The Effect of Technology Adoption on Operational Efficiency of Nepalese Commercial Banks

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Abstract

This study examines the effect of technology adoption on operational efficiency of Nepalese commercial banks. Operational efficiency is the dependent variables. The independent variables are ATM banking, internet banking, e-payment technology, internet banking, POS banking and mobile banking. The primary source of data is used to assess the opinions of respondents regarding ATM banking, internet banking, e-payment technology, internet banking, POS banking and mobile banking in Nepalese commercial banks. The study is based on the primary data of 132 respondents from the customers of Nepalese commercial banks. To achieve the purpose of the study, structured questionnaire is prepared. The correlation and multiple regression models are estimated to test the significance and importance of the effect of technology adoption on operational efficiency of Nepalese commercial banks.

The study showed that ATM banking has a positive impact on operational efficiency of banks. It indicates that increase in ATM banking services leads to increase in operational efficiency of banks. Similarly, internet banking has a positive impact on operational efficiency of banks. It means that better internet banking leads to increase in operational efficiency of banks. Likewise, e-payment technology has a positive impact on operational efficiency of bank. It means that better e-payment technology services leads to increase in operational efficiency of bank. Likewise, point of sale has a positive impact on operational efficiency of bank. It indicates that increase in point of sale services in retail stores leads to increase in operational efficiency of banks. Similarly, mobile banking has a positive impact on operational efficiency of banks. It means that better mobile banking service leads to increase in the operational efficiency of banks.

Keywords: operational efficiency, ATM banking, internet banking, e-payment technology, internet banking, POS banking, mobile banking

1. Introduction

In most developed countries, technology is a central element to deal with challenges in modern banking, such as lowering costs and enabling efficiency improvements. Certainly, worldwide most banks are highly

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successful at utilizing ICT to provide efficient banking services to their customers. In recent years, a number of technology initiatives for delivering banking services have appeared in different developing countries (Lysons, 2006). According to Cobb (2004), electronic payments can lower transaction costs stimulate higher consumption and GDP, increase government efficiency, boost financial intermediation and improve financial transparency. Similarly, electronic payments enable customers to handle their daily financial transactions without having to visit their local bank branch. Electronic payments products could save merchants time and expense in handling cash (Appiah and Agyemang, 2006). Koivu (2002) stated that mobile phone in Kenya influences the performance of organization, behavior and decision making of the entire economy. According to Jayawardhena and Foley (2000), internet and mobile banking results in cost and efficiency gains for banks. In the banking industry, providing high-quality innovative outputs improve the satisfaction level of employees that eventually increases the productivity of the employees (Obeng and Mkhize, 2017). Efficient use of information technologies increases labor productivity levels (Sabherwal and Chan, 2001). Complementing information technology and innovation activities could lead to higher improvements in employee productivity than applying them individually since technology can only contribute to increased productivity when used with other resources effectively (Dauda and Akingbade, 2011). Banking institutions must play a significant role to develop technological innovation-driven economy. The financial services institutions among the industries are most affected by the technological revolution. The financial services industry relies on the exchange of information, which itself depends heavily on communications technology and information (ICT) in order to obtain, analyze and provide data for all users concerned. Financial institutions continuously update their marketing strategies and technologies in order to satisfy the desires and demands of their clients in a safe environment (Rust and Kannon, 2003).

DeYoung *et al.* (2007) examined the market for US community banks to look into how internet banking affected bank performance. The study found that internet banking and bank performance are positively correlated with operational efficiency. Similarly, the study also stated that internet banking increased deposit service fee earnings, which increased bank profitability. Similarly, Kiplangat and Tibbs (2018) found a significant and positive influence of mobile banking on operational efficiency of commercial banks. Likewise, Brynjolfsson and Hitt (2000) concluded that information technology

greatly increases firm-level output. Further, Nader (2011) examined the effect of banking expansion on profit efficiency of Saudi banks. The study concluded that availability of PC banking, mobile banking, and point of sale terminals (POSs) have not increase profit efficiency. Despite the increasing adoption of technology in the banking industry, there is limited understanding of how these technological advancements affect the operational efficiency of banks (Smith, 2021). Similarly, Lee (2021) concluded that there is a positive relationship between technology adoption and employee skills in the banking industry. Further, Chen (2022) examined the relationship between technology adoption and cost-effectiveness in the banking industry. The study stated that banks that adopt technology are likely to achieve higher levels of cost-effectiveness compared to those that do not, through the automation of routine tasks and the reduction of operational costs.

