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# CHARACTERIZATION OF EARLY AND LATE ADOPTERS OF ATM CARD IN INDIAN BANKING INDUSTRY

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## Abstract

*The present study deals with affect of adoption pattern of the ATMs by banks on its characteristics. With the exploration of various characteristics of the banks like Size, Profitability, Efficiency, Cost of Operations, Asset quality and Credit risk, Financing Pattern, Diversification and Age etc.; the study has tried to differentiate between the early and late adopter category of the banks regarding ATM cards. The banks have been categorized into early and late adopters on the basis of their adoption period. For this purpose, 50 scheduled commercial banks consisting of 27 Public Sector Banks and 23 Private Sector Banks have been taken as sample to investigate the various aspects of and early adopter banks in comparison to late adopter banks. The time period of the study is 20 years i.e. from 1991 to 2010. It can be concluded that the initiators and first movers take advantage over the late adopters and laggards. They have found to perform better in terms of various parameters. Overall, the early adopter banks are larger in size, more diversified, having lesser branches, more market share and wide ATM network as compared to late adopter ones. Thus, the empirical results evidently reveal that the both the groups have their own different characteristics.*



*Keywords: ATMs, innovation, adoption, performance of banks, India.*

**T**he innovations and technological progress are engines of economic growth. Economists and other social scientists have attempted to understand the process of technology diffusion from time to time. When the real need arises, a new idea is generated in the social system which becomes innovation once it is adopted by the community. Thus, Innovation makes the initial idea commercially feasible, and then adoption of the technology by potential users leads to its diffusion (Khan, 2004).

Banks have also tried to redefine themselves with new rules by transforming its operations to universal banking and adding new channels with lucrative deals (Indian Banking; McKinsey and Company, 2010). Hence, the banks introduce innovative products through e-banking and e-payment system. This can be regarded as one of the ways for the banks to survive in this environment by launching the electronic products in the market viz. Internet Banking, Plastic Cards, Electronic fund transfer, Mobile Banking etc. which

are known for its unique features like more speed to conduct transactions, universal applicability, lesser financial cost etc. while taking into consideration the customers' needs, preferences, perceptions, convenience and need of an hour.

In modern era banking industry, information technology has revolutionized the way to approach their customers through innovative products and services. As information technology becomes more and more sophisticated, banks in many parts of the world are adopting a multiple-channel strategy. Also, the right mix of banking channels depends not only on the channel characteristics, but also the preferences of the consumers within a particular market (Wan et.al, 2005). Thus, the new innovations being adopted by banks hold great promises for them to grab huge business opportunities by competing worldwide. In this way, the innovations itself have also lured the banks to reengineer themselves with tech savvy services which can be reached to their customers by bringing flexibility in their "distribution channels" (De Sarkar, 2001). These new enhancements and their acceptance have shifted the bank interest from product centric to customer centric and Electronic banking can be seen as one of that advantageous change.

Innovation is thus one leading 'driving force' nowadays, in different businesses. It is therefore important to research the investments in technology and their impact in the bank business (Saunders and Walter, 1994; King and Sethi, 1994). The paper has been divided into six sections. Section I briefly explains the emergence of in-

formation technology in Indian banking industry, Section II elaborates the introduction and adoption of ATMs by banks in India, Section III deals with the previous literature related to study, Section IV describes the sample and need of the study, however Section V highlights the empirical results and last but not the least Section VI presents the concluding remarks of the results so found.

## LITERATURE REVIEW

### *Classification of the Adopters of Innovation*

Any organization does not adopt any innovation suddenly; it takes series of actions and observations while actually that decision is to be taken. Hence, It is particularly important to assess how technology is reducing the 'labor intensive activities, reducing service and processing cost, increasing service levels, and improving the productivity and competitiveness of the organization (Ombati et al., 2010). The main factors contributing the adoption level of innovation are tend to be the organizational readiness, external pressure and perceived benefits (Shaharudin et al., 2012)

Most of the diffusion studies have divided the organization's tendency to adopt the innovation in the categories viz. initiators, early adopters, late adopters and non adopters. It has been taken into consideration with the viewpoint of banks as follows:

*Initiators* can be defined as the innovators that have no external pressure on the banks but they are ready to install new technology as they may have the resources and perceive the benefits in

it. Initiators are less in number in industry and they do so to get first mover advantage.

