

Enhanced Bank Performance and Digitalization of Banking Services: A Causal Study of Indian Public Sector Banks

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ABSTRACT

A report of the IBEF reveals that the % of the Indian population holding bank account was 17% in 2009 which significantly grew to 80% in the year 2022. After the successful combat with COVID -19 India has emerged as the 3rd largest Fintech ecosystem globally. The use of digitalization in all the banking services has been achieved reducing the paper-based documentation works. As per the report of RBI the Return on equity of the scheduled commercial banks for the year 2022 is 10.1% which is highly remarkable. This paper applies panel regression to establish empirically the relationship between the variables measuring the digitalization of banking services and the variables measuring the profitability of the banks. The paper founds that the variables of the bank digitalization affects the profitability of the public sector banks in India to the extent of 56%

Keywords: Digitalization, panel regression, profitability, PSU Banks.

Introduction

In the banking industry, the practice of services by digital banking (DB) has increased substantially. As changes in user interfaces, the surge of digital banking has a considerable impact on banks' marketing strategies and practices (Dootson, Peatson, & Drennan, 2016). Banks and their consumers using of financial services thanks to digital banking. Banks face a difficulty because of the shift to digital banking brought on by changed client behavior, notably in the delivery of services.

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After the financial crisis of 2008, attracting and keeping clients, as well as boosting profitability, became increasingly important due to rising customer expectations and bank rivalry (Estrada-Guillén, Monferrer-Tirado, Moliner-Tena & Sánchez, Fandos-Roig, 2016).

Digitalization is a sociotechnical process that builds on digitizing, which enables the conversion of analogue data to digital form (Legner et al. 2017). The term "digitalization" refers to the process of "applying digitizing methods to broader social and institutional contexts" (Tilson et al. 2010). Therefore, the broad usage of IT serves as the base for digitization (Chen and Tsou 2006). Short digital innovation cycles are a result of the fast-moving nature of IT, the commoditization of technology, and the phenomena of ubiquitous computing. As a result, firms must be extremely nimble in responding to their constantly changing environments (Gimpel et al. 2018, Fichman et al. 2014). During last few decades, the financial services sector has undergone substantial transformation and experienced numerous breakthroughs because of these digital innovations (Yoo 2010, Chen and Tsou 2006; Brynjolfsson and Hitt 2000;).

It is widely understood and acknowledged that innovation refers to "the creation, adoption, and implementation of new ideas, methods, and products." digital institutional infrastructures, Digital organizational forms, and digital institutional building blocks are the three different types of digital innovation that Hinings et al. (2018) identify. Innovative digital organizational forms, like Uber and Airbnb, are built on digital technology and allow for novel "arrangements of practices, structures, and values defining an organization's core that are acceptable in a specific institutional setting" (Hinings et al. 2018). "Digital institutional infrastructures" strive to develop new norms based on cutting-edge methods for inter-organizational collaboration, governance, and regulation. These infrastructures challenge current organizational infrastructures (Raynard 2016, Hinings et al. 2018;).

Literature Review

Few of the past studies reviewed for the paper are mentioned below:

Digital banking is attractive to banks and clients because of its exceptional features and service quality (Amin, 2016, Jun & Palacios, 2016;). Customers can take advantage of banking and other services, and numerous services can be launched at once. Customers can simultaneously communicate, access the internet, and conduct banking activities. For its increased accessibility and user-friendliness, internet banking enables banks to provide services, providing a variety of advantages from any location (Yiu, Grant & Edgar, 2007, Martins et al., 2014;). It enables clients to complete most tasks easily from their homes (Mols, 2001).

Studies on digital banking have been dispersed, with researchers focusing on certain channels, which is a drawback. In contrast, Jun and Palacios (2016) found that m-banking service quality affects customer happiness and loyalty in the US banks. Amin (2016), Raza et al. (2015), and Amin (2016) explore the relationship between the quality of the e-banking service and customer satisfaction and loyalty. Saleem, Zahra, Ahmad, and Ismail (2016) point out that customer loyalty is related to social influence, market orientation, and service quality, with satisfaction acting as an antecedent. These studies have benefits in some situations, but to properly sell bank services and develop theories, it is necessary to comprehend the many perspectives on digital banking. Convenience, accessibility, service quality, and value obtained from them are arguably among the factors that should make digital banking desirable to users. Further research will be done on this material.

Internet banking is referred to as e-banking, mobile banking as m-banking, and telephone banking as t-banking (Sarokolaei, Rahimipoor, Nadimi, & Taheri, 2012; Hanafizadeh et al., 2014; Lin, 2011). (Sundarraaj & Wu, 2005). The key distinction between these digital channels and other services is the transmission medium, which in digital banking can either be mobile or internet digital networks. Additionally, as digital services are intangible and cannot be retained in an inventory, they are consumed as they are produced (Hatch, 1997).

