had positive effects on profit margins of the Nepalese banks during COVID 19. Similarly, the result reveals that the beta coefficients for point of sale are positive with operating expenses ratio. It means that POS has a positive impact on a firm's net profit margin.

Table 5: Regression Results on Operating Expense Ratio

Financial Planning Practices	B	Std. Error	t	Sig.
(Constant)	0.077	0.433	-0.157	0.552
DC	0.134	0.065	2.266	-0.005
IB	0.166	0.052	2.472	0.003
MB	0.151	0.055	2.671	0.001
POS	0.161	0.081	2.532	0.000
CD	0.127	0.037	2.227	-0.004
OER	0.357	0.052	3.562	0.003

Source: Field Data, (2024)

Table 5 shows the descriptive statistics of the selected dependent and independent variables based on which were gathered from the respondents of 3 medium commercial banks as well as collected from the annual report of the year of 2019/20 to 2022/2023 using linear regression. The model is OER= β0+ β1DC+ β2IB+ β3MB+ β4POS+β5CD + e, where The dependent variables is Operating expenses ratio (Operating Expenses Ratio is the ratio of operating cost to operating income in percentage).The independent variables are Debit Card (Debit card is the number of customer using Debit card services), Internet banking (Internet banking is the number of customer using internet banking services), Mobile banking (Mobile banking is the number of customer using Mobile banking services), Point of Sale Machine (Point of sale is the number of customer using Point of sale (POS) machine services), and Credit card (credit card is the number of customer using Credit card service.

The study indicates that debit cards have negative effects on operating expenses ratio. It reveals that the more the number of customers using debit card services, the lower would be the operating expenses ratio. This finding is similar with the findings of Basten & Ongena (2022), who found that debit cards had negative effects on operating expenses. This could be contributed to the costs of maintaining machines against the income obtained in operating the machines for credit cards usage. Likewise, the result reveals that the beta coefficient for the credit card are also negative with operating expenses ratio indicating that higher the number of customers using credit card services, lower would be the operating expenses ratio.

Similarly, the result shows that the beta coefficient for internet banking is positive meaning that more the number of customers using internet banking services, more the operating expenses ratio. This finding is similar to the findings of Keil & Ongena (2020) who found that internet banking in the Malaysian banks during COVID 19 pandemic were increasing with increased operating expenses. The beta coefficients for mobile banking are positive with operating expenses ratio in medium commercial banks under the study. It indicates that increase in use of mobile banking services leads to increase in operating expenses ratio. This finding further indicated that the beta coefficients for point of sale are positive with operating expenses ratio. It means that POS has a positive impact on a firm's operating expenses ratio.

4. CONCLUSION

4.1 Conclusions

Based on the findings, it is concluded that, like other service organizations, strived to improve customer service level and tie their customers closer. Findings of the study has shown that technology which include debit cards, credit cards, internet banking and POS were adopted by the commercial banks. The study also concludes that credit card, debit cards, internet banking POS and mobile banking has positive effects on profit margin of the studied banks. Similarly debit card and credit card have a negative influence on operating expenses ratio. However, internet banking, mobile banking and POS have a positive influence on the return on equity.

4.2 Recommendations

Based on the conclusions made, as far as net profit margin is concerned, it is recommended that banks should embrace and take advantage of the technology especially with the technologies that capture customer trends. These technologies at the moment are debit cards, credit cards, POS and internet banking.

Regarding the operating expenses being negatively influenced by debit card and credit cards, the study is recommending that banks should be very careful with the two products of technology as they seem to be cost centers in operations. The banks should ensure that, costing of debit cards and credit cards are optimally utilized.

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