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IMPACT OF E-BANKING APPLICATIONS ON THE FINANCIAL PERFORMANCE OF THE PAKISTANI BANKING SECTOR

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Abstract

In this day and age of globalization, efficiency, and reliability, the global economy is confronted with a new infrastructural challenge: the question of how to successfully manage information and communication technology (ICT). One example of how information and communication technology (ICT) has evolved into an indispensable tool that has brought about a profound shift in the manner in which monetary transactions are carried out is the rise of internet banking. Financial institutions have made significant investments in this sector and have demonstrated that clients will find it to be a helpful tool. A great number of commercial banks have adopted the usage of online banking with the primary objectives of better customer service, expanding revenue streams, and improving profit margins. Alternatively, it is troubling that each bank is spending money and embracing innovation at such a rapid pace. The primary objective of this research was to investigate the impact that a strategy using electronic banking had on the profitability of Pakistani financial institutions. The purpose of this study was to investigate the influence that online banking had on the return on equity and return on assets of Pakistani commercial banks from 2006 to 2016. Panel data were collected from three different banks. The findings of the study indicate that the use of internet banking causes a substantial enhancement in the return on equity and return on assets (ROE) of Pakistan's banking sector over the course of a longer period of time.

Keywords: E-banking, bank performance, ROE, ROA, commercial banks, Pakistan

INTRODUCTION

In the age of globalization, efficiency, and dependability, the global economy faces a new infrastructure challenge: ICT management. Information and communication technology (ICT) has transformed money management, as shown in internet banking. However, banks have extensively invested in this sector and proven people will utilize it. Many commercial banks employ online banking to improve customer service, revenue, and profit margins. However, each bank's innovation and spending rates are worrisome. E-banking has transformed the banking sector by enhancing efficiency and customer service through digital platforms. In Pakistan, commercial banks are increasingly adopting e-banking services, yet its impact on financial performance remains underexplored. This study examines the relationship between e-banking adoption and the financial performance of selected Pakistani banks, using ROA and ROE as key indicators from 2006 to 2016.

Information technology (IT) has played a vital role in addressing challenges and reshaping business models in the banking and insurance sectors, particularly in the 21st century. To combat these challenges, financial institutions are raising their productivity, efficiency, and penetration while also expanding into new product categories, developing new delivery channels, and growing their reach into specialized areas. Customers benefit from fast, easy, and secure financial transactions, while stockholders of banks reap substantial profits as a result (Jain & Popli, 2012).

In addition to customers' ever-evolving wants and needs, businesses face fiercer competition in today's market. Consequently, in order to maintain their viability and effectiveness, organizations are continuously looking for new tactics and ideas. According to Kemunto and Kagiri (2018), businesses have been greatly affected by the ways in which technology and globalization have evolved. Thanks to lightning-fast digital developments, businesses can now leverage electronic banking methods to boost their overall performance and competitiveness. In an effort to diversify their income streams, increase customer satisfaction, and meet the ever-changing needs and wishes of their clientele, commercial banks have begun to use e-banking strategies (Chedrawi, Harb, & Saleh, 2019).

Numerous businesses have come to the realization that the expanding pool of candidates for online jobs is of critical importance when it comes to the promotion and distribution of their products. Financial institutions have not only embraced technological advancements but have also led innovation within the industry. (Kondabagil, 2007). Customers were also proven to be strongly driven to consume when there was a large selection of products available to them and the process was simple. Providing users with multiple access points for online banking, such as a television, a computer, and a phone, is of utmost importance. In accordance with Mihalciuc, Apetri, and Bonaventure (2008), there are a number of different ways to perform electronic banking

transactions.

These methods include doing transactions over the phone, through mobile devices, through television, on the internet, and through computers. On-line banking, mobile banking, internet payment systems, and phone banking are just few of the many efforts that fall under its umbrella.