Changes in service quality might result from interactions between banks and clients during the service delivery process (Amin, 2016). Customers undoubtedly have a variety of service expectations, and how well service providers meet those

expectations affects how satisfied customers are. Therefore, there is an urgent need for research into the factors that influence customer service expectations in digital banking about customer experience, happiness, and loyalty.

Banking institutions can provide new consumer services through digital innovation. This can stop customers from travelling and waiting in line at branches to do banking operations. As some banks are already cutting the number of branches, this could improve operational efficiency for banks. Research into its acceptance is particularly intriguing due to these features and developments in banks (Hanafizadeh et al., 2014; Alsajj and Dennis, 2010; Yoon, 2010). Changes in service quality might result from interactions between banks and clients during the service delivery process (Amin, 2016). Customers undoubtedly have a variety of service expectations, and how well service providers meet those expectations affects how satisfied customers are. Therefore, there is an urgent need for research into the factors that influence customer service expectations in digital banking about customer experience, happiness, and loyalty.

The findings of a study by G & Vikram (2018) examining the effect of IT expenditures on a bank's profitability in comparison to marketing costs show that IT has a bigger impact on a bank's profitability than marketing. According to the research done by Vekya (2017), point-of-sale (POS) and ATM transactions are the two main drivers of e-banking since they each have a significant positive impact on the efficiency and profitability of financial institutions in Kenya. In contrast, the success of Kenya's commercial banks is not significantly impacted by mobile banking transactions.

The banking system would not be able to succeed without the usage of information and communication technology, according to Sabhaya J. Ranjan's (2014) analysis of how the banking business has changed with the entrance of modern technology. It has broadened the banking industry's role in the economy. Technology-enabled banks are more capable in the financial sector and can increase bank profitability.

According to Kujur Teju (2015), the implementation of e-banking increases banks' capacity for profit-making and boosts customer happiness, which in turn improves

banks' performance. The advancement has a bad relationship with security and risk. The developing nations confront several obstacles to successfully implementing new technological projects in comparison to developed nations. Customers of Nigerian banks should use electronic banking for comfort and ease since it has a significant impact on banks' performance using ATMs, mobile banking, and online banking (Ezekiel & Olaleakn , 2016).

The impact of Internet banking on banking performance was also examined by Ceylan Onay (2008), who concluded that in Turkey, both are positively correlated in terms of ROE (returns on equity) and ROA (return on assets), with ROA increasing in tandem with improvements in the use of and investments in electronic banking initiatives. According to research done by Sumra (2011), the use of ICT in banking increases customer happiness, efficiency, and profits while lowering costs or expenses.

Measuring Financial Performance

As banks use and analyze financial statistics in a variety of ways, measuring financial success can be challenging. As per the study of Keisidou et al. (2013), numerous metrics have been used by academics to quantify the impact of customer satisfaction and loyalty on financial success. In their study of consumer satisfaction, Anderson et al. (1994) applied Return on Investment to gauge financial performance (ROI). In a study of 2009 on the hospitality industry in the USA, Chi and Gursoy asked managers to rate their profitability, return on investment, and net profit in relation to three key competitors. In contrast, Return on Assets (ROA) or Return on Investment ROI, Net Profit Margin (NPM), and Return on Equity (ROE) are said to be the three commonly used measures to assess the financial performance of banks (Keisidou et al. (2013). The above measures will improve the customer experience. It has been discovered that these factors influence consumer loyalty, which finally affects sales growth and ROA.

Objectives and Research Methodology:

The research has the objective to empirically establish the impact of the digitalization measures on the profitability of the public sector banks in India.

Methods followed:

The sample taken for this study are the top performing ten Indian public sector banks. For the period of 10 years starting from 2012 to 2022.

The analysis is carried out by using the SPSS25 and Eviews statistical software. The statistical tools used in the paper are descriptive statistics and panel regression.

The performance of the bank is being measured by three major variables like return on asset (ROA). The other variables which measure the degree of digitalization (also taken as the independent variables of the study) are inward NEFT (INNEFT), inward RTGS (INRTGS), outward RTGS (OUTRTGS), outward RTGS (OUTRTGS), mobile banking transactions (MOBBANK), total ATM transactions (TOTALATM), total credit card transactions (TOTALCREDIT), total debit card transactions (TOTALDEBIT), and total POS (TOTALPOS).