*Early adopters* generally have the necessary resources and willingness too to allocate it in adopting new technology though having the little external pressure.

*Laggards or Late Adopters* are banks that have been pressured to adopt, but still have not recognized the need for it. Even though they could have necessary resources yet they do not see the advantage of adopting it. Therefore, the actual impact of technology on these may be perceived as limited.

*Non Adopters* are those banks which usually do not face high external pressure to adopt technology. In the absence of external pressure to adopt technology, the only mix of factors that can lead to the adoption by an organization can be combination of organizational readiness and high perception of benefits. The lack of either can lead to rejection of innovation.

In the present study, since all the banks have already adopted ATMs, these have been divided in the early and late adopter category.

### ***Introduction and adoption of ATMs in India***

Automated Teller Machines (ATMs) have gained prominence as a delivery channel for banking transactions in India. Banks have been deploying ATMs to increase their reach. While ATMs facilitate a variety of banking transactions for customers, their main utility has been for cash withdrawal and balance enquiry. In India, there is a con-

tinuous rise in the usage of ATMs by the customers. Since 2000, sufficient number of ATMs have been installed by various banks in India taking into consideration its popularity and usage among the customers.

First ATM was adopted in India by HSBC bank in 1987. Later very few banks adopted it until the external pressure made an influence at large. Regarding the diffusion of ATMs in India, the period from 1987 till 1991 can be categorized as the innovation phase. Afterwards, a big wave of technology adoption was literally influenced by the Narsimham committee (1991), as according to it, the Indian banking industry was liberalized and opened to competition from within and outside. In order to meet these challenges, it recommended the banks to implement advanced technology. However, it has been documented that initially bank managers resisted the implementation of technology because of the lack of flexibility in restructuring employment in the face of automation. This strategic push towards technology adoption was felt by the new entrants as they realized that their competition edge and sustainability over the long run was dependent on the provision of low cost service mediums such as Automatic Teller Machines (ATMs). Hence by the end of 1999, majority of the banks adopted ATMs and that has been categorized as the early adoption phase. However, there remained some banks which had not adopted it by that period even. Saraf committee (1999) insisted the banks to adopt it as early as possible to survive in the long run. The banks which were below par and not ready to adopt, due to external pressure started adopting ATMs and till 2008

Table 1. Adoption of ATM cards by Commercial banks in India

Banks	Adoption Rate		Total
	Early adopter $N_1$ (%age)	Late adopter $N_2$ (%age)	
Private Sector Banks	8 (34.78)	15 (65.22)	23 (100)
Public Sector Banks	10 (37.03)	17 (62.96)	27 (100)
Total	18 (36)	32 (64)	50 (100)

all the banks in India had their own ATM network to follow. Hence, Banks are said to be early adopters if they have installed ATMs since within 12 years of 1<sup>st</sup> installation. The remaining have been categorized as late adopter ones. The adoption level of ATMs in Indian banks can be depicted in Table 1 which shows that almost one third of the banks can be categorized as early adopters and remaining are to be considered as the late adopters irrespective of the category of the banks.

### *Previous Researches*

Technological leaders may reap first mover advantages (Porter, 1985). But it can not always hold true for all as to install innovation; firm needs lot of capital and expertise. The benefits may not be reaped instantly as per the expectations. Thus, the other category of follower may be able to take advantage by developing applications/innovation at lesser cost and more expertise by estimating the benefits from the experience of innovators (Santos and Peffer, 1995). Thus, two school of thoughts emerged in case of innovation adoption that whether it is beneficial for the organization to do so or not.

Most of the studies relating to adoption of innovation in banking sector deals with the adoption of services provided through internet banking. No doubt, enough literature is available

worldwide evaluating the banks performance by categorizing them into adopters and non adopters of innovations, but most of them are relating to Internet banking only and none of the studies have actually measured the early innovators advantage and experience effect.

