

DOES INNOVATION DETERMINE THE OPERATIONAL AND FINANCIAL PERFORMANCE? EVIDENCE FROM BANKING SECTOR OF PAKISTAN

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ABSTRACT

This study empirically analyzes the effects of innovation on the operational and financial performance of the banking sector during the time frame from 2010 to 2020. Innovations including automatic teller machines, internet banking and point of sale on the performance of banks are examined through a dynamic panel model using a generalized method of moments. To reduce the correlation and biasness problem GMM estimators are formulated. The results of this study display that automatic teller machines and internet banking have a positive impact on financial performance whilst they have a negative effect on operational performance. Although Point of sale has a poor substantial impact on the financial performance of banks, but it has spacious effect on the banks' operational performance. The findings of the study expand the understanding of bank managers to improve their market share through innovative electronic banking in the fierce global competition within the banking industry.

Keyword: Innovation, financial and operational performance, ROA, ROA, NIM dynamic panel model, profitability

INTRODUCTION

The globalization of the monetary gadget, deregulatory changes, and technological advancements that bring about the creation of progressive nature goods and services, are the primary causes of financial innovation. Financial innovation in the banking industry plays a crucial part in the expansion of the banks and offers modern thinking and techniques for banking products. So organizations start to implement advanced strategies to enhance overall organizational performance (Nazaritehrani, Mashali, 2020).

Innovation in banks refers to the adoption of the latest financial instruments in addition to embracing new methods to address operations. Banks adopt innovation in their operations, assets, and systems to reinforce profitability. Banks imply new ways to deal with transactions. Banks execute the operations using advanced methods and processes that permit them to complete the tasks efficaciously at a low cost. Introducing new financial equipment like automatic teller machines (ATMs), debit and credit playing cards, mobile banking, and internet banking is an instance of innovation in financial institution products (Dongol, 2021).

Banks undertake financial innovation in their products to compete in the market. Banks endure and increase their effectiveness in the marketplace by way of acting better (Kamau & Oluoch, 2016). To channalize the financial institution deposits and improve the various classes of products and resources to satisfy the client's needs, enforce effective technology in banking operations (Victor et

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al., 2015). Clients can also access their accounts using modern technology (Aliyu et al., 2012). Moreover, it increases the market share, promotes loyalty, and creates a competitive ambiance for the banks (Hillman & Keim, 2001). Keeping in mind the importance of innovation, the study attempts to investigate the impact of innovation on the performance of the banking sector.

The performance of banks is measured financially in addition to operationally. Financial performance determines how proficiently an organization adds value to its asset and increases the wealth of its owners and shareholders. Financial performance is estimated through return on asset (ROA), earnings per share (EPS) and return on equity (ROE) (Ahmad et al., 2011). Banks offer innovative products and services including money cell, ATM deposits, coins withdrawals, and net banking and help the clients to access money easily that lead to boosts the banks' capital, increase their profitability, and complement their financial performance (Azimova, 2021). Banks can enhance operating efficiency by facilitating online services like internet banking, e-Banking, point of sale (POS), automatic teller machines (ATMs), and real-time online branches (RTOB). Innovations can make bank maneuvers including passbook entries, check and account clearance, interbank and intra-bank reconciliation more accurate which leads to improving the operational performance of banks.

Previous studies have measured the consequences of innovation on the Banks' Financial Performance (Ilyas Akhisar, 2015; Safdar Hussain; 2018). To the best of my knowledge, the impact of innovations at the operational level performance has not been investigated in developing countries including Pakistan. The study attempts to fill this gap and analyze the impact of innovations on the financial and operational performance of banks during the time frame 2010-2020. Furthermore, the financial sector of Pakistan including public sector banks, specialized banks, private sector banks, foreign banks, and microfinance banks have been included in the study for in-depth analysis. The findings of the study are beneficial for managers to design strategies for innovation and should invest and engage in financial innovation and exert more awareness about financial innovation in order to boost their performance at an operational and financial level and to compete in ever-changing economic gadgets.

