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**AWARENESS AND RISK PERCEPTION OF ATM CARD USERS: AN EMPIRICAL INVESTIGATION****PRIYODARSHINI DHAR****M. TECH. STUDENT**

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**ABSTRACT**

From the very advent of ATMs, security issues have been a major concern. Due to lack of awareness and technological advancements, ATM frauds like skimming, shoulder surfing, PIN interception, pin security, etc, have accelerated through the years. This paper investigates into the level of awareness and risk perception of bank customers who use ATMs for financial transactions, regarding the types of possible frauds and precautionary and preventive measures. The awareness level and risk perceptions is measured using appropriate scaling techniques after making reliability tests and carrying out an extensive field survey of a random sample of about 500 ATM users of different private and public sector banks in districts of North Bengal.

**KEYWORDS**

ATM, Bank Technology, Frauds, Risk Perception, Awareness.

**JEL CLASSIFICATION**

D18, G21, O32.

**1. INTRODUCTION**

Information technology has been the most important catalysts for the transformation of the Indian banking industry in terms of outreach, efficiency and financial inclusion. The Automated Teller Machine (ATM) was first commercially introduced in the 1960s. There were over 1.5 million ATMs installed worldwide by 2005. ATM technology based services which has been growing rapidly is being used as a means of reaching out to the customers at lower transaction costs and offering hassle free services and has become a 'public technology'. With the advent of ATM services, banking has become a 24 X 365 hour service and has done away with the constraints of limited banking hours and generation and validation of paper documents for deposit or withdrawal transactions. Other than withdrawal and deposit transactions customers are getting multi function benefits to transfer funds, book air and train tickets, mobile recharge, and even cheque deposits.

Since the introduction of ATM facilities by HSBC Bank in Mumbai, the number of ATMs have been growing at a galloping rate. The table given below, which depicts the data from April 2011 to April 2015 speaks of the facts of growth of ATMs in India.

**TABLE 1: GROWTH OF AUTOMATED TELLER MACHINES OF PUBLIC AND PRIVATE SECTOR BANKS IN INDIA**

Year	No of ATMS onsite	No of ATMs offsite	Total ATMs	Additions over previous year	Annual Rate of Growth %
April 2011	41268	34377	75,645	-----	-----
April 2012	47914	48828	96,742	21,097	27.89
April 2013	57090	59288	1,16,378	19,636	20.29
April 2014	85134	77409	1,62,543	46,175	39.67
April 2015	90819	91661	1,82,480	19,937	12.26

Source: Compiled from ATM and POS statistics, Reserve Bank of India for different years

The distinguishing fact that emerges from the above table is that the number of ATMs have more than doubled in a span of five years in India recording a compounded annual growth rate (CAGR) of 19.35%. It is not only the ATMs (physical facilities) which have increased, but it is also the customer interaction which has rapidly increased as evidenced from the growth in number and value of transactions. The following table speaks out the facts.

**TABLE 2: GROWTH OF NUMBER AND VOLUME OF TRANSACTIONS IN ATMS IN INDIA**

Year	Total Debit Card Transactions in ATMs	Annual Rate of Growth %	Amount of Transactions ( Rs. Million )	Annual Rate of Growth %
April 2011	399553342	-----	1061653.47	-----
April 2012	452614082	13.28	1280330.654	20.59
April 2013	473418167	4.59	1565538.06	22.28
April 2014	554034275	17.03	1773477.07	13.28
April 2015	615527057	11.09	2000398.2	12.79

Source : Compiled from ATM and POS statistics, Reserve Bank of India for different years

However, use of this technology is susceptible to a number of risks as a variety of fraudulent techniques can be perpetrated against ATMs users to fleece them of cash during transactions. EAST (European ATM Security Team) in European Fraud Update 2014 has reported that in Europe, losses caused by ATM skimming are estimated at more than 350 million Euros a year. More than 3 million victims reported ATM skimming crime, with a cash average loss of \$1000 per incident. The study has also reported a 69% increase in ATM related fraud attacks, primarily driven by a surge in reported cash trapping activity across eleven countries. "The problem of ATM frauds is global in nature and its ramifications have been felt in India as well. It is a big threat and it requires a coordinated and cooperative action on the part of all the stakeholders" said Pravin Dalal, cyber security expert. ( Information Security Education and Awareness <http://infosecawareness.in/infosec-news/>). In the following paragraphs, a brief description is made of the most common types of ATM frauds.