In this context, Furst et al. (2000, 2002), Sullivan (2000), De Young (2001, 2005), Hasan et al. (2002), Delgado et al. (2004), Hernando and Nieto (2005), De Young et al. (2006), Malhotra and Singh (2009) etc. are some of the studies who have remarkably researched the performance characteristics of internet and non internet banks by comparing both groups. Various bank specific characteristics like Profitability, Asset Quality, Financing Structure, Size, Cost of Operations etc. have been taken as performance measures by these studies. Furst et al. (2000, 2002), by taking the sample of US banks, found that internet banks are having better performance than non internet banks and thus outperformed non internet banks. In the line of this, Hasan et al. (2002), Hernando and Nieto (2005), De Young et al. (2006), Malhotra and Singh (2009) also share the same views by analyzing the banks of Italy, Spain, US and India respectively. However, Sullivan (2000) and Delgado et al. (2004) envisaged the contrary results by reporting lower profitability and poorer performance for internet banks.

No doubt some of the studies try to capture the experience affect to explain the difference in performance of firms using the technology at different period of times. Furst et al. (2000) focused on different groups of Internet banks like De novo Internet Banks (those who have recently introduced the innovation) and mature banks. The results revealed that the de novo Internet banks had poorer performance ratios than non-Internet De novo Banks. In line with this De young (2001) found that profitability ratios and non-interest expenses ratios tend to improve more quickly over time at the internet-only start-ups than at the traditional start-ups. While analyzing the internet banking in Italy, Hasan (2002) suggested that with experience gained in innovations, banks are more likely to improve their performance in overall banking activities. Hence, there is not much literature available on the part of differentiation or comparison of performance of banks adopting plastic cards. However Santos and Peffers (1995) studied the effects of early adoption of automated teller machines (ATMs) by banks, on market share and income for the period 1971 to 1983 and included 2,534 banks across United States. The results indicate that the earliest adopters were able to increase market share as well as their income, with market share gains being sustained for a long time. In one of their other study, they tried to study the effect of early investments in the ATMs by banks on market share and overall bank performance. It has been found that the benefits obtained by the earliest adopters were larger than those obtained by the banks which adopted later. These findings support the evidence that early adoption of new

IT applications can lead to long-term competitive advantages for firms.

Hence, this aspect has not been extensively studied and thus untouched research issue of the banking sector in India. So the study is an attempt of this type in which the performance of the banks have been measured on the basis of their adoption pattern of ATMs.

## RESEARCH METHOD

### *Objective and Hypothesis of the Study*

The main objective of the study is to identify the characteristics of the banks which could have been affected with the adoption of ATMs in different timeline. In other words, the attempt has been made to investigate the difference in performance of banks which have adopted ATMs at early stage than that of later ones. The innovation no doubt has the tendency to impact the industry at large as well as the organizational performance. To measure the performance of organization is a complex process which includes internal operations and external activities and interaction between them. There are a multitude of measures used to assess bank performance. The main drivers of banks' performance are its earnings, efficiency, growth, liquidity, risk-taking, leverage etc. For this purpose, various Bank specific variables Viz. Age, Efficiency, Size, Asset Quality, Profitability, Diversification, Capitalisation, Cost Of Operations, Financing Pattern, Network Effect, Liquidity and Industry Advantage have been taken into consideration which may help to demarcate early adopters and late adopters. There can be some variations or differentiations in these two groups in context of their characteristics.



Table 2. List of the Variables

Parameter	Variables	Explanation
Age		Number of Years since incorporation
Diversification	Noninterest Income	Ratio of non interest income to total income
Capitalization	CRAR	Ratio of total capital to risk weighted assets
Industry Advantage	Market Share	Ratio of banks loan and investment to loan and investment of total banks
Size	Assets	Log of total assets of the bank
	Branches	Total number of branches
Financing Pattern	Deposits	Ratio of total deposits to total funds
	Borrowings	Ratio of total borrowings to total funds
	Product Mix	Ratio of demand deposits to Total deposits
Cost of Operations	Wages	Payment to employees over operating expenses
	Fixed Cost	Ratio of expenses for premises and fixed asset to operating revenue
Profitability	ROA	Ratio of net profits to total assets
	ROE	Ratio of net profits to equity
Asset quality and credit risk	Loans	Ratio of total loans to total assets
	Non Performing Assets	Ratio of net non performing loans to total loans
Efficiency	Business per Employee	Ratio of deposits and advances to total number of employees
	Net Interest Margin	Ratio of net interest margin to net operating revenue
Liquidity	Liquid Assets	Total Liquid assets of the bank
	Cash Deposit Ratio	Ratio of Cash and Cash equivalents to total deposits
Network Effect	Number of ATMs	Number of ATMs installed
	ATM branch ratio	Ratio of Number of ATMs to Branch network