REVIEW OF LITERATURE

The theoretical and empirical review of the study is given below. The most commonly theories that relate innovations with organizational performance are innovation diffusion theory and Schumpeter Theory of Innovation

Innovation Diffusion Theory

E.M. Rogers proposed the innovation diffusion theory in 1962. This theory illustrates how innovation affects the organization. Technological and cultural factors among the elements of innovation strongly influence the operational procedures to meet the client's desires and needs. The innovative bank products through which banks provides services including ATMs, internet banks and POS with a ramification of functions via one platform is very useful for each client and banks.

Schumpeter Theory of Innovation

Another theory that relates innovation to the performance of the organization is Schumpeter's theory of innovation. Innovations, according to Schumpeter, may enable businesses in lowering total costs and enhancing demand for their goods. As one ATM can carry out many tasks inclusive of cash withdrawal, cash switch, stability inquiry and invoice fee. Therefore, banks can lower expenses by setting up one ATM in a particular vicinity and charging a price for the services they provide via ATMs. The use of net banking and point of sale facilitates the customers in an excellent way by offering services including intra-bank and interbank funds transfers, software invoice bills, scheduled finances transfers, the printing of e-statements, digital cards, intra-financial institution credit score card payments, and fee bills.

Empirical literature of the study

The banking sector continues to move quickly to invest in innovation and digital advancement as a result of the ongoing global technological evolution. Technological evolution is one of the main factors creating chances for the growth and development of the banking sector globally. Banks utilize technology advancements to add wealth in order to achieve competitive advantages. Comparing traditional banking services to the approach employed in the past, global banks have changed their approach and strategy (Shabbir & urRehman, 2016).

Recent studies have examined innovation effects on banking performance and measured the efficiency of banks operating in both developed and underdeveloped countries. The banking sector of

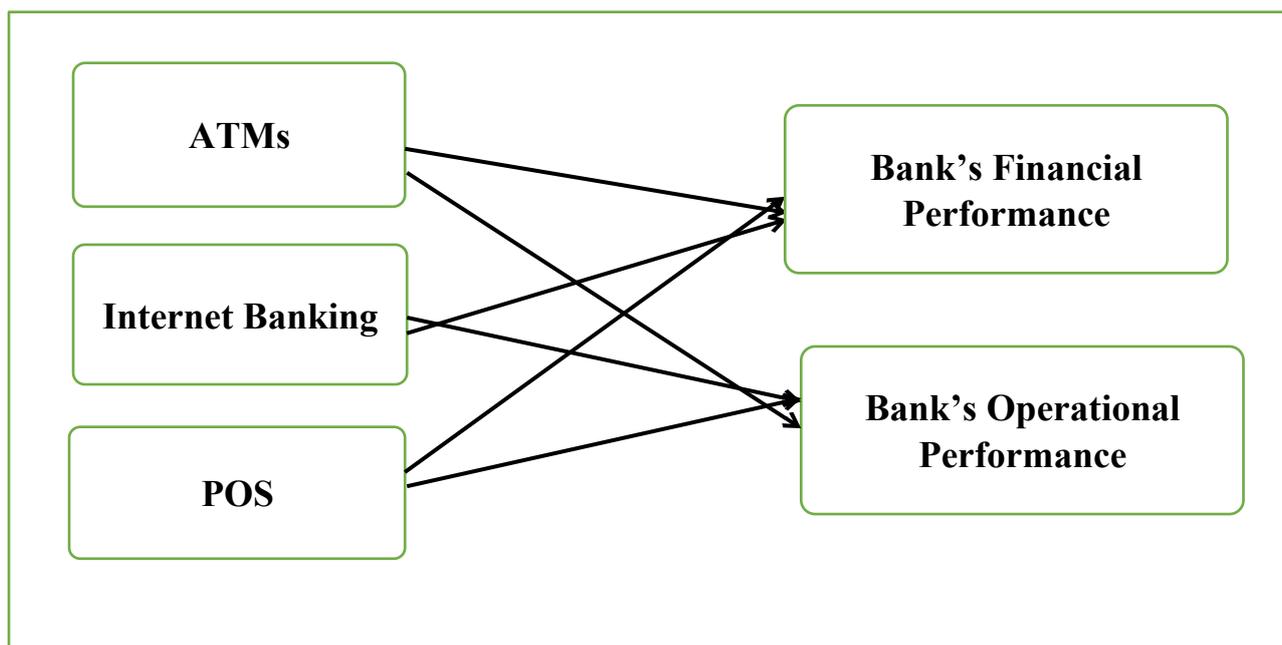
developing countries is improving due to the implementation of innovation in bank operations and payment methods systems such as electronic banking, mobile banking and ATMs (Nkem&Akujinma, 2017). Limited studies are conducted in developing countries including Pakistan so there is a need to analyze the impact of technological advancement on banks' performance. Moreover, that research measured a positive impact of innovation on banks' efficiency in terms of profitability but to test operational efficiency through innovation is still missing.