## 2. ATM FRAUDS: A BRIEF DESCRIPTION

### (i) *Shoulder Surfing*

In this case the cheater usually positions himself close to the ATM to clandestinely watch as the ATM user enters their PIN and records the information manually or by installing miniature video cameras discretely on the fascia close to the PIN pad, to record the PIN entry information and the number of the card. These information are later used to carry out transactions on the internet.

### (ii) *Card Theft*

In this technique the actual ATM card is trapped by using a card trapping device, often encased in a plastic transparent film, inserted into the card reader throat. The card is prevented from being returned to the consumer at the end of the transaction by attaching hooks to the probes. The cheater who stays close to the customer makes a suggestion for re-entering the PIN, which he quickly memorizes. After the consumer leaves the area, believing their card to have been captured the cheater takes out the card with a probe and withdraws money.

### (iii) *Skimming Devices*

Skimmers" are contraptions used by cheaters to encapsulate the data stored in the magnetic strip of a card. Small card readers are installed on the top of actual card readers and can trick the consumer into believing that the device is part of the ATM. Sometimes signs are given instructing ATM users to swipe cards through the additional reader "for security purposes" before performing a transaction. Information can be captured and retained the information from more than 500 cards, including account numbers, balances and verification codes. The device is then removed, allowing the downloading of the recorded data.

### (iv) *Counterfeit PIN Pad Overlay*

In this technique a counterfeit PIN pad is placed over the original keypad. This superimposed transparent overlay captures the PIN data and stores the information into its memory. The transparent overlay cannot be normally detected by the ATM user. After the user enters the information, the counterfeit PIN pad is removed and all information are downloaded. Counterfeit PIN pads can be almost identical in appearance and size as the original. This method when administered in combination with card theft provides the cheater with the information needed to loot an unwary users bank account.

### (v) *PIN Interception*

In this fraud technique, the information of the PIN is captured in electronic format through an electronic data recorder as soon as the ATM PIN is entered. The PIN is usually captured as the PIN is transmitted to the host computer for the online PIN check. The cheater usually accesses the communication cable of the PIN pad inside the terminal. It is easier for ATM technicians to administer this technique than outsiders.

There are other sophisticated methods being contrived with rigor as engineers are trying to plug these problems. However, it is more important to delve into the issue as to whether ATM users are aware of these techniques and take adequate care while handling ATMs. With this background it would be pertinent to find out whether researchers have been giving serious thought to the risk perceptions and awareness of users. The review of literature given below highlights some relevant findings.

## 3. REVIEW OF LITERATURE

Adepoju. A. S. and Hassan, M.E. (2010) opined that 'there have been a proliferation of ATM frauds in the country even and across the globe. Managing the risk associated with ATM fraud as well as diminishing its impact is an important issue that face financial institutions as fraud techniques have become more advanced with increased occurrences. The ATM is only one of many Electronic Funds Transfer (EFT) devices that are vulnerable to fraud attacks.' Regarding ATM frauds, Diebold (2002) found that the major form of ATM fraud is PIN theft which is carried out by various means; skimming, shoulder surfing, camera, key pad recorder etc. This study elucidates that the common type of fraud perpetuated is PIN theft which is mostly as a result of congestion at ATM points. Brunner et al. (2004) in their study concluded that the location of ATM is a high determinant to fraud or crime carried out at ATM point. From this research over 75% of the respondents affirm that the location of ATM in secluded place contribute to the fraud perpetuated at ATM point. ATM within the banking premises is more secure than ATMs outside the bank premises. Ho and Ng (1994) suggested that one of the major reasons why cash is still the main medium for the payment of goods and services is that consumers perceive other payment media as inherently risky. In a well cited study Lockett and Littler (1997) empirically demonstrated that the use of electronic banking involves risk and suggested that consumers perceived that an existence of risk was present with the use of e-payments. In another oft cited article, Gan et al (2006) examined the relationship between perceived risk factors and customers use of e-banking and demonstrated that there existed a negative relationship between these variables. Pikkarainen et al., (2004) in their empirical investigations pointed out that despite the fact that e-payments facilitate customers in doing their banking activities, they are still reluctant in adopting the new technology because they do not have full control over their own behaviour and system processes. Okeke (2013) carried out empirical survey of e-banking customers from different segments in Nigeria with questionnaire as the instrument for data collection to ascertain which of the perceived risk/security factors of psychological risk, quality risk, time-loss risk, financial risk, physical risk and security that are dominant in classifying e-banking customers on the basis of high and low involvement. The results show that the ATM/debit/credit cards command high involvement. In fact researchers have been trying to gauge the use of ATM services from the angle of consumer behaviour. Lo'pez and Castillo (2008) argued that perceived risk in customer behaviour lead to unpleasant consequences and the same logic is applicable to ATM services where customers may shy away from these machines if they perceive that risks are too high. Zeithaml (1981) argued that services are riskier than products because services are intangible, non-standardized, and often offered without guarantees or warrantees. Some service like ATM facilities are so technical or specialized that consumers possess neither the knowledge nor the experience to evaluate whether they are satisfied, even after they have consumed the service. Achumba (2006) suggested that affective component is what the individual feels about the object –whether it is pleasant or unpleasant. Adverts that encourage people to experience the feelings and sensations associated with products like ATM or other e-payments stimulate affective involvement. Sellapan and Hariharan (2013) identified that there are 4 factors that help customers to getting awareness on ATM service and there are 10 factors that help customers to getting awareness on Online Banking Services.