Ho: There is no significant difference between early adopters and late adopter banks in terms of their various characteristics

The sample of the study is confined to 50 commercial banks consisting of 23 private and 27 public sector banks. Foreign sector banks have not been taken since the information regarding their adoption pattern is not available. The time period has been taken from the year 1991 to 2011. In the sample all the banks have already been adopted the ATMs during the study period.

**Data Analysis Technique**

Independent sample T test has been applied by differentiating the banks into two groups. The t-test may be used to compare the means of a criterion variable for two independent samples. This test of difference of means

indicates whether there is significant difference between the means of two sample groups or not. Here,

$$Ho: \mu_1 = \mu_2$$

$$Ha: \mu_1 \neq \mu_2$$

Since the sample size is large enough, the normality of data does not make much relevance at all. The t based methods are only weakly dependent on normality of Yi, particularly when n is large. They are extremely dependent on the independence assumption. However, the equality of variance has been tested by applying Levine’s Test. The t statistic to test whether the population means are different can be calculated as follows:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{s_{\bar{X}_1 - \bar{X}_2}} \tag{1}$$

Where,

$$s_{\bar{X}_1 - \bar{X}_2} = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} \tag{2}$$

Table 3. Size of the Early and Late adopters of ATM Cards

Banks	Total Assets (in Rs.)			Branches		
	Mean		t-statistics (p value)	Mean		t-statistics (p value)
	Early Adopters	Late Adopters		Early Adopters	Late Adopters	
All sampled banks ( $N_1 = 18, N_2 = 32$ )	19.40107	18.75827	1.841024* (0.073558)	1.225896	1.665493	-2.0454** (0.046336)
Public Sector Banks ( $N_1 = 10, N_2 = 17$ )	19.95302	19.56458	1.273016 (0.214724)	1.346036	1.710109	-2.87132*** (0.008387)
Private Sector Banks ( $N_1 = 8, N_2 = 15$ )	18.71115	17.77918	2.107791** (0.050847)	1.075722	1.614929	-1.19968 (0.243818)

\*\*\*, \*\* and \* means statistically significant at 1%, 5% and 10 % respectively

Where  $s^2$  is the unbiased estimator of the variance of the two samples,  $n$  = number of variables, 1 = group one, 2 = group two.

## RESULTS AND DISCUSSION

The empirical results showing the performance of early adopters and late adopters of ATM cards in Indian banking sector, while taking the various bank specific parameters into consideration are as follows:

### Size

Total Assets and Number of branches have been taken as the proxy to parameter size. It has been assumed that the banks adopting new technology or innovation will have more assets and thus larger in size. It may be due to the fact that the presence of scale of economies and scope, larger banks would have more chances to develop and innovate. However, branches could have the opposite effect as due to the adoption of new technology banks may not need to have more branches.

As shown in Table 3, in respect of size, total assets are found to be more in case of early adopter banks irrespective of type of banks. However, the difference is not significant in case of public sector banks. It depicts that the innovative banks are larger in size in terms of to-

tal assets they have. However, Number of branches as the measure of size, have been negatively affected with the adoption of ATMs as per the expectation. Since ATMs can be considered alternative to Brick and Mortar banking, which resist the banks to install further branches. However, the difference is not found to be significant in case of private sector banks.