Dzombo *et al.* (2017) examined the effect of branchless banking strategy on the financial performance of commercial banks in Kenya. The study found that branchless banking such as automated teller machines banking, phone banking, internet banking (IB) and point of sale banking have positive and significant impact on financial performance of commercial banks. In addition, the availability of automated teller machines (ATM), cards, telephone banking, personal computer banking and internet banking have positive impact on financial performance of banking system (Narteh, 2014). Similarly, Mahdi and Mehrdad (2010) determined the impact of e-banking in Iran. The study showed that there is a positive correlation between e-banking and profitability of banks. Likewise, Rafael and Francisco (2007) investigated the impact of various regional banking sector developments and innovations during 1986-2001 in Spain. The study found that product and service delivery innovations contribute positively to regional gross domestic product, investment and gross savings growth. In addition, Simpson (2002) assessed the impact of the internet in banking: observations and evidence from developed and emerging markets. The study revealed that electronic banking is motivated largely by the prospects of operating costs minimization and operating revenues maximization. The adoption of internet banking leads to cost reduction and hence likely to increase banks' profitability. In addition, Polatoglu and Ekin (2001) found that online banking has a positive impact on the profits of Turkish banks. Online banking has changed the dimensions of competition in the retail banking sector which has also provided opportunities for emerging a gradual process. Likewise, Kozak (2005) examined the impact of information technology development on the profitability and efficiency of

the US banking industry. The study found that there is a positive correlation between the use of information technology and cost reductions. In addition, Kagan *et al.* (2005) examined the impact of internet banking's potential on community banks' performance. The study revealed that internet banking and bank performance are positively correlated.

In the context of Nepal, Regmi (2015) examined the state of mobile banking. The study found that although consumers are knowledgeable about mobile banking and are able to sense the benefits of the banking sector, customers do harbor certain apprehensions about using it. The study also discovered that consumers are afraid to utilize the service since the customers don't have a good understanding of it. Similarly, Joshi (2019) assessed how the quality of ATM services affected customer satisfaction, productivity, and profitability in the banking industry of Nepal. The study revealed that the profitability and productivity of ATM services are positively correlated with each other. Likewise, Sapkota *et al.* (2018) investigated the current state of POS banking utilization in Nepali commercial banking services. The study stated that the bank has been offering a variety of services throughout the nation, including debit cards, ATM cards, mobile banking, mobile cash, utility bill payment, and internet. In addition, Kunwar and Thakur (2019) assessed the user acceptance of mobile banking: A demographic study of Nepal focusing on young customer aged (25-40). The study revealed that the parameters of mobile banking have positive effect on the user's behavioral intention and attitude towards the bank's profitability of Nepalese commercial banks. The study also revealed that factors like user's behavioral intention and attitude that have positive influence in mobile banking adoption. The payment gateway industry like Nepal Electronic Payment System Ltd. (NEPS) and Smart Card Technologies (SCT), the e-payment system in Nepal is growing (Dangol and Kautish, 2019). In addition, Subedi (2020) pointed out positive influence of convenience, security, faith in traditional banking, and awareness on the adoption of mobile banking.

The above discussion shows that empirical evidences vary greatly across the studies on the effect of technology adoption on operational efficiency of commercial banks. Though there are above mentioned empirical evidences in the context of other countries and in Nepal, no such findings using more recent data exist in the context of Nepal. Therefore, in order to support one view or the other, this study has been conducted.

The major objective of the study is to examine the effect of technology

adoption on operational efficiency of Nepalese commercial banks. Specifically, it examines the relationship of ATM banking, internet banking, e-payment technology, mobile banking and point of sale banking with operational efficiency of Nepalese commercial banks.

The remainder of this study is organized as follows. Section two describes the sample, data and methodology. Section three presents the empirical results and the final sections draws the conclusion.

2. Methodological aspects

The study is based on the primary data. The data were gathered from 132 respondents through questionnaire. The study employed convenience sampling method. The respondents' views were collected on ATM banking, internet banking, e-payment technology, mobile banking and point of sale banking on operational efficiency of Nepalese commercial banks. This study is based on descriptive as well as causal comparative research designs.