Beginning in 2006 and continuing through 2016, this study will investigate the profitability of commercial banks in Pakistan, as well as the impact that electronic banking services had on those profits. In order to carry out this study, an integrated model will be constructed. In point of fact, electronic banking has made significant progress over the course of this period of time, mostly as a result of developments in information and communications technology (ICT) and the supervision of the State Bank of Pakistan.

Research Gap

One aspect of this research that is particularly important is that it is constructing an integrated model in order to investigate the impact that electronic banking activities have on the profits of commercial banks in Pakistan. Research shows that there is a gap in this field, there has not been a single study conducted in Pakistan that has attempted to provide a quantitative method for analyzing this component. The purpose of this study is to bridge the knowledge gap that has been created by using a sample of three Pakistani commercial banks that have utilized an electronic banking system between 2009-2011, to conduct an empirical investigation into the effects that e-banking has had on the performance of these banks. In order to contribute to the existing body of empirical literature, this study will either corroborate or deny the findings of investigations that have been conducted all over the world. The empirical findings of the study appear to have higher significance for countries that are still in the process of developing.

Problem Statement

In the age of globalization and rapid advances in technology, information and communication technology (ICT) has created a massive revolution in financial services, and electronic banking, otherwise known as e-banking, has become a significant innovation in banking. While the majority of commercial banks in Pakistan have adopted the use of e-banking as a vehicle for maximizing efficiency, enhancing the quality of customer service, as well as enhancing profitability, the relative absence of empirical evidence of its actual effect on the financial performance of the banks remains a common concern. Such an effect is usually measured through a variety of financial indicators such as Return on Assets (ROA) and Return on Equity (ROE). While various studies across the globe have

investigated this relevant relationship, the case of Pakistan is lacking in terms of depth in terms of comprehensive and quantitative studies that are able to integrate such financial performance indicators with the use of e-banking services. Such a common gap is a significant impediment for banks and policymakers alike to make informed decisions on technology investment and actualizing their strategic implications. Accordingly, the main purpose of this study is to address and compensate for this serious gap by an in-depth investigation of the effect that e-banking applications have on the profitability of a selected list of commercial banks in Pakistan, for the period 2006-2016.

Research Objectives

This study aims to evaluate the effectiveness of e-banking services on the financial performance of commercial banks in Pakistan, with a specific focus on Return on Assets (ROA) and Return on Equity (ROE).

Research Questions

Does E-banking increases ROE and ROA of commercial banks in Pakistan?

Research Hypothesis

The primary objective of this research is to investigate the ways in which electronic banking has impacted the bottom lines of commercial banks in Pakistan. This is the reason why we came up with the following hypothesis:

H1: The financial performance of banks did not significantly change before and after the implementation of electronic banking.

H2: The financial performance of banks significantly changed before and after the implementation of electronic banking.

Literature Review

Many studies have examined how E-banking affects bank profitability in different countries. Online banking ROI was studied by (Carvalho & Siegel, 2002). The study calculated return by combining EBIT and NAV in its financial account aggregation analysis. This analysis included three banks weighted by their five-year customer online account totals. The results show that banks and other financial organizations that use Account Aggregation Services without cross-selling will lose money. This is especially true given the service's eventual commodity status. Rodriguez, Neito (2007) transactional websites' impact on commercial banks' financial performance was examined in this

study. This study included 72 Spanish financial institutions functioning between 1944 and 2002. According to the results, performance is not immediately affected. The growth of internet distribution channels has reduced overhead costs. The statistical significance of this effect appears 1.5 years after adoption.