There are numerous researches that have been conducted on the relationship between innovation and banks' performance (Chaarani&Abiad, 2018; Tahir et al., 2018; Padam, 2021; Akhisar et al., 2015). These studies have examined the outcomes of innovation on banks' profitability. The elements of technological advancement including ATMs, point of sale (POS), RTOB, debit and credit cards and internet banking have been used as a degree of innovation and support a tremendous impact of innovation on the bank's performance. Moreover, these studies guided factors measuring the innovation impacting the profitability of the banks undoubtedly and also identify a few factors that affect the profitability of banks negatively.

Pham & Quddus (2021), Olalere et al., (2021), Chipeta & Muthinja, (2018), Shabbir & Rehman, (2016), and Victor & Obinzie (2015) have discussed the importance of innovation for financial institutions. These studies illustrate the importance of innovation for the financial intermediaries to grow in the market to enhance banks' market share. Moreover, access to money is being made easy through the provision of technology-based services. The innovation helps the banks to reduce the cost as one platform like ATM and internet banking perform many functions. Banks charge fees for the services they provide through ATMs and internet banking. It means banks have to bear less cost and earn more profit.

Hai et al., (2022) empirically tested the role of technological advancement on 142,972 manufacturing firms in China from 1999-2009. The findings of the study identified a U-shaped relationship between innovation outcomes and financial performance. The study identified that innovation in products and operational procedures is essential for economies to transform from transition central planning to market-based in order to attract huge market share globally. Oliveira et al., (2018) demonstrated the impact of innovation on financial performance in contrast to Hai et al., study. The findings of the study reveal that innovation may generate new products for manufacturing firms but it is not necessary that it will contribute to enhancing financial gains. The empirical literature reveals mixed results of technology advancement on organizational performance. The study attempts to address the problem that technological advancement positively or negatively influences the banking industry of Pakistan.

Conceptual Framework



Following research hypotheses are designed from the theoretical and empirical studies

H1: Innovation (ATMs, internet banking and POS) has an influence on financial performance (ROA)

H2: Innovation (ATMs, internet banking and POS) has an influence on financial performance (ROE)
 H3: Innovation (ATMs, internet banking and POS) has an influence on operational performance (NIM)

METHODOLOGY FRAMEWORK OF THE STUDY

The population of this study is Pakistan's financial sector. The sample for this study is composed of public sector banks, foreign banks, private sector banks, specialized banks, and microfinance banks during the time frame 2010-2020. The data have been collected from the website of State Bank of Pakistan (Payment systems reviews) and financial statement analysis issued by the (SBP). Data of ATMs, POS and internet banking collected from the payment system reviews and the data of ROA, ROE and NIM collected from the financial statements analysis. The operational definition and measurement of endogenous and exogenous variables are given in table 1

Table No. 1 Operational Measurement of Variables

Innovation	Operational Measurement
Automatic Teller machines (ATM)	Amount of cash withdrawn at any time by customers from his/her account held in bank
Point of sale (POS)	Payments made by customers at any time during purchase and sale
Internet banking (IB)	Services offered by bank through electronic channels
Financial performance	
Return on asset (ROA)	It shows the contribution of assets in generating net income. It is quantified as Return on Asset= Net Income/ Total Assets
Return on Equity (ROE)	It shows the contribution of equity capital in generating profit. It is calculated as Return on equity=Net Income/ Shareholders equity
Operational performance Net interest Margin (NIM)	It measures net interest income over assets. It is quantified as Net interest margin= Net interest income/ assets.