The model

The model used in this study assumes that operational efficiency depends upon the effect of technology adoption on operational efficiency. The dependent variable selected for the study is operational efficiency. Similarly, the selected independent variables are ATM banking, internet banking, e-payment technology, mobile banking and point of sale banking. Therefore, the model takes the following form:

$$OE = \beta_0 + \beta_1 ATM + \beta_2 IB + \beta_3 EPT + \beta_4 POS + \beta_5 MB + e$$

Where,

OE = Operating efficiency

ATM=ATM banking

IB=Internet banking

EPT= E-payment technology

POS= point of sale banking

MB= Mobile banking

ATM banking was measured using a 5-point Likert scale where the respondents were asked to indicate the responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items and sample items include "ATM machines are located in such place where customer can have easy access to

it", "ATM banking provides the customer with facility of withdrawing the money 24/7 through their debit cards" and so on. The reliability of the items was measured by computing the Cronbach's alpha ($\alpha = 0.872$).

Internet banking was measured using a 5-point Likert scale where the respondents were asked to indicate the responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items and sample items include "Internet banking transaction is more effective than manual system", "Internet banking service is efficient and time saving and so on. The reliability of the items was measured by computing the Cronbach's alpha ($\alpha = 0.886$).

E-payment technology was measured using a 5-point Likert scale where the respondents were asked to indicate the responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items and sample items include "E-payment technology helps to perform secured online transactions", "E-payment system is better than cash and saves time" and so on. The reliability of the items was measured by computing the Cronbach's alpha ($\alpha = 0.855$).

POS banking was measured using a 5-point Likert scale where the respondents were asked to indicate the responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items and sample items include "POS makes work convenient which makes banking easier for customer", "POS in my bank manages employees and offer customer rewards program" and so on. The reliability of the items was measured by computing the Cronbach's alpha ($\alpha = 0.876$).

Mobile banking was measured using a 5-point Likert scale where the respondents were asked to indicate the responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items and sample items include "Banking operations can be carried out easily by using mobile banking", "Mobile banking helps to save time and cost" and so on. The reliability of the items was measured by computing the Cronbach's alpha ($\alpha = 0.889$).

Operational efficiency was measured using a 5-point Likert scale where the respondents were asked to indicate the responses using 1 for strongly agree and 5 for strongly disagree. There are 5 items and sample items include "E-payment technology offers cost saving opportunity to banks which helps to increase operational efficiency", "Proper implementation of e-banking facilities will help to increase operational efficiency" and so on. The reliability of the items was measured by computing the Cronbach's alpha ($\alpha = 0.843$).

The following section describes the independent variables used in this study along with the hypothesis formulation.

ATM banking

Automated teller machine (ATM) is one of the services introduced by banks with the objective of providing customers quick access to their finance and reducing the costs of access. Idris (2014) found that ATM adoption of ATM banking has reduced the cost of banking operations, improved transaction speed, and increased customer satisfaction. Similarly, Emmanuel and Mulyungi (2019) found that there is a positive relationship between ATM services and the expansion and sustainability of Eco-bank. Likewise, Khan (2010) revealed that ATM service quality positively and significantly contributes toward customer satisfaction. Similarly, Adeniran and Junaidu (2014) found that Automated Teller Machines (ATMs) has a positive impact on the way that banks provide their services. Likewise, Harelimana (2018) evaluated ATM usage and its effect on bank profitability in Kigali, Rwanda. The study found that there is a positive relationship between the bank of Kigali's profitability and automated teller machines. Further, Dhungel *et al*. (2012) stated that ATM usage has a favorable impact on users' productivity, likelihood, and level of customer satisfaction. Based on it, this study develops the following hypothesis:

H_1: There is a positive relationship between ATM banking and operational efficiency.

Internet banking

Internet banking is defined as the process whereby the customer is able to access, control and use his or her account over the internet (Kim *et al*., 2006). Murat and Isaac (2019) found that internet banking has a positive and significant impact on bank performance. Similarly, Noah *et al*. (2019) found that internet banking has a significant and positive influence on productivity through efficiency and profitability. The study also concluded that internet banking leads to strategic advantage against competitors and increases the likelihood of customer loyalty. Likewise, Mateka *et al*. (2016) discovered that internet banking has a favorable effect on bank productivity and profitability, including incomes, operational costs, loan book, and consumer deposits. Moreover, Tunay *et al*. (2015) investigated an interaction between internet banking and bank performance. The study found that the more advanced internet banking practices in European countries illustrate the more performance of the strongest banks. The study also stated that internet banking

has a significant relationship with performance of the bank considering the whole sample. Further, Stoica *et al*. (2015) found that effective and efficient use of internet banking services have positive impacts on overall bank's performances. Based on it, this study develops the following hypothesis:

H_2: There is a positive relationship between internet banking and operational efficiency.