However, not much work has been done on the awareness and risk perception of ATM users in India. Considering the growth rate of ATMs in India, studies to gauge these parameters are essential for taking up policies and strategies for ATM security and making operations more user friendly. Efforts have been made to fill up this research gap in the discussions that follow.

## 4. OBJECTIVES OF THE STUDY

On the basis of the literature reviewed and the identified research gap, the study attempts to

1. To assess the overall risk perception of ATM users
2. To assess the overall risk perception of ATM users based on their demographic characteristics and location in rural and urban areas.
3. To assess the perception of ATM users based on their transactions carried out.
4. To assess the awareness level of ATM users of different fraud techniques and find the association between different demographic profiles and education levels.

## 5. METHODOLOGY

The study has been based on primary data collected by means of self administration of structured questionnaires to ATM users in different urban rural and semi-urban areas in West Bengal. The questionnaire was were pilot tested on 50 respondents. Reliability tests carried out and Cronbach's alpha for multi item constructs was calculated to be 0.798. Questionnaires were administered to 508 respondents who were intercepted on a random basis after they had used ATMs of any banks in different localities. The questionnaire was administered to only those respondents who had used the ATM for at least five times. This was done to avoid first time ATM users and gauge the perception of users who had certain experience with this technology. 20 filled in questionnaires had to be rejected due to faulty insertions and the final sample size stood at 488 respondents. The profile of the sample respondents are given below:

TABLE 3: PROFILE OF RESPONDENTS (N=488)

Basis	Categories	Number	% of total
Gender	Male	284	58
	Female	204	42
Location	Urban	184	38
	Rural	147	30
	Semi-Urban	157	32
Age	18 to 25 years	73	15
	25 to 35 "	109	22
	35 to 45 "	119	25
	45 to 55 "	105	21
	55 and above	22	17
Education	Post Graduate and above	118	24
	Graduates	159	33
	High School	107	22
	Below High School	104	21
Occupation	Professionals	87	18
	Businessmen/women	84	17
	Salaried persons	142	29
	Housewives	64	13
	Students	111	23
Income per annum (Rs. Lakhs )	Upto 2.5	112	23
	2.5 to 5	134	27
	5 to 10	163	34
	Above 10	79	16

However, while collecting information for assessing risk perception transaction-wise , it was found that not all the respondents had carried out all types of transactions . For example only 94 respondents out of 488 had used ATMs for bill payments, 118 respondents had used ATMs for fund transfer, 102 respondents had carried out online transactions. In these cases, analysis was done on the basis of number of responses available.

The questionnaires were structured using different types of scales. For measurement and quantification of the risk perception of the ATM users a seven point semantic differential scale with the left pole designated as *highly risky* and anchored with a score of (-3) and the right pole designated as *absolutely no risk* and anchored with a score of (3) was used and overall responses recorded.

Risk perception information was also analysed according to age, gender, education and according to transactions. The need for such analysis was drawn from findings of previous researchers like Bashir et.al (2014) who found out that age and education have a highly significant positive relationship with risk perception and income and gender have a significant but negative relationship with risk perception. In a previous study too Bashir et.al (2013) found that females are more reluctant to take on risk than males. Younger as well as better-educated people are also willing to take more risk. Earlier Sitkin and Pablo (1992) studied risk behaviour and different cognitive factors and found that gender has an indirect impact on risk perception through risk propensity and overconfidence.