The dynamic panel model is employed in this study. This method is commonly applied to measure the banks' performance. The generalized method of moments (GMM) is used to examine how innovation affects the banks' performance. Karl Pearson proposed GMM estimates in 1894, and Lars Peter Hansen advocated for the generalization of the method of moments in 1982. To minimize possible biases in the sample of the study, the GMM estimator is preferred (Goddard et al., 2011). Heteroscedasticity is a huge concern in both regression analysis and the analysis of variance. It is required to show that the instrument employed is legal and that second-order autocorrelation in error terms is invalid in order to verify the validity of the instrument and consistent estimates. The A Hansen (1982) test is used to ensure that the heteroscedasticity in the error terms is robust (Goddard et al., 2011). To check the good fit of the model J-statistics is used.

Economic Model of the study

The economic model of the study is presented as

$$ROA_{it} = \alpha + \beta 1(ATM) + \beta 2(Internet\ Banking) + \beta 3(POS) + \mu_i \quad (1)$$

$$ROE_{it} = \alpha + \beta 1(ATM) + \beta 2(Internet\ Banking) + \beta 3(POS) + \mu_i \quad (2)$$

$$NIM_{it} = \alpha + \beta 1(ATM) + \beta 2(Internet\ Banking) + \beta 3(POS) + \mu_i \quad (3)$$

Where as

ROA_{it} = Return on assets of a specific bank during a year,

ROE_{it} = Return on equity of a specific bank during a year

NIM_{it} = Net interest margin of a specific bank during a year

STATISTICAL ANALYSIS AND DISCUSSION OF THE STUDY

Table No. 2 Statistical Summary

	IB	POS	ATM	ROA	ROE	NIM
Mean	952.1	189.263	3467.49	0.0114	0.1573	0.0515
Median	797.7	172.1	3202.3	0.0106	0.1480	0.051
Maximum	2952.7	366.2	6429.4	0.0206	0.4785	0.0602
Minimum	141	70	905	0.0030	-0.0559	0.0457
Std. Dev.	779.2	110.134	1952.23	0.0046	0.1228	0.0039
Skewness	1.427	0.4539	0.2825	0.4011	1.1504	0.5302
Kurtosis	4.421	2.7332	2.6793	2.8895	5.2910	2.8865
Observations	165	165	165	165	165	165

Note: Internet Banking, point of sale (POS), Automated teller machine (ATM), ROA, ROE & NIM

Table 2 shows that the number of observations during the time period (2010-2020) is 165. Data distribution is positively skewed demonstrating that most of the values are concentrated around the right of the mean. The positively skewed distribution indicates abnormal gains from investment in innovation. The data series are leptokurtic indicating the probability of extreme values existing in the distribution. Average values of internet banking POS and ATM transactions are observed as 952.1, 182.26, and 3467.49 respectively. The average return of ROA, ROE and NIM are positive and predict banks are earning profit relative to fundamentals.

Table No. 3 Correlation Summary

	POS	IB	ATM	ROA	ROE	NIM
POS	1	0.78	0.77	-0.36	-0.29	-0.44
IB	0.78	1	0.77	-0.33	-0.24	-0.31
ATM	0.77	0.77	1	-0.30	-0.26	-0.44
ROA	-0.36	-0.33	-0.30	1	0.37	0.33
ROE	-0.29	-0.24	-0.26	0.37	1	0.12
NIM	-0.44	-0.31	-0.44	0.33	0.12	1

Note: Point of sale, Internet banking, automated teller machine, ROA, ROE and NIM

Table 3 reveals that ATM and internet banking are positively correlated with financial performance contrasting to operational performance. POS has a positive relationship with operational performance contrasting to financial performance. The correlation is within tolerable limits therefore the problem of multicollinearity has not been observed in the data.