### Profitability

ROE and ROA are considered as the reliable variables to measure the performance of banks in terms of profits. Two different thoughts have been found in the literature as far as this parameter is concerned. As some researchers thought that those banks who innovate easily or early are more profitable than those who lag behind it. It may be due to the fact that the products and services can get more diversified with the adoption of new technology. However on the other hand, some studies report the poor profitability of the adopters or tech savvy banks than the traditional banks. The installation and adoption involve the huge investments and expenses which can lead to the reduction in overall income of the organization.

As per table 4, Profitability, is insignificantly different for both the groups

Table 4. Profitability of the Early and Late adopters of ATM Cards

Banks	ROE			ROA		
	Mean		t-statistics (p value)	Mean		t-statistics (p value)
	Early Adopters	Late Adopters		Early Adopters	Late Adopters	
<b>All sampled banks</b> ( $N_1 = 18, N_2 = 32$ )	17.12076	14.29592	1.608458 (0.114294)	0.929914	0.997058	-0.4052 (0.68716)
<b>Public Sector Banks</b> ( $N_1 = 10, N_2 = 17$ )	19.09796	16.62957	1.521155 (0.141395)	0.901555	0.834134	0.885487 (0.386075)
<b>Private Sector Banks</b> ( $N_1 = 8, N_2 = 15$ )	14.64926	11.6511	1.030224 (0.314625)	0.965364	1.181706	-0.61699 (0.543875)

\*\*\*, \*\* and \* means statistically significant at 1%, 5% and 10 % respectively

Table 5. Cost of Operations of the Early and Late adopters of ATM Cards

Banks	Fixed cost (Infrastructure cost)			Labor Cost (Wages)		
	Mean		t-statistics (p value)	Mean		t-statistics (p value)
	Early Adopters	Late Adopters		Early Adopters	Late Adopters	
<b>All sampled banks</b> ( $N_1 = 18, N_2 = 32$ )	0.219517	-0.06025	1.404906 (0.166894)	0.570174	0.523468	-0.73051 (0.468629)
<b>Public Sector Banks</b> ( $N_1 = 10, N_2 = 17$ )	0.082119	-0.10098	0.566732 (0.575975)	0.665164	0.65988	0.231773 (0.818634)
<b>Private Sector Banks</b> ( $N_1 = 8, N_2 = 15$ )	0.391265	-0.01409	2.194195** (0.03961)	0.451438	0.530291	-1.27533 (0.21612)

\*\*\*, \*\* and \* means statistically significant at 1%, 5% and 10 % respectively

(i.e. early and late adopters) irrespective of the type of banks denying any impact of innovativeness on the profitability of the bank. However, the banks which are early adopters have higher profitability ratios as compared to late adopter ones.

### Cost of Operations

The cost of operation born by the banks in form of fixed and labor cost is also found to be insignificantly different except for the private sector banks. It can be concluded that the fixed cost incurred by banks who are early adopters of ATMs is higher as compared to banks who adopted it in later years though found to be significant only in case of private sector banks. It may be due to the fact that installation of ATM needs lot of infrastructure expenses to be incurred which ultimately raised the fixed cost to handle it.

Also, the labor cost in terms of wages paid to employees reduced with the adoption as expected. Since, this technology is used to reduce the need of man power or human teller as the retail transactions to be performed by the Human teller can now be operated by customer itself with no time and negligible cost to bear.

### Financing Pattern

Most of the researchers have categorized deposits as the traditional source of financing the assets and borrowings as non-traditional or modern source of financing. The literature observes that the more tech savvy banks are having lesser dependence on traditional source of finance i.e. deposits. On the other hand in context of borrowings the adopter banks can be seen leading towards accepting nontraditional sources of financing their assets. As per table 6, Deposits of the early

Table 6. Financing Pattern of the Early and Late adopters of ATM Cards

Banks	Deposits			Borrowings		
	Mean		t-statistics (p value)	Mean		t-statistics (p value)
	Early Adopters	Late Adopters		Early Adopters	Late Adopters	
<b>All sampled banks</b> ( $N_1 = 18, N_2 = 32$ )	0.816339	0.834131	-0.73237 (0.467578)	0.044948	0.054195	-0.40912 (0.684348)
<b>Public Sector Banks</b> ( $N_1 = 10, N_2 = 17$ )	0.820527	0.86156	-3.58131*** (0.001439)	0.028806	0.02114	1.367135 (0.183751)
<b>Private Sector Banks</b> ( $N_1 = 8, N_2 = 15$ )	0.811104	0.800823	0.228361 (0.821711)	0.065127	0.091657	-0.45902 (0.650932)