E-payment technology

Many organizations and individual users are connected via an electronic payment system, which is a type of inter organizational information system for financial exchange. Frank and Binaebi (2019) analyzed the introduction of electronic payments. The study showed that electronic payments have positive and significant impact on returns on equity of Nigerian banks. Similarly, Mustapha (2018) found that the adoption of electronic payment systems into the financial industry have positive relationship with the banks' profitability and productivity. Likewise, Nzaro and Magidi (2014) found that there is a positive relationship of electronic payment systems with bank's profitability and productivity. Further, Itah (2014) concluded that there is a significant and positive correlation of electronic payment systems with bank's profitability and productivity. Based on it, this study develops the following hypothesis:

H_3: There is a positive relationship between E-payment technology and operational efficiency.

Point of sale banking

Point of sale (POS) terminal is a retail payment device which reads a customer's bank's name and account number when a bank card or credit card is swiped (passed through a magnetic stripe reader. Jenevive and Anyanwaokoro (2017) found that increasing in use of the POS payment method is expected to increase the performance (profitability) of commercial banks. The study also found that there is a positive but insignificant relationship between POS payment method and profitability of commercial banks in Nigeria. Similarly, Njoroge and Mugambi (2018) found that growing use of debit cards have greatly lowered transaction costs and improved convenience for both credit card and debit card users, both of which increase the operational efficiency of the banking sector in the form of ROA. Points of sale at old and new generation banks in Nigeria have positive and statistically significant association with operational efficiency (Okon and Amaegberi, 2018). Similarly, Williams *et*

al. (2018) found a significant and positive correlation between POS adoption and operational efficiency. Based on it, this study develops the following hypothesis:

H_4: There is a positive relationship between point of sale banking and operational efficiency.

Mobile banking

Mobile banking is the provision of banking and financial services associated to banks using portable communication devices. One invention that has gradually become more prevalent across many industries and economic sectors is mobile banking. A suitable financial environment is regarded as a crucial pillar and an enabler of economic growth (Koivu, 2002). Similarly, Daniyan *et al*. (2017) found that mobile banking considerably and positively impact the profitability and productivity of Nigeria's commercial banks. Likewise, Abubakar (2014) examined the effects of electronic mobile banking on growth of deposit money banks in Nigeria. The study revealed a positive relationships exist between mobile banking and total deposits. In addition, Alsharif and Sambasivan (2018) found that mobile banking has a favorable effect on MFIs' performance, including enhanced outreach, increased efficiency, and cost savings. Further, Ijeoma (2018) assessed the effect of mobile banking on the financial results of commercial banks in Kenya over a seven-year period. The study stated that mobile banking positively affects a bank's efficiency and profitability. The study also revealed that banking does result in more revenue. Based on it, this study develops the following hypothesis:

H_5: There is a positive relationship between mobile banking and operational efficiency.

3. Results and discussion

Correlation analysis

On analysis of data, correlation analysis has been undertaken first and for this purpose, Kendall's Tau correlation coefficients along with mean and standard deviation has been computed and the results are presented in Table 1.

Table 1

Kendall's Tau correlation coefficients matrix

This table presents Kendall's Tau coefficients between dependent and independent variables.

The correlation coefficients are based on 132 observations. The dependent variable is OE (Operational efficiency). The independent variables are ATM (ATM banking), IB (Internet banking), EPT (E-payment technology), POS (Point of sale banking) and MB (Mobile banking).

Variables	Mean	S.D.	OE	ATM	IB	EPT	POS	MB
OE	4.128	0.718	1					
ATM	4.172	0.712	0.547**	1				
IB	4.098	0.768	0.514**	0.560**	1			
EPT	4.013	0.743	0.465**	0.521**	0.514**	1		
POS	3.677	0.820	0.334**	0.253**	0.358**	0.390**	1	
MB	4.145	0.829	0.471**	0.514**	0.485**	0.550**	0.303**	1

Note: The asterisk signs (**) and (*) indicate that the results are significant at one percent and five percent levels respectively.

Table 1 reveals that ATM banking has a positive impact on operational efficiency of banks. It indicates that increase in ATM banking services leads to increase in operational efficiency of banks. Similarly, internet banking has a positive impact on operational efficiency of banks. It means that better internet banking leads to increase in operational efficiency of banks. Likewise, e-payment technology has a positive impact on operational efficiency of bank. It indicates that better e-payment technology services leads to increase in operational efficiency of bank. Further, point of sale has a positive impact on operational efficiency of bank. It indicates that increase in point of sale services in retail stores leads to increase in operational efficiency of banks. In addition, mobile banking has a positive impact on operational efficiency of banks. It indicates that better mobile banking leads to increase in the operational efficiency of banks.