The study by Onay, Ozsoz, and Helvacıoğlu (2008) studied the impact of online banking on bank profitability (ROE and ROA) in Turkey. The research controlled for bank-specific factors and macroeconomic indices. The study sample includes 13 Turkish banks that offered internet banking from 1996 to 2005. Internet banking improved ROE two years later, supporting Hernando and Nieto (2007). Sumra, Manzoor, Sumra, & Abbas (2011) examined how electronic banking affected twelve Pakistani banks' productivity. The purpose of this qualitative study is to determine what makes a bank profitable. No mathematical model was used in this research until 2011. Turkish researchers investigated how internet banking users affected 18 commercial banks' efficiency and productivity (Onay & Ozsoz, 2013). Using panel data regression, they found that online banking significantly affected branch operations. Increased competition led to poor interest income after two years of internet banking.

Kagendo (2015) studied Kenyan commercial banks' E-banking strategy and performance. The results show that Kenyan commercial banks may enhance their performance by connecting their e-banking infrastructure, efficiency techniques, and quality. The findings suggest that banks should invest in new technology to enable more e-banking options that quickly meet client needs.

Kenyan researchers examined how mobile banking affects commercial bank profits (Mabwai, 2016). The study analyzed using descriptive research. The results showed that mobile banking transaction volume, capital sufficiency, market share, and asset size boosted commercial banks' profits.

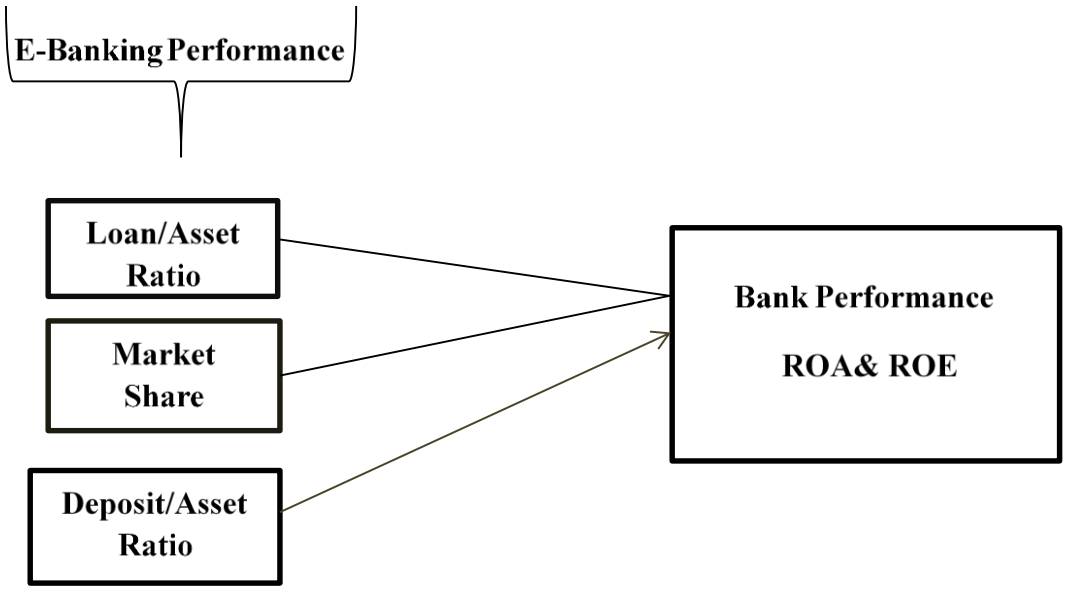
Evian, Limijaya, and Hutagaol-Martowidjojo (2021) examined the impact of e-banking—specifically internet banking, mobile banking, and ATMs-on bank performance in Indonesia. Their study evaluated bank performance using financial indicators such as Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM), while also considering control variables like firm size, operational efficiency, and Capital Adequacy Ratio (CAR). Using data from 36 listed banks over the period 2015–2019 and applying multiple regression analysis, the study concluded that e-banking positively influences bank performance.

While several international studies have assessed the relationship between e-banking and banking profitability, there remains a lack of empirical research specifically focused on the Pakistani banking sector. Unlike previous studies, this research aims to develop an integrated model to empirically examine the impact of e-banking services on the financial performance of commercial banks in

Pakistan, particularly in terms of ROE. To the best of the researcher's knowledge, no prior study has applied this approach within the Pakistani context.