\*\*\*, \*\* and \* means statistically significant at 1%, 5% and 10 % respectively

Table 7. Capitalization and Diversification of the Early and Late adopters of ATM Cards

Banks	CRAR (Capitalization)			Non Interest Income (Diversification)		
	Mean		t-statistics (p value)	Mean		t-statistics (p value)
	Early Adopters	Late Adopters		Early Adopters	Late Adopters	
<b>All sampled banks</b> ( $N_1 = 18, N_2 = 32$ )	12.44049	13.14166	-1.48346 (0.145486)	1.596061	1.435809	2.222154** (0.03153)
<b>Public Sector Banks</b> ( $N_1 = 10, N_2 = 17$ )	12.44979	12.64849	-0.52801 (0.602385)	1.572654	1.397271	2.382063** (0.025141)
<b>Private Sector Banks</b> ( $N_1 = 8, N_2 = 15$ )	12.68329	14.57243	-1.57979 (0.129101)	1.60618	1.356563	1.783338* (0.097734)

\*\*\*, \*\* and \* means statistically significant at 1%, 5% and 10 % respectively

adopters are comparatively less in case of public sector banks. However opposite can be seen in the case of private sector banks, in which the deposits have been reported more for early adopters and difference is significant too. Since, private sector banks try to take initiative in providing more value added services through the ATM.

The financing through borrowing are also found to be lesser for early adopters except for private sector banks only. Thus, it can be said that the public sector banks adopting ATM use modernized sources to raise funds than just being rely on the traditional sources in the form of deposits from customers while it is reverse in case of private sector banks.

#### **Capitalization and Diversification**

Table 7 depicts that capitalization is lesser in case of early adopter banks

and it is insignificant too. It shows that the capitalization of the banks has not been affected with its innovativeness. On the other hand, diversification measured from non interest income is positive and significant too which means that the innovative banks are more diversified and raise their income by providing modern services to its customers.

#### **Credit Risk and Asset Quality**

Loans and advances distributed by banks are more in case of all the sampled banks as well as public sector banks. Table 8 indicates as per the expectation that the banks which tend to transform more deposit to loans can be regarded as efficient one and has more innovation capacities. Private sector banks depict the other view of picture as in this case loans have been negatively affected with the adoption.

Table 8. Credit Risk and Asset Quality of the Early and Late adopters of ATM Cards

Banks	Loans			Non Performing Assets		
	Mean		t-statistics (p value)	Mean		t-statistics (p value)
	Early Adopters	Late Adopters		Early Adopters	Late Adopters	
All sampled banks ( $N_1 = 18, N_2 = 32$ )	0.484476	0.478092	0.446922 (0.657447)	3.332889	3.853792	-1.4105 (0.164912)
Public Sector Banks ( $N_1 = 10, N_2 = 17$ )	0.487186	0.469314	1.206628 (0.23887)	3.1433	3.530716	-1.00341 (0.325483)
Private Sector Banks ( $N_1 = 8, N_2 = 15$ )	0.481088	0.488752	-0.28806 (0.776954)	3.569875	4.219945	-0.97326 (0.342683)

\*\*\*, \*\* and \* means statistically significant at 1%, 5% and 10 % respectively

Table 9. Experience and Industry Advantage of the Early and Late adopters of ATM Cards

Banks	Age			Market Share (Competitive Advantage)		
	Mean		t-statistics (p value)	Mean		t-statistics (p value)
	Early Adopters	Late Adopters		Early Adopters	Late Adopters	
All sampled banks ( $N_1 = 18, N_2 = 32$ )	68.11111	71.40625	-0.34724 (0.729931)	0.030034	0.012559	1.984347** (0.05295)
Public Sector Banks ( $N_1 = 10, N_2 = 17$ )	75.2	84.94118	-1.06639 (0.296438)	0.043053	0.019954	1.557157 (0.132003)
Private Sector Banks ( $N_1 = 8, N_2 = 15$ )	59.25	56.06667	0.193509 (0.849361)	0.013761	0.004178	2.025962** (0.05566)

\*\*\*, \*\* and \* means statistically significant at 1%, 5% and 10 % respectively

On the other hand, the quality of asset is being measured with help of NPA. The results verified that the early adopter banks have better asset quality as NPAs are lesser in their case. However, the results are opposite in case of private sector banks.

