Impact of Investment in Information Technology on Performance of Banks and National Economy: A Study with respect to Karnataka Bank Ltd.

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Abstract

Banks are the essential supply chain partners of the Indian financial system to boost the growth of the national economy. The banking sector is afflicted by many challenging forces. One such is the technology impact that has led to the emergence of E-Banking by shunning the traditional system of pen and paper. Banks have to be financially sound in their operations when the investment in Information Technology is on the incline. It is of utmost importance to all – be it policy makers, bankers, researchers and scholars to assess the impact of investment in information technology on the financial and operating performance of the banks. The paper studies the impact of investment in Information Technology of Karnataka Bank Ltd. on its financial and operating performance for a period of ten years from 2001 – 02 to 2010 – 11. An attempt is made to investigate whether the investment in information technology of the bank is related to the growth of the national economy.
Keywords: Technology, Performance, Bank, Economy.

Introduction

Banks are an important constituent of the Indian Financial system and account closely to three quarters of the country's financial assets and ninety percent of the total financial services sector (Allan, Chakrabarti and De, 2007). Banks are the supply chain partners of growth and development by mobilizing savings and providing loanable funds to any sector (Sergeant, 2001; Qamar, 2000). Banks are also the responsible partners in the contribution of investments, employment generation, governance and risk management (Fetz, 2002).

The Banking Industry in India with Reserve Bank of India as its apex bank is illustrated in Figure 1. Scheduled Banks in India constitute those banks which are included in the Second Schedule of Reserve Bank of India (RBI) Act, 1934. Non-scheduled bank in India" means a banking company as defined in clause (c) of section 5 of the Banking Regulation Act, 1949 (10 of 1949), which is not a scheduled bank". For the purpose of performance assessment of banks, the banks are classified as –

1. Public Sector Banks – State Bank of India and its Associate Banks, nineteen Nationalized Banks and other Public Sector Banks.
2. Private Sector Banks – Fourteen old Private Sector Banks and seven new Private Sector Banks.
3. Foreign Banks – Thirty three Foreign Banks

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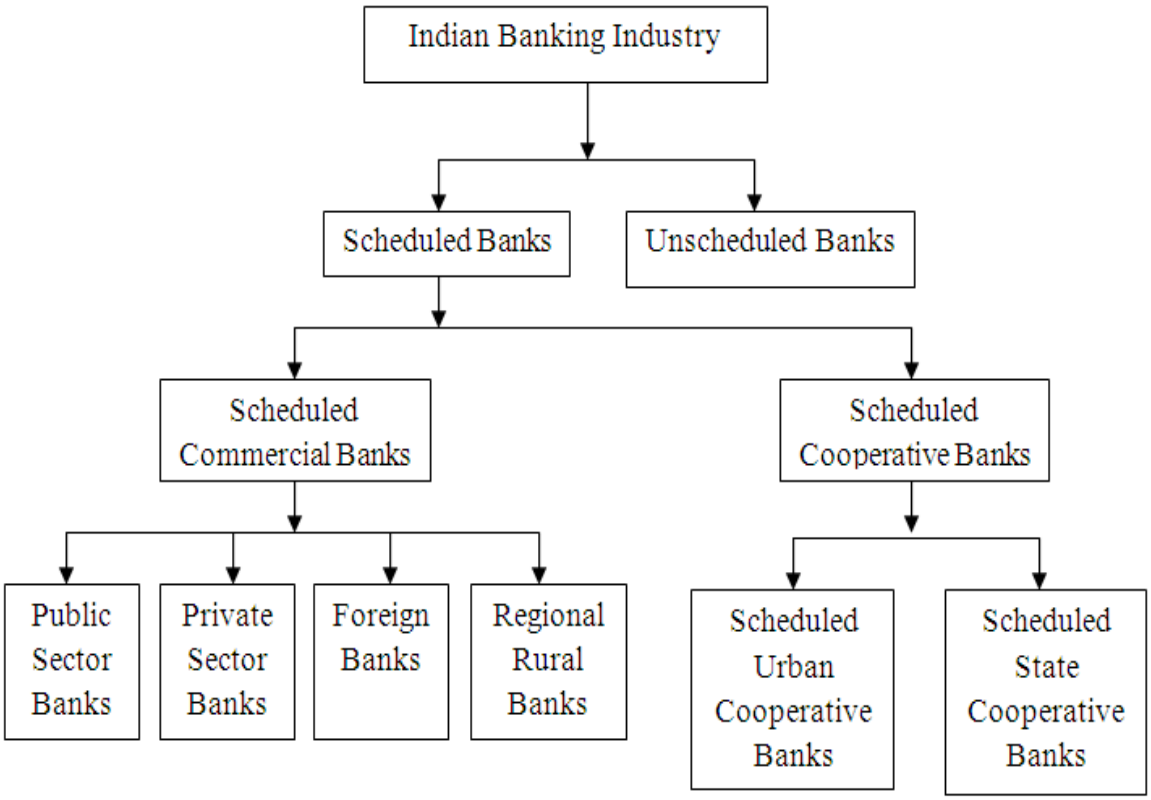