Model

The theoretical model supports the independent variables that can impact changes in Profitability of banking sector in Pakistan.



THEORETICAL FRAMEWORK

Technology Acceptance Model

This study adopts a financial performance evaluation framework to examine the relationship between technology-driven service delivery—specifically electronic banking (e-banking)—and the profitability of commercial banks in Pakistan. E-banking, encompassing services such as online banking, mobile banking, and ATM usage, has become an essential part of modern banking operations. Rather than focusing on customer perceptions or behavioral adoption models, this framework concentrates on quantifiable financial outcomes. Return on Assets (ROA) and Return on Equity (ROE) are employed as the primary indicators of financial performance, providing insights into how efficiently banks utilize their assets and equity to generate profits. These measures are widely accepted in financial research for assessing institutional profitability and operational effectiveness.

This analytical framework is informed by a body of empirical literature that links technological innovation with improvements in financial performance. Prior studies have shown that banks adopting digital services can reduce operational costs, expand customer outreach, and enhance transaction efficiency—all of which contribute to increased profitability. By examining data from

selected Pakistani commercial banks over a defined period (2006–2016), this study aims to determine whether similar trends exist in Pakistan's banking sector. This framework is particularly relevant in emerging economies where digital transformation in banking is ongoing, and where empirical data on its financial effects remain limited. Thus, this study contributes to the existing literature by offering evidence on the financial implications of e-banking adoption in a developing country context.

Diffusion of Innovation theory

Rogers introduced innovation diffusion theory (IDT) in 1962. The notion pioneered diffusion research and set the standard (Rogers, 1962). Relative Advantage, Compatibility, observability, trial ability, and relative benefit are the five invention traits that lead to acceptance, according to the Diffusion of Innovation theory. How much people think Internet banking is better than traditional banking in terms of social and economic satisfaction, ease of bank balance management, speed of transactions, and quality.

Customers like internet banking's interoperability with ATMs, E-payments, and phone banking (Puschel, Mazzon, & Hernandez, 1, 2010). However, complexity describes how difficult E-banking is to understand. The term "observability" reflects how visible Online Banking is. Diffusion of innovation theory helps explain innovation and its acceptability. This idea simplifies E-banking, making it relevant to the study.

Regression Equation

$ROE = \alpha + \beta(L/A)t + \beta(D/A)t + \beta(M\ share)t + \varepsilon t$

$ROA = \alpha + \beta(L/A)t + \beta(D/A)t + \beta(M\ share)t + \varepsilon t$

ROE= Return on equity

ROA = Return on assets

L/A= Loan to Asset Ratio

D/A= Deposit to Asset Ratio

M share= Market share α Constant

β Beta Coefficient

εt Error Term

Table 1: Variable matrix

Variable	Definition	Type	Reference
ROA	Return on assets being measured as ratio of net income after tax to total assets of banks is the indicator of Bank performance.	Dependent variable	(Riaz, 2013), (Nawaz, et al.,2012), (Kithinj, 2010)
ROE	The return on equity (ROE) is a measure of the earnings (revenue) available to the owners of the firm on the capital they invest.	Dependent variable	(Lukman Shamsuddin, 2002: 64)
DAR	Deposit to asset ratio determines how much an assets value is financed by deposit account.	Independent variable	Kwan (2000)
LAR	The loan to asset ratio (LAR) is a liquidity indicator that measures the proportion of bank assets to total debt in a given year.	Independent variable	(Sufian & Habibullah, 2010; Sufian, 2011)
M Share	It refers to the volume of sales generated by the company in comparison to the industry.	Independent variable	(Pimms ,2001)

DATA AND METHODOLOGY

Data collection

The primary sources of the initial variable data for the study were a wide range of secondary sources, the most popular of which were the websites of PSE-listed banks and their annual reports. It is also possible to locate the annual reports of Pakistani commercial banks on the website of the State Bank of Pakistan.