### *Experience and Industry Advantage*

According to Table 9, Age of the early adopter banks is comparatively found to be lesser than the late adopters as the younger banks are more innovative and tried to adopt new technology sooner than the older ones though the results have been found insignificant. However, in case of private sector banks, older ones are found to be more innovative.

It can be assumed that the banks adopting the new technology will have more

market share in the industry. It may be due to the reason that they will have more exposure in the market by adopting the new product and thus can have approach to the maximum customers in the industry. As per the expectation, the market share of the early adopter banks is more as compared to the late adopter ones and the results are significant too.

### *Network effect*

The network in the present study has been measured in terms of proportion of ATM to number of branches and total number of ATMs the banks have with it. The banks which adopt ATMs early are supposed to have more dispersed network as compared to the late adopters. The early the bank will adopt ATM, more will the proportion of ATM to number of branches of the

Table 10. Network effect of the Early and Late adopters of ATM Cards

Banks	Number of ATMs			ATMs Branch ratio		
	Mean		t-statistics (p value)	Mean		t-statistics (p value)
	Early Adopters	Late Adopters		Early Adopters	Late Adopters	
All sampled banks ( $N_1 = 18, N_2 = 32$ )	2277.278	604.5333	2.345718** (0.023357)	124.2353	61.87143	2.715107*** (0.0095)
Public Sector Banks ( $N_1 = 10, N_2 = 17$ )	2552.6	872.0625	1.366768 (0.184366)	79.7	47.56875	2.423859** (0.024513)
Private Sector Banks ( $N_1 = 8, N_2 = 15$ )	1933.125	298.7857	2.759619** (0.012088)	187.8571	80.94167	2.340907** (0.031683)

\*\*\*, \*\* and \* means statistically significant at 1%, 5% and 10 % respectively

Table 11. Efficiency of the Early and Late adopters of ATM Cards

Banks	Business per employee			Net Interest Margin		
	Mean		t-statistics (p value)	Mean		t-statistics (p value)
	Early Adopters	Late Adopters		Early Adopters	Late Adopters	
All sampled banks ( $N_1 = 18, N_2 = 32$ )	5.721065	5.647103	0.713672 (0.478886)	2.914716	2.86712	0.367852 (0.714812)
Public Sector Banks ( $N_1 = 10, N_2 = 17$ )	5.553942	5.612256	-0.58068 (0.566654)	2.987947	2.963762	0.237547 (0.970169)
Private Sector Banks ( $N_1 = 8, N_2 = 15$ )	5.929969	5.686596	1.328116 (0.198395)	2.823176	2.757592	0.253974 (0.802533)

\*\*\*, \*\* and \* means statistically significant at 1%, 5% and 10 % respectively

banks and in similar way it can be interpreted for number of total ATMs. As per Table 10, Network of the banks in terms of branches and number of ATMs has been positively and significantly influenced by the adoption of ATMs in early years irrespective of the banks type. Proportion of ATM to the branches is more in those banks who have early adopted the ATMs. Also the number of ATMs of early adopter banks is more than that of late adopters.

### Efficiency

According to Table 11, the banks which are more prone to adopt new technology or ATM are found to be more efficient as the business per employee and net interest margin is higher for the early adopters.

However, business per employee of the early adopters in case of public sector banks is comparatively less, which de-

picts that with the adoption of ATMs, the private sector banks may get advantage by exploring new avenues of business as a whole, which ultimately enhance their efficiency which is not hold true for public sector banks.

### Liquidity

Liquidity of the banks in Table 12 has shown interesting and odd results. The banks which have adopted ATMs at the early stage have lesser liquidity as compared to banks which have adopted at the later stage though the difference is insignificant statistically.