Regression analysis

Having indicated the Kendall's Tau correlation coefficients, the regression analysis has been carried out and the results are presented in Table 2. More specifically, it shows the regression results of ATM banking, internet banking, e-payment technology, point of sale banking and mobile banking on operational efficiency of Nepalese commercial banks.

Table 2

Estimated regression result of ATM banking, internet banking, e-payment technology, point of sale banking and mobile banking on operational efficiency

The results are based on 132 observations using linear regression model. The model is OE

$= \beta_0 + \beta_1 ATM + \beta_2 IB + \beta_3 EPT + \beta_4 POS + \beta_5 MB +$ where the dependent variable is OE (Operational efficiency). The independent variables are ATM (ATM banking), IB (Internet banking), EPT (E-payment technology), POS (Point of sale banking) and MB (Mobile banking).

Model	Intercept	Regression coefficients of					Adj. R_bar2	SEE	F-value
		ATM	IB	EPT	POS	MB			
1	0.729 (3.310)**	0.815 (15.647)**					0.650	0.424	244.816
2	1.185 (5.412)**		0.718 (13.684)**				0.587	0.461	187.252
3	1.360 (5.609)**			0.690 (11.615)**			0.505	0.504	134.898
4	2.730 (10.481)**				0.380 (5.502)**		0.183	0.649	30.268
5	1.621 (7.047)**					0.605 (11.119)**	0.483	0.516	123.629
6	0.619 (2.903)**	0.552 (6.206)**	0.295 (3.576)**				0.680	0.406	139.899
7	1.169 (4.515)**			0.630 (9.512)**	0.117 (1.946)		0.516	0.499	70.790
8	1.372 (5.429)**				0.135 (2.229)*	0.546 (9.111)**	0.499	0.508	66.186
9	0.506 (2.353)*	0.487 (5.317)**	0.214 (2.433)*	0.178 (2.356)*			0.690	0.399	98.404
10	0.975 (3.923)**			0.397 (4.735)**	0.075 (1.301)	0.310 (4.160)**	0.570	0.470	58.927
11	0.765 (3.372)**		0.496 (7.445)**		0.048 (0.929)	0.278 (4.509)**	0.648	0.426	81.213

Notes:

i. Figures in parenthesis are t-values.
ii. The asterisk signs (**) and (*) indicate that the results are significant at one percent and five percent level respectively.
iii. Operational efficiency is dependent variable.

Table 2 show that the beta coefficients for ATM banking are positive with operational efficiency. It indicates that ATM banking has a positive impact on operational efficiency. Thus finding is consistent with the findings of Adeniran and Junaidu (2014). Likewise, the beta coefficients for internet banking are positive with operational efficiency. It indicates that internet banking has a positive impact on operational efficiency. This findings is consistent with the findings of Noah *et al*. (2019). In addition, the beta coefficients for e-payment technology are positive with operational efficiency. It indicates that e-payment technology has a positive impact on operational efficiency. This findings is consistent with the findings of Frank and Binaebi (2019). Further, the beta coefficients for POS banking are positive with operational efficiency. It indicates that POS banking has a positive impact on operational efficiency. This findings is consistent with the findings of Njoroge and

Mugambi (2018). In addition, the beta coefficients for mobile banking are positive with operational efficiency. It indicates that mobile banking has a positive impact on operational efficiency. This findings is consistent with the findings of Daniyan *et al*. (2017).

4. Summary and conclusion

The adoption of technology into banking has made the creation and delivery of financial services simpler and more affordable. Technology fosters economic development and is key towards sustaining high living standards around the world. Information and communication technologies (ICT) fuel the greatest wave of technical innovation currently spreading across the globe, affecting new areas of social and economic activity. Unsurprisingly, financial businesses everywhere have been in the throes of organizational changes and innovation based on new possibilities opened up by ICT.

This study attempts to examine the effect of technology adoption on the operational efficiency of Nepalese commercial banks .The study is based on primary data of 132 respondents.

The showed that ATM banking, internet banking, mobile banking, e-payment technology, and POS banking have positive impacts on the operational efficiency of Nepalese commercial banks. Thus, the facilities and services pertaining to ATM banking, internet banking, mobile banking, e-payment technology, and POS banking enhance the operational efficiency of Nepalese commercial banks. The study also concludes that ATM banking followed by internet banking are the most influencing factors that affect the operational efficiency of Nepalese commercial banks.

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