Sample Study

The study's panel consists of three commercial banks in Pakistan that are serving the nation rather than any one industry or demographic. The study's sample consisted of three banks: Askari Bank (2009–present), Habib Metropolitan Bank (HMB) (starting in 2010), and the National Bank of Pakistan (NBP) (beginning in 2011).

Time Period Of Study

Information on variables is growing throughout the course of ten years, from 2006 to 2016, as a result of the introduction of electronic banking in Pakistan, which also continues to see growth over this time period. There has been an effort made to incorporate the maximum amount of data that is

currently available on the variables in order to acquire a more accurate picture of the pattern that is being followed.

Data Analysis and Techniques Used

Eviews11 is used to perform analysis on the data that was obtained from the sample of banks. The purpose of panel data analysis is to provide an explanation for the characteristics of the variables that have been chosen in terms of their dispersion or central tendency. In addition, it addresses the Correlation test, which is responsible for determining the nature of the relationship that exists between the independent variables and the dependent variables. Additionally, the test addresses issues of serial correlation.

RESULTS

Descriptive statistics

The relation among the variables in model has been tested using Multiple Regression .But before moving on the regression Descriptive tests have been applied to analyze the characteristics of variables under consideration and normality of data. The results of descriptive analysis can be seen in the given table.

Table 2: Descriptive statistics

Variables	Mean	Std.Dev	Min	Max
ROE	0.1176	0.1098	-0.3192	0.2314
ROA	0.0086	0.0070	-0.0136	0.0189
LOAN/ASSET RATIO	0.0833	0.0893	0.00018	0.3003
DEPOSIT/ASSET RATIO	0.7783	0.0660	0.60000	0.8690
MARKET SHARE	0.0641	0.0191	0.03230	0.0967

For each of the variables, the values of the mean, maximum, and lowest, as well as the standard deviation, are displayed in Table 2, which displays the descriptive statistics. Based on the data presented in the table, the highest mean value is 0.77, which represents the ratio of deposits to assets. It has been determined that the data appears to be normal as Std. All of the variables' development measures do not have extremely high values, which can have an impact on the normalcy of all of the values.

Correlation Analysis

I also used correlation analysis to test the multi-co linearity among the variables. The correlation matrix is shown in the table.

Table 3: Correlation Analysis

Correlation	DV1 ROA	DV2 ROE	IV1 LAR	IV2 MS	IV3 DAR
DV1 ROA	1.000000				
DV2 ROE	0.9152	1.000000			
IV1 LAR	0.3895	0.225	1.000000		
IV2 MS	0.2705	0.4625	-0.556	1.000000	
IV3 DAR	-0.333	-0.223	-0.498	0.5277	1.000000

Table 3, shows that ROE and ROA is negatively related with deposits/asset ratio.

Regression Analysis

After confirming no multicollinearity using correlation, I tested statistical hypothesis with panel regression. Table 4 reveals that R2 is 55% strong, indicating a significant link between independent variables and dependent variables. While adjusted R2 supports multiple regression and implies all cause-and-effect relationships among variables being examined. A Durbin-Watson value of 1.35 indicates no autocorrelation between variables. Value of F-statistics= 18.52 and P=0.000006(P<0.05) in (T-4) indicates model fitness and it shows that variables being used in the model are actual predicators of Bank performance. So it leads null hypothesis to be rejected.