Table No. 4 Regression Results

Return On Assets (ROA)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.0292	0.0015	18.5606	0
ATM	8.20***	2.97	2.7610	0.0104
IB	3.86***	7.24	5.3250	0
POS	-0.0002***	5.19	-4.5092	0.0001
R-squared	0.9262	J-statistic		26
Adjusted R-squared	0.9177	Prob(J-statistic)		0.0000
Return On Equity (ROE)				
C	0.2048	0.0344	5.9499	0
ATM	0.0001***	6.52	2.1493	0.0364
IB	1.67	4.58	0.3656	0.7162

POS	-0.0029***	0.0011	-2.4387	0.0183
R-squared	0.1658	J-statistic		6.36
Adjusted R-squared	0.1168	Prob (J-statistic)		0.000
Net Interest Margin (NIM)				
C	0.0544	0.0027	19.8927	0
ATM	-1.44***	5.16	-2.7987	0.0095
IB	-1.85	1.26	-0.1470	0.8842
POS	0.0002***	9.02	2.7090	0.0118
R-squared	0.2492	J-statistic		26
Adjusted R-squared	0.1625	Prob (J-statistic)		0.0000

The *** indicates confidence interval at 5%.

Table 4 illustrates the regression results at a 95% confidence interval. The significant positive coefficients of innovation in the context of ATM and IB using GMM disclose that financial performance (ROA) can be improved if banks improve the number of ATMs and offer high-quality services through internet banking. On the other hand, POS impacts financial performance negatively. As POS is associated with high promotional expenses and infrastructural costs that lead to reduce profit margins. Azimova (2021) found a positive impact of point of sale on financial performance, so contrasting results in Pakistan are observed as compared to Turkey.

Regression results in the context of financial performance measured through ROE are the same as ROA. The influence of ATM and IB on ROE is positive contrasting with POS at a 95% confidence level. The innovation causes improved profitability by providing online bank services efficiently. The bank charges fees for ATM transactions and IB services and earns profit. (Pham & Qudus, 2021; Olalere et al., 2021). Therefore banks should adopt the new trend of digital technology to sustain and improve their financial performance.

Regression results in the context of operational performance are in contrast to financial performance. The significant positive coefficient of POS at a 95% confidence level demonstrates that operational performance is being affected positively by POS. The findings of the study support that banks should encourage point-of-sale transactions to improve operational performance. On the other hand, ATM and IB negatively influence operational performance and contrast to (Tidd & Hull, 2015). That study empirically examined that innovation in procedures enables the bank to compete in the market and improve its market share. The findings of the study support the hypothesis that innovation significantly influences organizational performance in the context of operational as well as financial.

The results are in line with the studies conducted on financial innovation and banks' performance (Eunice Mbogo, 2017; Hai et al, 2022; Al- Samadi& Al-Wabal 2011; Khrawish& Al-Sadi 2011). These studies show the positive and negative influence of technology advancement on profitability, one of the indicators of organizational financial performance.

CONCLUSION

The impact of innovation on the operational and financial performance of Pakistani banks has been examined in this study. The generalized method of moments (GMM) estimator is used to look at the impact of innovation on banks' performance to get more precise and valuable findings. In the current study ROA, ROE, and NIM are employed as dependent variables along with ATMs, POS, and internet banking as independent variables. Data from 2010 to 2020 were obtained from the state bank of Pakistan's (SBP) website. The results of this study show that all concerned variables have an effect on the performance of banks.

Transactions through ATMs and internet banking have a positive impact on the financial performance of the banks. Innovations in the services using advanced technology including ATM and internet banking have a positive influence on banks' financial performance contrasting to operational performance. So banks should provide services consisting of Cash withdrawals, money transfers, and utility bill payments through ATMs to boost banks' profitability. Banks charge fees for the services offered through internet banking, which lead to improved future earnings.

POS affects banks' operational performance positively in contrast to financial performance. Transactions through POS increase the expense of banks' operations and reduce the profit margin of banks. POS has high infrastructure and advertisement costs that decrease the banks' profitability. The

findings of the study encourage bank managers to improve their market share through innovative electronic banking in the fierce global competition within the banking industry. The current study is limited to the banking sector only; other sectors including non-financial sectors may be analyzed in this context for the future research.

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