For measurement and quantification of the awareness levels of the respondents a five point Likert Scale was used with the following anchors :- Highly aware (2), Somewhat aware (1), No response (0), Very little aware (-1), Not at all aware (-2). Scores were calculated for individual statements as well a composite score for awareness was calculated

6. DATA ANALYSIS AND FINDINGS

The findings of the study are reported in the tables below. The overall risk perception of the ATM users has been reported in table 4.

TABLE 4: OVERALL RISK PERCEPTION OF BANK CLIENTS USING ATM CARDS

Category of Respondents	Mean Score	N	z values
Overall risk perception of using ATM cards	1.344	488	14.63*
Perception of Urban Respondents	1.626	184	18.06*
Perception of Rural Respondents	0.879	147	7.92*
Perception of Semi-Urban Respondents	1.448	157	13.62*
Perception of Male Respondents	1.437	284	19.26*
Perception of Female Respondents	1.214	204	11.44*

Note: N denotes the number of Respondents in each category. The mean scores have been calculated on the basis of a seven point semantic differential scale ( highly risky(-3) to absolutely no risk (3)). \* denotes significance at 1% level.

The mean scores shown in the table are self explanatory. The overall risk perception of the respondents shows that the ATM users do not consider the technology to be risky. However, the score show that they do not also consider the system to be absolutely risk free . There are a difference in scores of rural and urban respondents and the risk perception of rural respondents are higher ( as represented by lower mean score) . Similarly on gender basis female ATM users have a slightly higher risk perception than their male counterparts. The risk perception of female ATM users are quite in consonance with the risk behaviour pattern as found by Bashir et.al ( 2013 and 2014) and sitkin and Pablo (1992). In the next table, the risk perceptions of ATM users have been depicted according to the age category of respondent

TABLE 5: OVERALL RISK PERCEPTION OF BANK CLIENTS (ACCORDING TO AGE) USING ATM CARDS

Category of Respondents (age wise)	Mean Score	N	z values
18- 25 years	2.140	73	18.45*
25- 35 years	1.828	109	14.22*
35 -45 years	1.414	119	9.43*
45 -55 years	1.082	105	8.67*
55 years and above	(-) 0.882	22	-2.38**

N denotes the number of Respondents in each category. The mean scores have been calculated on the basis of a seven point semantic differential scale ( highly risky(-3) to absolutely no risk (3)). \* denotes significance at 1% level and \*\* denotes significance at 5% level.

This table shows interesting facts. As depicted by the mean scores, the risk perceptions rise with increasing age. Younger respondents in the age category of 18 to 25 years have a mean score more than 2 , nearly edging towards the right pole which depicts *absolutely no risk*. However, users above 55 years have a much higher risk perception as evident from the negative mean score. In the next stage of analysis, risk perceptions of the respondents have been gauged on the basis of the transactions undertaken by them. In this case not all the transactions listed in the table were made by all the respondents. Therefore the table shows

variance in the number of respondents according to transactions. For example only 94 respondents out of 488 have made bill payments through ATMs. The mean scores for each type of transaction is given in the table below

TABLE 6: TRANSACTION WISE RISK PERCEPTION OF ATM USERS

Statements	Mean Score	N	z values
1) Using Cards for cash withdrawals from ATMs	1.867	488	10.41*
2) Using cards for depositing cash in ATMs	(-) 0.968	216	-7.56*
3) Using cards for bill payments through ATMs	(-) 1.202	94	-1.54
4) Using cards for fund transfer through ATMs	(-)0.924	118	-1.94**
5) Using cards for PIN change through ATMs	1.334	406	3.77*
6) Using cards for payment in shops/malls/ petrol pumps	(-) 0.878	328	-2.32**
7) Using cards for online transactions	(-) 1.464	102	-11.01*
8) Using cards for Balance Enquiry & Mini statements	1.422	464	13.24*
9) Disclosing PIN to others	(-) 1.164	488	-3.47*
10) Keeping PIN unaltered after receiving PIN from bank	(-) 0.628	488	-1.46

Notes: N denotes the number of respondents who have actually carried out the transactions or know how to carry out these transactions. The mean scores have been calculated on the basis of a seven point semantic differential scale ( highly risky(-3) to absolutely no risk (3).. \* denotes significance at 1% level and \*\* denotes significance at 5% level.