Table 4: Regression Analysis

Dependent Variable: DV1_ROE
Method; panel least square
Sample; 2006-2016
Periods included; 11
Cross-sections included; 3
T-Panel observations; 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.268736	0.065225	-4.120115	0.0003
IV1_L_A_RATIO	0.862915	0.181021	4.766927	0.0000
IV3_MARKET_SHARE	4.899791	0.844625	5.801142	0.0000

Root MSE	0.072359	R-squared	0.552578
Mean dependent var Hannan-	0.117697	Adjusted R-squared	0.522750
Quinn criter Durbin- Watson	-2.186762	F-statistic	18.52538
stat	1.351337	Prob(F-statistic)	0.000006

Table 5: Regression Analysis

Dependent Variable: DV2_ROA

Method; panel least square
Sample; 2006-2016
Periods; 11
Cross sections; 3
T-Panel observations; 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.013233	0.004421	-2.993359	0.0055
IV1_L_A_RATIO	0.061754	0.012269	5.033267	0.0000
IV3_MARKET_SHARE	0.260094	0.057247	4.543376	0.0001
Root MSE	0.004904	R-squared		0.6975120
Mean dependent var	0.008610	Adjusted R-squared		0.6401282
Hannan-Quinn criter.	-7.569804	F-statistics		14.85146
Durbin-Watson stat	0.999281	Prob(F-staistic)		0.000033

Table 5 displays the anticipated results of the integrated model. The modified R2 value of 0.640128 is very near to 1, suggesting that the independent variables (L/A and M share) explain 69% of the variance in the dependent variable (ROA). At the 5% level of significance, the overall impact of E-banking services on ROA is described by Prob. (F-Statistics) = 0.000033. There is positive serial correlation, no autocorrelation, and the mathematical equations are accurate (Durbin-Watson = 0.999 is close to 1).

Table 6: Regression Analysis

Dependent Variable: DV1_ROE
Method; panel least square
Sample; 2006-2016
Periods; 11
Cross sections; 3
T-Panel observations; 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.406889	0.227390	1.789391	0.0833
IV2_D_A_RATIO	-0.371552	0.291134	-1.276226	0.2114
Root MSE	0.105442	R-squared		0.049918
Mean dependent var	0.117697	Adjusted R-squared		0.019270
Hannan-Quinin criter	-1.509581	F-statistic		1.628754
Durbin-Watson stat	1.591199	Prob (F-staistic)		0.211355

Table 6 shows that there is no impact of DAR on ROE because its Prob value is 0.2113 which is greater than 0.05. Value of R2 is 0.049 which means that there is no relationship between ROE and DAR. Prob (F-statistic) = 0.211 that shows the regression model is not significant.

Table 7: Regression Analysis

Dependent Variable: DV2_ROA
Method; panel least square
Sample; 2006-2016
Periods; 11
Cross sections; 3
T-Panel observations; 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.036234	0.014065	2.576187	0.0150
IV2_D_A_RATIO	-0.035491	0.018008	-1.970897	0.0577
Root MSE	0.006522	R-squared		0.111352
Mean dependent var	0.008610	Adjusted R-squared		0.082685
Hanan-Quinin criter	-1.09346	F-statistic		3.884435
Durbin-Watson stat	1.192790	Prob (F-statistic)		0.057721

Table 7 shows that prob value is 0.057>0.05 which means DAR has insignificant impact on ROA. The value of R2 and adjusted R2 is too low that shows no any relation among DAR and ROA.

CONCLUSION

This large-scale analysis extensively examined the pivotal function of e-banking services in the financial performance of the commercial banks in Pakistan. The study considered a number of the most significant financial ratios critical in estimating bank performance, such as Return on Assets (ROA), Return on Equity (ROE), Loan-to-Asset Ratio, Deposit-to-Asset Ratio, and Market Share. The analysis time span considered a large time period from 2006 to 2016, which gave a solid dataset for assessment.

The findings of the regression analysis indicate that both the Loan-to-Asset Ratio and Market Share have statistically significant and positive effects on the profitability of the banks, as indicated by the indicators of ROA and ROE. This indicates that higher lending operations and greater market coverage have a positive effect on the overall financial results of the banks. Conversely, Deposit-to-Asset Ratio indicated no impact on both ROA and ROE, indicating that mobilization of deposits alone does not necessarily lead to improvements in profitability.

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