Figure 1: Structure of Indian Banking System

Statement of Problem

Information Technology, a revolutionary force has not left the banking sector untouched. There has been computerization of banks and its branches with core banking solutions at its helm. Emergence of E-Banking has facilitated internet banking, phone banking, and mobile banking to the customers making the services accessible anytime and anywhere. The investment in Information Technology accounts for 1 – 3 percent of the annual revenues for the public sector banks and sometimes above 5% for the private sector banks (KPMG Report, 2010).

Ho and Mallick (2006) documented the two positive effects of regarding the relation between Information Technology and banks performance. First, IT can reduce banks' operational costs. Second, IT can facilitate transactions among customers within the same network. Banks have used Information Technology to enhance profitability, productivity and customer satisfaction.

The relationship between Information Technology and banks performance is of interest to all –policy makers, bankers, researchers and scholars. The present study investigates the impact of investment in information technology on the performance of banks. As the growth of the economy depends on the control of financial resources, banks in India constituting the majority share, the linkage between the investment in Information Technology and growth of the economy is also studied.

Objectives of the Study

The objectives of the study are twofold –

1. To investigate the impact of the investment in Information Technology on the financial and operating performance of the banks.
2. To study the linkage between the investment in Information Technology and growth of the economy.

Literature Review

Some of the most important theoretical and empirical studies related to the impact of Information Technology on the performance of banks have been reviewed. Rajput and Gupta (2011) studied the impact of IT on Indian Commercial Banking Sector using DEA analysis, which is a non parametric linear programming based technique. The results conveyed that all Commercial Banks have shown a significant and improving trend in their performance due to the adoption of IT.

Ho and Mallick (2006) examined the effects of Information Technology in the US banking industry. They utilized a Hotelling model to examine the differential effects of the information technology (IT) in moderating the relationship between costs and revenue. The impact of IT on profitability was estimated using a panel of 68 US banks over 20 years. The evidence suggested that the network effect was relatively high in the US banking industry, implying that although banks use IT to improve competitive advantage, the net effect is not as positive as normally expected.

Karim and Hamdan (2005) conducted a survey on 12 banks in the US for the period of 1989-1997. They noticed that though Information Technology has been one of the most essential dynamic factors relating all efforts, it has not improved banks' earnings.

Data Extraction and Methodology

The study of the investment in Information Technology on the performance of the banks has been conducted with respect to Karnataka Bank Ltd. for a period of ten years from 2001 – 02 to 2010 – 11. Case Study method has been adopted for the purpose of study. Karnataka Bank, an old Private Sector Banks of India, was incorporated on February 18th, 1924 at Mangalore, a coastal town of Dakshina Kannada district in Karnataka State. Over the years the Bank has grown with the merger of Sringeri Sharada Bank Ltd., Chitradurga Bank Ltd. and Bank of Karnataka. The bank has a total of 447 branches, spread across 19 states and 2 Union Territories, with a total business of about Rs. 31248 Crore. The bank presently employs over 4,900 employees and is answerable to about 71,822 shareholders and over 3.7 million customers. The research is entirely based on the internal sources of secondary data. The secondary data has been collected from the annual reports of Karnataka bank for a period of ten years from 2001 – 02 to 2010 – 11.

The impact of investment in Information Technology on the financial and operating performance of the banks is studied through the technique of Backward Stepwise Regression. The main research hypothesis is formulated as **'**There is statistically significant impact on the use of Information Technology to improve the performance of Karnataka Bank'. The independent variables considered are Hardware, Software, Internet Banking, Phone Banking, Number of

ATMs, use of Cyber branches and Banking via SMS. The dependent variables considered relate to performance of Banks that are - Return on Equity, Market Value Added, Earnings Per Share, Return on Assets, Net Profit Margin, Spread, Burden, Total Expenses, Total Income and Wage Bills. The control variables are Size, Deposits/Assets and Credit Facilities/Assets.