The Significance and Probable Outcome of the Paper

This study will enable the academia and industry to identify the digital means which has the highest impact on the profitability of the banks. This will help the banks to focus more on those modes of digitalization that bring more profit to the banks. The study will also confirm the degree of contribution of these digital parameters to the profitability of the banks under study.

Data Analysis Results of Public Sector Banks

The proposed research model of panel regression has some pre-requisite conditions. One of the prime conditions is that the data series of the variable under study should be normally distributed. Therefore, to access the normality and other characteristics descriptive statistics of the panel data have been presented in Table – 1 below.

Table-1
Descriptive Statistics of the Variables

	INNEFT	INRTGS	MOBBANK	OUTNEFT	OUTRTGS	ROA	TOTAL ATM	TOTAL CREDIT	TOTAL DEBIT	TOTAL POS
Mean	3184777.	80357.84	1.58E+08	2139817.	86591.12	0.099364	10553.63	28921.70	593590.4	75986.99
Median	325422.5	1430.586	6598027.	172982.7	1522.195	0.300000	6081.500	565.5399	79616.95	11868.50
Maximum	61059299	1707919.	3.63E+09	43164147	1900509.	1.310000	65617.00	1327631.	10240726	827254.0
Minimum	16121.25	44.57383	13.04000	11303.19	40.81823	-3.010000	502.0000	0.000000	7523.800	0.000000
Std. Dev.	8667392.	251358.0	4.57E+08	6714045.	269972.0	0.752678	14757.04	155368.3	1639067.	158969.2
Skewness	4.933113	5.057695	5.280848	5.278035	5.111918	-1.350439	2.542844	7.352895	5.124977	3.075097
Kurtosis	29.43788	29.58713	35.84887	30.99519	30.64185	5.151304	8.398646	57.05720	29.46714	12.22825
Jarque-Bera	3649.725	3708.819	5456.905	4102.822	3981.078	54.64642	252.1273	14384.52	3692.201	563.6835
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	3.50E+08	8839362.	1.73E+10	2.35E+08	9525023.	10.93000	1160899.	3181387.	65294948	8358569.
Sum Sq. Dev.	8.19E+15	6.89E+12	2.27E+19	4.91E+15	7.94E+12	61.75106	2.37E+10	2.63E+12	2.93E+14	2.75E+12
Observations	110	110	110	110	110	110	110	110	110	110

Source: Author's own calculation

The information provided in Table – 1 reveals that all the variables are highly skewed indicating that they are not normally distributed. To be statistically confirmed we look at the Jarque-Bera statistics and their corresponding p-values. It is observed that all the variables have p-values of the Jarque-Bera Statistics have less than 0.05. this leads to the rejection of the null hypothesis (the data series comes from a normal distribution). In this case, the alternative hypothesis is accepted and concluded that the data series does not follow normal distribution. To ensure normality subsequently the data series were converted to logarithmic values. Again, this log converted values were tested for normality by using descriptive statistics. The results of the descriptive of the log converted variables are presented in Table – 2 below.

Table – 2
Descriptive Statistics of Log Converted Variables

	LGATM	LG CREDIT	LGDEBIT	LGINNEFT	LGINRTGS	LGMOB	LGOUTN EFT	LGOUTR TGS	LGPOS	LGROA
Mean	8.676291	7.200148	11.74463	13.10651	8.336407	14.70517	12.56399	8.407440	9.605675	-0.974640
Median	8.712936	6.361552	11.28495	12.69231	7.265796	15.69932	12.06093	7.327907	9.398934	-0.733969
Maximum	11.09159	14.09891	16.14188	17.92736	14.35079	22.01141	17.58052	14.45763	13.62587	0.270027
Minimum	6.218600	3.058707	8.925827	9.687893	3.797147	2.568022	9.332841	3.709129	3.135494	-3.912023
Std. Dev.	1.023224	2.279000	1.678503	1.910585	2.447206	4.518675	1.942371	2.450594	1.985402	0.858554
Skewness	0.480564	0.701572	0.574080	0.016437	0.040709	-0.610416	0.576002	0.837383	-0.094307	-0.242555
Kurtosis	3.162806	2.913202	2.502357	2.419544	2.414570	2.459616	2.479056	2.425879	2.973636	4.309202
Jarque-Bera	4.355419	8.728860	7.177125	6.433885	14.52868	8.169550	7.326450	14.36627	0.163216	25.97053
Probability	0.113301	0.112722	0.087638	0.060077	0.090700	0.076827	0.085650	0.078759	0.921633	0.650002
Sum	954.3920	763.2157	1291.910	1441.716	917.0048	1617.568	1382.039	924.8184	1037.413	-76.99658
Sum Sq. Dev.	114.1217	545.3531	307.0937	397.8864	652.7809	2225.608	411.2356	654.5896	421.7751	57.49496
Observations	110	110	110	110	110	110	110	110	110	110

Source: Author's own calculation

The skewness values of all the variables are very close to zero giving a preliminary confirmation of near-normal data series. Further, confirmation of the normal statistics is obtained from the Jarque-Bera statistics and their corresponding p-values. It is revealed from Table – 2 that all the p-values are greater than 0.05. This led to the acceptance of the alternative hypothesis. The acceptance of the alternative hypothesis confirms that the data are normally distributed.

