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Characterization of Early and Late Adopters of ATM Card in Indian Banking Industry
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The present study deals with the 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 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.
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 information 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
A continuous 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

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 continuous rise in the usage of ATMs by the customers.
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 1st 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 Peffers, 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), Hernandez 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), Hernandez 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.
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.
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 $Y_i$, 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:

$$ t = \frac{\overline{X}_1 - \overline{X}_2}{s_{\overline{X}_1 - \overline{X}_2}} $$ \hspace{1cm} (1)

Where,

$$ s_{\overline{X}_1 - \overline{X}_2} = \sqrt{s_1^2/n_1 + s_2^2/n_2}. $$ \hspace{1cm} (2)

### 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 early adopters and late adopter banks in terms of their various characteristics.

**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.

### Table 2. List of the Variables

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

Cahyono and Hartijasti
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 3. Size of the Early and Late adopters of ATM Cards

<table>
<thead>
<tr>
<th>Banks</th>
<th>Total Assets (in Rs.)</th>
<th>Branches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td>Early Adopters</td>
<td>Late Adopters</td>
</tr>
<tr>
<td></td>
<td>t-statistics (p value)</td>
<td></td>
</tr>
<tr>
<td>All sampled banks</td>
<td>19.40107</td>
<td>18.75827</td>
</tr>
<tr>
<td></td>
<td>(N₁ = 18, N₂ = 32)</td>
<td></td>
</tr>
<tr>
<td>Public Sector Banks</td>
<td>19.95302</td>
<td>19.56458</td>
</tr>
<tr>
<td></td>
<td>(N₁ = 10, N₂ = 17)</td>
<td></td>
</tr>
<tr>
<td>Private Sector Banks</td>
<td>18.71115</td>
<td>17.77918</td>
</tr>
<tr>
<td></td>
<td>(N₁ = 8, N₂ = 15)</td>
<td></td>
</tr>
</tbody>
</table>

***, ** 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.
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 manpower 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.

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

<table>
<thead>
<tr>
<th>Banks</th>
<th>Mean ROE</th>
<th>t-statistics (p value)</th>
<th>Mean ROA</th>
<th>t-statistics (p value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All sampled banks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(N₁ = 18, N₂ = 32)</td>
<td>17.12076</td>
<td>-0.06025</td>
<td>0.92914</td>
<td>0.997058</td>
</tr>
<tr>
<td>Public Sector Banks</td>
<td>19.09796</td>
<td>1.030224</td>
<td>0.965364</td>
<td>1.181706</td>
</tr>
<tr>
<td>(N₁ = 10, N₂ = 17)</td>
<td>14.64926</td>
<td>(0.314625)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private Sector Banks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(N₁ = 8, N₂ = 15)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Banks</th>
<th>Mean Fixed cost (Infrastructure cost)</th>
<th>t-statistics (p value)</th>
<th>Mean Labor Cost (Wages)</th>
<th>t-statistics (p value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All sampled banks</td>
<td>0.219517</td>
<td>1.404906</td>
<td>0.570174</td>
<td></td>
</tr>
<tr>
<td>(N₁ = 18, N₂ = 32)</td>
<td>(0.06025)</td>
<td>(0.166894)</td>
<td>(0.523468)</td>
<td></td>
</tr>
<tr>
<td>Public Sector Banks</td>
<td>0.082119</td>
<td>0.566732</td>
<td>0.665164</td>
<td></td>
</tr>
<tr>
<td>(N₁ = 10, N₂ = 17)</td>
<td>(0.10098)</td>
<td>(0.575975)</td>
<td>(0.65988)</td>
<td></td>
</tr>
<tr>
<td>Private Sector Banks</td>
<td>0.391265</td>
<td>2.194195**</td>
<td>0.451438</td>
<td></td>
</tr>
<tr>
<td>(N₁ = 8, N₂ = 15)</td>
<td>(0.01409)</td>
<td>(0.03961)</td>
<td>(0.530291)</td>
<td></td>
</tr>
</tbody>
</table>