The linkage between the investment in Information Technology and growth rate of the Economy is analyzed through the technique of Backward Stepwise Regression. The research hypothesis is formulated as 'There is statistically significant impact on the use of Information Technology to improve the performance of economy'. The independent variables and control variables are the same as above. The dependent variable to test this hypothesis is Gross Domestic Product. GDP is a significant variable to measure the growth rate of the economy.

The model can be mathematically expressed as -

$$\text{Performance Indicators} = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8+\beta_9X_9 + \beta_{10}X_{10}$$

Where,

Performance Indicators of the bank and economy are the dependent Variables.

$X_1 - X_7$ are independent variables and $X_8 - X_{10}$ are control variables.

X_1 = Software, it is the net investment of bank in the software during the period.

X_2 = Hardware, it is the net investment of bank in the computer hardware and equipment during the period.

X_3 = Internet Banking. It is a dummy variable, so that if the bank applies this property during the period gives (1), otherwise gives (0).

X_4 = Phone Banking. It is a dummy variable, so that if the bank applies this property during the period give (1), otherwise it gives (0).

X_5 = ATM, the number of ATMs owned by the bank during the period

X_6 = Cyber Branch. It is a dummy variable, so that if the bank applies this property during the period, give (1), otherwise (0).

X_7 = SMS. It is a dummy variable, so that if the bank applies this property during the period gives (1), otherwise (0).

X_8 = Size, it is the size of the bank, measured by total assets during the period. It is a control variable.

X_9 = Deposits, it is a ratio of deposits to assets during the period. It is a control variable.

X_{10}= Credit, is the proportion of credit facilities to the assets during the period. It is a control variable.

Empirical Analysis and Results

The following section evaluates the impact of the investment in Information Technology on the financial and operating performance of the banks. The descriptive statistics of the independent and control variables are reported in Table 1.

Table 1: Descriptive Statistics of Independent and Control Variables

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
Software (Rs in lakhs)	272.4	203.5	239.319	39	878
Hardware (Rs in lakhs)	965.1	789	529.033	465	2267
No. of ATM's	103	91	94.015	0	267
Size (Rs in lakhs)	1722300	1558800	793794	776000	3170000
Deposits to Assets	0.882	0.885	0.01229	0.86	0.9
Credit facilities to Assets	0.507	0.52	0.05677	0.42	0.59

The descriptive statistics of the financial and operating performance are shown in Table 2.

Table 2: Descriptive Statistics of the Financial and Operating Performance

Indicator	Mean	Median	Std. Dev.	Minimum	Maximum
Return on Equity (%)	16.435	17.205	4.27736	9.6	23.02
Market Value Added (Rs in lakhs)	75113	67412	69439.4	-6122.9	196000
Earnings Per Share (Rs)	27.515	20.94	17.0822	13.5	67.57
Net Profit Margin (%)	11.273	11.825	2.6077	7.1	14.86
Return on Assets (%)	1.16	1.265	0.25206	0.67	1.37
Spread (Rs in lakhs)	35025	35080	15105.3	14000	61200
Burden (Rs in lakhs)	1559.6	1552	11396.1	-11600	25700
Wage Bills (Rs in lakhs)	15659	12712	7901.54	8897.15	34507.54
Total Expenses (Rs in lakhs)	142010.6	113114.7	59395.73	89313.03	245799.1
Total Income (Rs in lakhs)	159160	130770	63164.4	98425.93	266260.3

The correlation between the independent variables, control variables and the financial performance indicators are presented in Table 3. It is observed that investment in software has a high positive statistically significant correlation with earnings per share and credit facilities to assets with market value added. The number of ATM's and size of the bank has a statistically significant negative correlation with return on equity, earnings per share, market value added and return on assets.