Now having ensured that the data are normally distributed, we can proceed for the panel regression. In the subsequent section the results of the panel regression have been analysed.

Table-3
Hausman test with ROA as Dependent Variable

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	21.221130	9	0.0117

Source: Author's own calculation

In this section the panel regression has been applied by using the Return on asset data of all the public sector banks as the dependent variable and the other measures of the bank digitalization as the independent variable. To choose the better regression model among the fixed effect model and random effect model of the regression model at the first test the Hausman test was run by choosing the panel random effect of the panel regression. The result of the Hausman test is presented below.

The Random effect model is the most appropriate model for panel regression, according to the null hypothesis for the Hausman Test. The Hausman Test's p-value is less than 0.05, as shown in Table 3, and this indicates that the null hypothesis is rejected. The alternative hypothesis' acceptance demonstrates that the fixed effect is in this instance the best option for this panel regression.

The outcomes of the fixed panel regression with Return on Asset as the dependent variable are shown in Table 4 below.

Table-4
Panel Regression Results with ROA as Dependent Variable

Dependent Variable: LGROA				
Method: Panel Least Squares				
Date: 08/20/09 Time: 00:25				
Sample: 2012 2022				
Periods included: 11				
Cross-sections included: 10				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.442654	1.109573	0.398940	0.0014
LGATM	0.232784	0.232727	1.000243	0.3214
LGCREDT	0.208450	0.055092	3.783702	0.0004
LGDEBIT	0.110043	0.182131	0.604197	0.0081
LGINNEFT	0.075267	0.310624	0.242309	0.0094
LGOUTNEFT	0.177727	0.274150	0.648283	0.0194
LGINRTGS	0.392679	0.766224	3.122689	0.0028
LGMOB	0.072035	0.038442	1.873876	0.0661
LGOUTRTGS	0.149906	0.781057	2.752561	0.0079
LGPOS	0.178106	0.065520	2.718339	0.0087
Effects Specification				
R-squared	0.566887	Mean dependent var		-0.944197
Adjusted R-squared	0.430115	S.D. dependent var		0.851066
S.E. of regression	0.642477	Akaike info criterion		2.165345
Sum squared resid	23.52824	Schwarz criterion		2.748028
Log likelihood	-63.28311	Hannan-Quinn criter.		2.398213
F-statistic	4.144744	Durbin-Watson stat		1.727614
Prob(F-statistic)	0.000020			

Source: Author's own calculation

The data shows that, except for the variables total ATM and value of mobile banking transactions with p-values more than 0.05, all independent variables are significant in affecting the dependent variable. Inward RTGS values have the greatest impact on the dependent variable (39%) followed by total credit card transactions (20%) and total POS transactions (17 percent). The dependent and independent variables have a substantial overall association, as indicated by the F-statistics p-value of 0.000. In other words, the model has value and is trustworthy. The r-square result reveals a 56 percent overall influence of all variables on the dependent variable. It is concluded that public sector banks' Return on Assets is impacted by digitalization measures to the tune of 56%.

The equation of the above regression model has been presented below.

$$\begin{aligned} \text{LGROA} = & 0.442653520919 + 0.232783563505 * \text{LGATM} + 0.208450211935 * \\ & \text{LGCREDIT} + 0.110043224369 * \text{LGDEBIT} + 0.0752670393389 * \text{LGINNEFT} + \\ & 0.177726691634 * \text{LGOUTNEFT} + 0.39267869887 * \text{LGINRTGS} + \\ & 0.0720350172476 * \text{LGMOB} + 0.14990600009 * \text{LGOUTRTGS} + \\ & 0.178105502288 * \text{LGPOS} + [\text{CX}=\text{F}] \end{aligned}$$

Conclusions

The banks selected for this article represent the top ten public sector banks by considering their profitability. The results of the panel regression confirm that the digitalization component having the highest impact on the ROA are inward RTGS values (39%) followed by total credit card transactions (20%) and total POS transactions (17%). Therefore, the banks should focus more on the improvement of these services. The overall impact of all the digital parameters of the study on the ROA of the selected public sector banks is to the extent of 56%. The other unexplained parts of the variances are the subject matter of further study.

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