The cash deposit ratio is lesser for the early adopter public sector banks and all the sampled banks. It implies more liquidity for them. However, the cash deposit ratio is found to be more in case of private sector early adopter banks, which implies to have lesser liquidity with the early adoption of ATMs. It may be due to the fact that the banks

Table 12. Liquidity of the Early and Late adopters of ATM Cards

Banks	Cash Deposit ratio		t-statistics (p value)	Liquid Assets to Total Assets		t-statistics (p value)
	Mean			Mean		
	Early Adopters	Late Adopters		Early Adopters	Late Adopters	
All sampled banks ( $N_1 = 18, N_2 = 32$ )	7.738468	8.03104	-0.89122 (0.377254)	0.096522	0.100396	-0.49093 (0.625915)
Public Sector Banks ( $N_1 = 10, N_2 = 17$ )	7.574087	8.204413	-1.5246 (0.139912)	0.09505	0.088041	1.25783 (0.220554)
Private Sector Banks ( $N_1 = 8, N_2 = 15$ )	7.943944	7.83455	0.205701 (0.839006)	0.098362	0.116869	-1.19484 (0.24801)

\*\*\*, \*\* and \* means statistically significant at 1%, 5% and 10 % respectively

Table 13. Summary of Empirical Results of ATM Cards

Parameters	Variables	All Sampled Banks	Public Sector Banks	Private Sector Banks
Size	Total Assets	Yes (+ve)	No (+ve)	Yes (+ve)
	Branches	Yes (-ve)	Yes (-ve)	No (-ve)
Profitability	ROE	No (+ve)	No (+ve)	No (+ve)
	ROA	No (-ve)	No (+ve)	No (-ve)
Cost of Operations	Fixed cost	No (+ve)	No (+ve)	Yes (+ve)
	Labor Cost	No (-ve)	No (+ve)	No (-ve)
	Deposits	No (-ve)	Yes (-ve)	Yes (+ve)
Financing Pattern	Borrowings	No (-ve)	No (+ve)	Yes (+ve)
	Product Mix	No (-ve)	No (+ve)	Yes (-ve)
Capitalization	CRAR	No (-ve)	No (-ve)	No (-ve)
Diversification	Non interest Income	Yes (+ve)	Yes (+ve)	No (+ve)
	Loans	No (+ve)	No (+ve)	No (-ve)
Asser Quality and Credit Risk	Non Performing Assets	No (-ve)	No (-ve)	No (+ve)
	Business per Employee	No (+ve)	No (-ve)	No (+ve)
Efficiency	Net Interest Margin	No (+ve)	No (+ve)	No (+ve)
Experience	Age	No (-ve)	No (-ve)	No (+ve)
Industry Advantage	Market Share	Yes (+ve)	No (+ve)	Yes (+ve)
	Cash Deposit Ratio	No (-ve)	No (-ve)	No (+ve)
Liquidity	Liquid Assets	No (-ve)	No (+ve)	No (-ve)
	ATM Branch Ratio	Yes (+ve)	Yes (+ve)	Yes (+ve)
ATM Network	Number of ATMs	Yes (+ve)	No (+ve)	Yes (+ve)

Note: Yes means statistically significant at 1%, 5% or 10%; No means statistically insignificant at 1%, 5% or 10%; (+ve) means variable having positive relation with adoption and (-ve) means variable having negative relation with adoption

have to dispense more cash in case of ATMs due to its 24x7 hour cash withdrawal and usage facility as compared to the routine basis brick and mortar banking transactions. Liquid assets of the banks which they acquire have also found to be lesser for early adopter private sector banks. However, the liquidly assets have been found to be

more for early adopter public sector banks.

## CONCLUSION

The study reveals the issue relating to effect of adoption pattern of the ATMs by banks on its characteristics. It can be concluded that the initiators and first movers take advantage over the

late adopters and laggards and thus former have found to perform better in terms of various parameters. Overall, the early adopter banks are larger

in size, more diversified, having lesser branches, more market share and wide ATM network as compare to late adopter ones.

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