Table 3: Correlation between Independent Variables, Control Variables and Financial Performance

Variable	ROE	MVA	EPS	NPM	ROA
Software	0.71*	-0.538	0.901*	-0.147	0.296
Hardware	0.621*	-0.57*	0.842*	-0.344	0.141
Internet Banking	-0.49	0.479	-0.497	-0.422	-0.538
No. of ATM's	-0.789*	0.599*	-0.711*	-0.462	-0.769*
Size	-0.824*	0.552*	-0.715*	-0.461	-0.787*
Deposits to Assets	0.709*	-0.608*	0.589*	0.116	0.538
Credit Facilities to Assets	-0.615*	0.92*	-0.781*	0.115	-0.373

Note: * indicates that correlation is statistically significant at 5% level (1 tailed test)

The correlation between the independent variables, control variables and operating performance are given in Table 4. It is examined that internet banking has a high positive statistically significant correlation with total expenses and total income. Also the number of ATM's and size of the bank has a high positive statistically significant correlation with wage bills, total expenses and total income. Software and deposits to assets has a negative statistically significant correlation with spread, burden and operating expenses. Wage bills have a negative statistically significant correlation with deposits to assets.

Table 4: Correlation between Independent Variables, Control Variables and Operating Performance

Variable	Software	Hardware	Internet Banking	No. of ATM's	Size	Deposits to Assets	Credit Facilities to Assets
Spread	-0.674*	-0.515	0.698*	0.848*	0.843*	-0.702*	0.846*
Burden	-0.606*	-0.501	0.645*	0.882*	0.878*	-0.785*	0.799*
Wage Bills	-0.534	-0.291	0.809*	0.928*	0.943*	-0.675*	0.569*
Total Expenses	-0.512	-0.208	0.915*	0.973*	0.973*	-0.487	0.552*
Total Income	-0.536	-0.231	0.926*	0.977*	0.975*	-0.487	0.582*

Note: * indicates that correlation is statistically significant at 5% level (1 tailed test)

The research hypothesis formulated that there is statistically significant impact on the use of Information Technology to improve the performance of Karnataka Bank is investigated with the aid of Backward Multivariate Regression. The results of the Backward Stepwise Regression with the financial and operating performance as independent variables are specified in Table 5.

Table 5 has revealed that 92.8% of the variations in Return on Equity are explained by the changes in the significant independent variables of investment in software, hardware and control variable of size of the bank. 99.3% of the variations in Market Value Added are explained by the changes in the significant independent variables of investment in software, hardware, practice of internet banking and the control variable of credit facilities to assets. 93.6% of the variations in Earnings Per Share are explained by the changes in significant independent variable of investment in software and control variable of credit facilities to assets. 87.2% of the variations in Net Profit Margin are explained by the changes in the significant independent variables of investment in software, no. of ATM's and the control variable of credit facilities to assets. 92.6% of the variations in the Return on Assets are explained by the changes in the significant independent variables of investment in hardware and control variables of size and credit facilities to assets. 88% of the variations in Spread are explained by the changes in the significant independent variable of investment in software and control variable of credit facilities to assets. 91.7% of the variations in Burden are explained by the changes in the significant independent variables of investment in software, hardware and no. of ATM's.

Table 5: Impact of Investment in Information Technology on Financial and Operating Performance of Karnataka Bank

Performance	Iterations	R square	Independent Variables	Unstandardised Coefficients	t tests Sig. (p value)
ROE	4	0.928	(Constant)	34.692	0.002
			Software	-0.025	0.046
			Hardware	0.011	0.023
			No. of ATM's	0.116	0.072
			Size	-0.00002	0.027
MVA	3	0.993	(Constant)	-198685.667	0.018
			Software	562.763	0.003
			Hardware	-265.429	0.002
			Internet Banking	144676.418	0.001
			Size	-0.028	0.052
			Credit Facilities to Assets	722878.194	0.002
EPS	6	0.936	(Constant)	78.297	0.004
			Software	0.048	0.001
			Credit Facilities to Assets	-126.093	0.008
NPM	4	0.872	(Constant)	-12.285	0.162
			Software	-0.023	0.046
			Hardware	0.008	0.093
			No. of ATM's	-0.057	0.005
			Credit Facilities to Assets	56.038	0.013
ROA	4	0.926	(Constant)	.340	0.477
			Software	-0.003	0.009
			Hardware	0.001	0.012
			Size	-0.000000679	0.001
			Credit Facilities to Assets	3.450	0.017
Spread	5	0.880	(Constant)	-64289.278	0.042
			Software	-65.357	0.031
			Hardware	22.906	0.070
			Credit Facilities to Assets	187398.389	0.006
Burden	5	0.917	(Constant)	-3746.321	0.350
			Software	57.263	0.041
			Hardware	-25.931	0.023
			No. of ATM's	143.185	0.001
Wage Bills	5	0.939	(Constant)	228641.304	0.036
			No. of ATM's	82.080	0.001
			Deposits to assets	-222755.237	0.048
			Credit Facilities to Assets	-49227.339	0.070
Total Expenses	5	0.988	(Constant)	59873.122	0.000
			Software	-146.718	0.016
			Hardware	70.118	0.007
			No. of ATM's	528.982	0.000
Total Incomes	5	0.995	(Constant)	74944.885	.000
			Software	-172.572	.001
			Hardware	77.716	.001
			No. of ATM's	546.345	.000