***, ** 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.

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

<table>
<thead>
<tr>
<th>Banks</th>
<th>Deposits Mean</th>
<th>t-statistics</th>
<th>Borrowings Mean</th>
<th>t-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Early Adopters</td>
<td>Late Adopters</td>
<td>(p value)</td>
<td>Early Adopters</td>
</tr>
<tr>
<td>All sampled banks</td>
<td>0.816339</td>
<td>0.834131</td>
<td>-0.73237</td>
<td>0.044948</td>
</tr>
<tr>
<td>(N₁ = 18, N₂ = 32)</td>
<td></td>
<td></td>
<td>(0.467578)</td>
<td>(0.684348)</td>
</tr>
<tr>
<td>Public Sector Banks</td>
<td>0.820527</td>
<td>0.86156</td>
<td>-3.58131***</td>
<td>0.028806</td>
</tr>
<tr>
<td>(N₁ = 10, N₂ = 17)</td>
<td></td>
<td></td>
<td>(0.001439)</td>
<td>(0.183751)</td>
</tr>
<tr>
<td>Private Sector Banks</td>
<td>0.811104</td>
<td>0.800823</td>
<td>0.228361</td>
<td>0.065127</td>
</tr>
<tr>
<td>(N₁ = 8, N₂ = 15)</td>
<td></td>
<td></td>
<td>(0.821711)</td>
<td>(0.650932)</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Banks</th>
<th>CRAR (Capitalization) Mean</th>
<th>t-statistics</th>
<th>Non Interest Income (Diversification) Mean</th>
<th>t-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Early Adopters</td>
<td>Late Adopters</td>
<td>(p value)</td>
<td>Early Adopters</td>
</tr>
<tr>
<td>All sampled banks</td>
<td>12.44049</td>
<td>13.14166</td>
<td>-1.48346 (0.145486)</td>
<td>1.596061</td>
</tr>
<tr>
<td>(N₁ = 18, N₂ = 32)</td>
<td></td>
<td></td>
<td></td>
<td>(0.602385)</td>
</tr>
<tr>
<td>Public Sector Banks</td>
<td>12.44979</td>
<td>12.64849</td>
<td>-0.52801 (0.602385)</td>
<td>1.572654</td>
</tr>
<tr>
<td>(N₁ = 10, N₂ = 17)</td>
<td></td>
<td></td>
<td></td>
<td>(0.129101)</td>
</tr>
<tr>
<td>Private Sector Banks</td>
<td>12.68329</td>
<td>14.57243</td>
<td>-1.57979 (0.129101)</td>
<td>1.60618</td>
</tr>
<tr>
<td>(N₁ = 8, N₂ = 15)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

adaptors 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.
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

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.

<table>
<thead>
<tr>
<th>Banks</th>
<th>Age</th>
<th>Market Share (Competitive Advantage)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>t-statistics (p value)</td>
</tr>
<tr>
<td>Early Adopters</td>
<td>Late Adopters</td>
<td></td>
</tr>
<tr>
<td>All sampled banks</td>
<td>68.11111</td>
<td>-0.34724 (0.729931)</td>
</tr>
<tr>
<td>(N₁ = 18, N₂ = 32)</td>
<td>71.40625</td>
<td></td>
</tr>
<tr>
<td>Public Sector Banks</td>
<td>75.2</td>
<td>-1.06639 (0.296438)</td>
</tr>
<tr>
<td>(N₁ = 10, N₂ = 17)</td>
<td>84.94118</td>
<td></td>
</tr>
<tr>
<td>Private Sector Banks</td>
<td>59.25</td>
<td>0.193509 (0.849361)</td>
</tr>
<tr>
<td>(N₁ = 8, N₂ = 15)</td>
<td>56.06667</td>
<td></td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Banks</th>
<th>Loans Mean</th>
<th>Non Performing Assets Mean</th>
<th>t-statistics (p value)</th>
<th>t-statistics (p value)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Early Adopters</td>
<td>Late Adopters</td>
<td>Early Adopters</td>
<td>Late Adopters</td>
</tr>
<tr>
<td>All sampled banks</td>
<td>0.484476</td>
<td>0.478092</td>
<td>0.446922</td>
<td>(0.657447)</td>
</tr>
<tr>
<td>(N₁ = 18, N₂ = 32)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Sector Banks</td>
<td>0.487186</td>
<td>0.469314</td>
<td>1.206628</td>
<td>(0.23887)</td>
</tr>
<tr>
<td>(N₁ = 10, N₂ = 17)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private Sector Banks</td>
<td>0.481088</td>
<td>0.488752</td>
<td>-0.28806</td>
<td>(0.776954)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Banks</th>
<th>Number of ATMs</th>
<th>ATMs Branch ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td>------------------------------</td>
<td>----------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>All sampled banks</td>
<td>2277.278</td>
<td>604.5333</td>
</tr>
<tr>
<td></td>
<td>124.2353</td>
<td>61.87143</td>
</tr>
<tr>
<td>Public Sector Banks</td>
<td>2552.6</td>
<td>872.0625</td>
</tr>
<tr>
<td></td>
<td>79.7</td>
<td>47.56875</td>
</tr>
<tr>
<td>Private Sector Banks</td>
<td>1933.125</td>
<td>298.7857</td>
</tr>
<tr>
<td></td>
<td>187.8571</td>
<td>80.94167</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Banks</th>
<th>Business per employee</th>
<th>Net Interest Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>t-statistics (p value)</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>All sampled banks</td>
<td>5.721065</td>
<td>0.713672 (0.478886)</td>
</tr>
<tr>
<td>Public Sector Banks</td>
<td>5.553942</td>
<td>-0.58068 (0.566654)</td>
</tr>
<tr>
<td>Private Sector Banks</td>
<td>5.929969</td>
<td>1.328116 (0.198395)</td>
</tr>
</tbody>
</table>

***, ** 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 depicts 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.
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 liquidity 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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