The risk perception score for cash withdrawals are quite low as depicted by the high mean scores. This is probably due to the fact that when one is receiving the cash automatically, the perception of risks tends to be low. Moreover, when some of the respondents who gave high scores for this statement were asked about their awareness of cash trapping or blockage of cash, they replied in negative and said they had never experienced these incidents. The ATM users also responded positively when queried about PIN change through ATM or balance enquiry showing that these were quite harmless transactions. However, a high degree of risk was perceived by the respondents when transactions like depositing cash, or making online transactions, bill payments and fund transfers. When questioned in details, most of the respondents reported that they did not know the details of how these transactions took place and therefore felt that problems in debiting their accounts with incorrect account or disclosure of their bank account details may occur. They reported that they undertook these transactions on the advice of their friends or families, who were not also very conversant with the transactional intricacies. Moreover, instructions and advice from the bank was rarely available. It can be inferred that lack of financial literacy in these respects lead to a feeling of uncertainty and give rise to higher risk perceptions.

Drawing from the above statements, it can be presumed that a sense of insecurity can develop in an individual if the person is not aware of the problems that can occur while transacting through ATMs. Moreover, a person with low awareness will always hesitate to take up different types of transactions that are available in these machines, which reduces the involvement of the customers with the financial institutions. These people can even be unaware of the fraudulent attacks which may be perpetrated on them while executing transactions with which they are familiar and once they are subject to these attacks the possibility of alienation from this banking technology can increase. In the next stage of investigation the level of awareness of the ATM users were measured on a Likert's scale. The findings are given below:

TABLE 7: AWARENESS OF ATM USERS OF VARIOUS TYPES OF FRAUDS (N=488)

Statements	Mean Score	z values
1) Skimmers can be placed in the slot for inserting ATM card	-1.278	-5.66*
2) Skimmers can take your details of cards and bank account	-1.278	-5.66*
3) Hidden cameras can be placed for recording your PIN	-0.979	-2.12**
4) Key Overlay pads can be used to get your PIN when you use the keypad	-1.141	-3.66*
5) Other persons in the ATM chamber can surf over your shoulder to know the PIN	0.402	7.88*
6) Trapping devices can block your cash when it comes out of the cash dispenser	-1.217	--2.46**

Note: A Five point Likert Scale was used with the following anchors Highly aware (2), Somewhat aware (1), No response (0), Very little aware (-1), Not at all aware (-2). \* denotes significance at 1% level and \*\* denotes significance at 5% level.

It is to be mentioned here that in the table above, only the statements which were found to be statistically significant have been reported. The table shows that the awareness levels regarding the major types of frauds are quite low. There is only an exception in the 5<sup>th</sup> statement where a positive degree of awareness can be noticed.

In the next stage the composite awareness scores for each individual respondent was calculated using the following methodology. Theoretically a respondent can be highly aware of all six statements and can score 2 for each response. Therefore the total score of the respondent can be 2 X 6 =12. Similarly a respondent can be totally unaware of all the statements administered to him/her. The total score in this case will be -2 X 6 =-12. Therefore the composite score of each individual respondents can vary from 12 to -12. To find whether there was any association between gender and Composite awareness scores, age and composite awareness scores, education levels and composite awareness scores the following null hypotheses were framed:

H<sub>1</sub>: There would be no association between gender and composite awareness scores.

H<sub>2</sub>: There would be no association between age and composite awareness scores.

H<sub>3</sub>: There would be no association between education levels and composite awareness scores.

On the basis of the composite calculated above, Chi Square ( $\chi^2$ ) tests were made to test the hypotheses. The results are reported in the following tables.

TABLE 8: CONTINGENCY TABLE SHOWING ASSOCIATION BETWEEN GENDER AND COMPOSITE AWARENESS SCORES

Gender	Composite Scores				Total
	12 to 7	6 to 0	-1 to -6	-7 to -12	
Male	38	58	54	134	284
Female	17	26	38	123	204
Total	55	84	92	257	488

$\chi^2 = 10.96$  significant at 5% level

The null hypothesis H<sub>1</sub> being rejected at 5% level shows that there is significant association between gender and level of awareness. The contingency table shows that to some extent female users are less aware than their male counterparts.