Table 5 has also disclosed that wage bills are affected by 93.9% due to significant independent variable of number of ATM's and control variable of deposits to assets. Total expenses are affected by 98.8% due to the significant independent variables of investment in software, hardware and number of ATM's. Total incomes are affected by 99.5% due to the significant independent variables of investment in software, hardware and number of ATM's. As the R square is above 85% for all the dependent variables of financial and operating performance, the strength of the model should be noted. The hypothesis that there is statistically significant impact on the use of Information Technology to improve the performance of Karnataka Bank is accepted. The results of Table 5 involve the following –

1. Investment in software is significantly negatively related to ROE, NPM, ROA, Spread, Total Expenses and Total Incomes.
2. Investment in hardware is significantly negatively related to MVA and Burden.
3. Investment in Hardware is significantly positively related to ROE and ROA.
4. The number of ATM's is significantly positively related to Burden, Wage Bills, Total Expenses and Total Incomes.
5. Internet Banking is significantly positively related to Market value Added.

Investment in software has led to the cost advantage and reduced profitability. Investment in hardware has led to the cost advantage too. This is consistent with the results of the studies of Ho and Mallick (2006), Shu and Strassmann (2005) and Leckey, Osei and Harvey (2011). Kumar, Malathy and Ganesh (2011) have cited that acceleration in the number of ATM's are associated with the escalation of the wage bills. Ajaya and Pinto (2012) too have stressed that ATM Banking is the most preferred channel to bank with by the customers. The magnitude of the coefficient of the number of ATM's is higher for the total incomes than total expenses, wage bills or burden. The magnitude of the coefficient of investment in software and hardware is small when compared to the number of ATM's. Hence the investment in the number of ATM's has increased profitability. The study has in addition shown that investment in hardware has led to increased profitability. The study has implied that a larger investment in ATM's, a component of hardware has led to increased profitability. This is consistent with the study of Leckey, Osei and Harvey (2011). The burden will remarkably decrease only when the human tellers are totally substituted by the information technology. The crux is that the investment in information technology should be increased and the bank should equate the marginal cost with the marginal revenue to enjoy profit maximizing conditions. The internet banking facility should be adopted by the bank to improve the market value of equity.

The impact of the investment in Information Technology can be linked to the growth rate of the economy. Backward Stepwise Regression Technique has been used to analyze the linkage and the results are provided in Table 6.

Table 6: Impact of Investment in Information Technology on the Performance of the Economy

Performance	Iterations	R square	Independent Variables	Unstandardised Coefficients	t tests Sig. (p value)
GDP	5	0.856	(Constant)	-4.538	0.494
			Number of ATM's	0.019	0.036
			Credit Facilities to Assets	35.128	0.045

Table 6 has divulged that 85.6% of the variations in the Gross Domestic Product are explained by the changes in the significant independent variable of number of ATM's and control variable of credit facilities to Assets. As the R square is above 85% for the dependent variable of Gross Domestic Product, the strength of the model should be noted. The hypothesis that there is statistically significant impact on the use of Information Technology to improve the performance of economy is accepted.

Conclusion

The banking sector is a lucrative industry in India. The investment of Information Technology has been on a rapid incline as a tool to combat competition in the banking industry with a mix of players from the public, private and foreign sector. The study has concluded that the investment in information technology has an impact on the financial and operating performance of the Karnataka bank and economy. Since the study is micro in nature, the results cannot be generalized to all the banks in India. The suggestions to increase the investment in hardware and the number of ATM's to improve profitability should be considered by banks that have not deployed adequate funds to information technology. Internet Banking should be adopted by all the banks to enhance the market value added of equity of the banks. It can be concluded that banks are the supply chain partners of growth of the economy.

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