TABLE 9: CONTINGENCY TABLE SHOWING ASSOCIATION BETWEEN AGE AND COMPOSITE AWARENESS SCORES

Age \ Composite Scores	12 to 7	6 to 0	-1 to -6	-7 to -12	Total
18 to 25 years	21	32	13	7	73
25 to 35 "	17	22	32	38	109
35 to 45 "	10	17	20	79	119
45 and above	7	13	27	140	187
Total	55	84	92	257	488

$\chi^2 = 132.57$  significant at 1% level

The Chi Square figures show that the null hypothesis  $H_2$  is rejected at 1% level and therefore the association between age and awareness is highly significant. The contingency table speaks for itself. It shows that people in the younger age groups are more aware of the risks than the ATM users at the higher age groups. This is probably their higher exposure to electronic gadgets, internet and interaction with social media.

TABLE 10 : CONTINGENCY TABLE SHOWING ASSOCIATION BETWEEN EDUCATION AND COMPOSITE AWARENESS SCORES

Age \ Composite Scores	12 to 7	6 to 0	-1 to -6	-7 to -12	Total
Post Graduate and above	19	28	34	37	118
Graduates	16	23	21	99	159
High School	11	19	20	57	107
Below High School	9	14	17	64	104
Total	55	84	92	257	488

$\chi^2 = 32.66$  significant at 1% level

In this case also the null hypothesis is rejected at 1% level of significance showing that there is an association between the level of education and awareness levels. The contingency table speaks very clearly that the higher the education levels, the higher is the awareness levels. This seems quite natural as educated ATM users can gather information from the media, internet and read and follow instructions issued by banks.

### 7. CONCLUSION AND POLICY IMPLICATIONS

The findings of this study have deep policy ramifications. Recalling the arguments Lopez and Castillo (2008), that perceived risk in customer behaviour would lead to unpleasant consequences and is applicable to ATM services where customers may shy away from these machines if they perceive that risks are too high, it can be logically placed that if ATM users are unaware and afraid, the reasons why these machines were installed would get defeated. ATMs facilitate withdrawal, deposit and other transactions off the counter and relieve pressure on banks to put up more personnel at teller counters. Moreover, with transactional ease over 24 X 365 hours motivate higher number of deposit and withdrawal transactions. However, if the arguments put forward by Ho and Ng (1994) are to be carried, bank customers would prefer dealing in cash physically rather than risking their transactions through ATMs. This can be viewed in the context of financial inclusion programmes like Pradhan Mantri Jan Dhan Yojana where millions of ATM cards have been issued to people at 'the bottom of the pyramid'. A large number of these people have the minimum level of education and paltry savings. An atmosphere of insecurity would not induce in them the habit of making transactions through these machines. The vision of 100% financial inclusion in India would therefore get a set-back. Moreover, use of ATMs cuts off direct interaction with the bank staff. As Okeke (2013) opines with 'extensive use of ATMs, the absence of direct interaction with bank staff has increased customers' apprehensions about the perceived risk/security. To reduce the customers concerns about perceived risk as well as of security and privacy concerns, banks should improve the quality of interaction with the customers to alleviate these apprehensions'.

In this context it is important that the banks should come up with the following measures to alleviate risk in ATM transactions.

- Frequent awareness campaigns need to be carried out by banks and government agencies on ATM frauds and prevention. In some cases security tips are put up on notice boards inside the ATM rooms and in some cases security measures are prescribed in the banks' websites. However, with the financial inclusion drive on, a large number of people with low literacy levels do not have the ability to read and comprehend such tips. Bank personnel need to frequently interact with the ATM users to increase their awareness levels.
- Awareness campaigns need to be intensified and frequent for women, specially in the rural areas, persons with lower educational levels and persons in higher age groups.
- Some banks like State Bank of India has set up TLCs ( Tech Learning Centres ) for educating customers in banking technology. This can be emulated by other banks as well increase technological financial literacy of users.
- Moreover, the technical precautions like setting up alarm devices when anything other than a card is placed and generating error codes should be activated.
- Regarding the infrastructural aspects of ATM rooms, camera Surveillance, Mirror Self Surveillance systems should be installed so that shoulder surfing can be checked.
- Banks also need to issue Chip Based Cards and Biometric devices for user identification

These measures can reduce the actual occurrences of frauds, perception of risk and create higher involvement of the bank customers with the banks.

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