# Customers Perception on Security System in E-Banking Services with special references to Online/Net Banking

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***Abstract:***

*The emergence of E-Banking (Electronic Banking) changed the entire revolutionary concept thereby increased the usage widely leading to more innovation, development in banking technology. In which one of the major development and vastly used in combination of E-commerce and E-banking technology is Online/Net banking. Online/ Net Banking helps in online payment and transparency of cash transactions for both to the banks and the customers. The other major E-Banking services are ATM, internet/ online banking, Net banking, Mobile banking, SMS banking and Phone banking. This paper has dealt with customers' satisfaction towards security system in Online/Net banking as part of e-banking and its preventive measures.*

***Keyword:*** *Security system in Online/Net banking*

## I. INTRODUCTION

### 1.1 Concept of E-Banking

Due to advancement in Internet, WWW, Mobile Technology, Smart phones and E-Commerce many innovations started craving and implemented keeping a motto to ways to make it electronically digitized for easy operations at your fingertips for users, business, government, banks etc. Based on which one of the biggest breakthrough and presently used at a large scale all over the world is E-Banking I.e. Electronic Banking. The emergence of E-Banking changed the entire revolutionary concept thereby increased in usage widely and thereby more innovation, development and increase in online shopping, e-commerce, e-payment and banking.

E-Banking is where banking is done electronically through various technology and devices like ATM (Automated teller Machine), Online/Internet Banking / Net banking, E-Payment, Mobile banking, Phone banking, SMS banking, swiping at vendor outlet etc by using debit and credit card, A/C no., customer number, customer User ID, Password,

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Authentication codes, OTP Pin, ATM Pin no. etc.

This enables the financial institutions, individuals or businesses, to access accounts, transact business and apply or obtain information on financial products and services which can be performed electronically i.e. via internet etc. Due to emergence of E-Banking it saved customers in avoiding long queue, transport, cost delays and thereby creating an evironment of trust between the bank and customer for more fast, reliable, efficient and personalized services. Banks through internet has emerged as a strategic resource for achieving higher efficiency.

### 1.2 Evolution of E-Banking

Earlier traditional banking industry deals with few schemes like savings, deposits, loans etc. and also for the bank it is a manual tedious process of maintaing and tracking the accounts and transaction of each and every customer. Even customers equally had the difficulties of coming to the banks, long queue system, sometimes no proper response from the banks, need to come repetitive times to the bank for any banking transaction or information, lack of benefits and infrastructure for customers, lack of different types of schemes and banking services.

Due to emergence of computer (1950), E-Commerce (1972) and worldwide web (1989) carved in development and innovation of E-Banking (started in 1970 and strategic imperative in 1990), ATM (1967-2000) (1965-SMS banking (1980) and Mobile banking (2010). Due to the emergence of E-banking changed the entire revolutionary thereby leading to increase in usage widely and more innovative development in E-commerce, E-payment and banking sector etc. In this modern banking the storage space is reduced, and 24/7*365 days banking from anywhere in the world and banking services/customer care support round the clock thus making modern banking or the emergence of E-banking system user friendly and cost effective system.

Online became popular in 1980s, connecting via television and phone to send transfer, provide instructions to the banks, pay bills etc. The implementation of WWW (World Wide Web) in 1989 led to development of online banking in 1990 which became popular leading to more innovation, added features and usage of online banking worldwide. Net banking is found in 1996 and incorporated in 2007.

The emergence of E-banking revolutionary changed the entire financial system and lead to more innovative development in E-payment, E-commerce and banking sector industry etc. In this modern banking, reduced storage space, 24/7*365 days banking from anywhere in the world and customer care support/ banking services which is present round the clock, thus making modern banking i.e. E-banking system user friendly and cost effective system.

### 1.3 Online Banking / Internet Banking / Net Banking

Online banking is doing banking transactions via bank website connected via internet for performing bank financial transactions. The bank in which the customer have accounts provides the net banking user ID and password and transaction password and in few banks even the authorization code, virtual keypad etc. to access net banking or to do online payments. Wherein the customers can transfer of amount, view their account balances, bill payment, mini statement and transaction history, credit card payment, financial products and services details or for applying, deposits, loans, other account details which customers holds like current account, NRI account, demat account etc. and other banking activities likes cheque book request, stop payment or requisition raised like address change etc.

Also the customers can do e-payment for the online shopping, bill payment, recharge, application fees payment, education fees etc.. By using debit/ credit card details or via net banking by providing the internet banking password and OTP (one time Password) Pin no., CVV no. Hence convenient for the customers to do all the transactions at one place i.e. home etc. without travelling and reducing the cost/travel/long queue/ physical stress and easy tracking of the activities and transactions performed.

### 1.4 Online/Internet/Net Banking Benefits:

The emergence of online/internet/ net banking the banking activity and e-payment can be done at home or from anywhere in the world without going to the bank making it easy and reducing the cost, transport and long queue etc.

In Net banking activities like fund transfer, account details, opening and viewing details of deposits, insurance, ECS, viewing/changing of registered mobile, email etc. and other banking activities can be performed by providing net banking credentials. Online/internet/ e-payment banking is helpful in doing online bill payment, online purchases, online payment activities etc. by giving debit/credit card details or via net banking thereby making it easy and reduced cost, time, travel and long queue etc. and can be performed at home or at any place instead of going to the shop or government departments for payments etc.

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### 1.5 Common incidents of Security breach and Crime while using online/ net banking:

Hackers attack either banks servers/ networks or the customer systems via virus, hoax website or else by sending hoax emails, hoax links via website, links, social networking sites etc., and thereby stealing the sensitive information, bank credentials, blocking the network/servers/ hard disk and erasing the data sometimes.

The hackers misuse the sensitive information like customer account holders list details or banks credentials and sells this information to either a 3rd party/competitor or else use the bank credentials and if required hack even the mobile phone/email for stealing OTP Pin details and use them for online shopping or transfer of amount.

Due to this hacking the customers/banks are unaware that they are attacked and by the time it is realized either the sensitive data/information is lost or money or sensitive data is erased/stolen etc. or a combination of these creating a huge loss for the banks/customers.

### 1.6 List of few precautionary steps provided by banks, RBI, Government for online/internet/net banking:

- Avoid accessing your Net Banking account from a cyber cafe or a shared computer in case if used change passwords from your personal computer
- Every time once you complete an online banking session, log off from bank website and don't just close your browser
- Always type in the correct URL of your respective bank into your browser window while operating net banking and never click a link that offers to take you to the website
- Ensure that the passwords are not stored automatically but type the password when prompted
- Ensure that the password is complex, difficult for others to guess, different password i.e. for login, transaction, other bank accounts etc. and change your passwords at least once in a month
- Never share your Internet Banking passwords with anyone and remember your password and never write it down or save it in your pc or mail or SMS etc.
- Always check the last log-in to your Internet Banking account

## II. Review of Literature

**Sathye Milind (1999)** examined the factors affecting the adoption of Internet banking by Australian consumers. The sample for this survey was drawn from individual residents and business firms in Australia. Study found that security concerns and lack of awareness about Internet banking and its benefits stand out as being the obstacles to the adoption of Internet banking in Australia.

**Rawani A. M. and M P Gupta (2002)** tried to explore empirically the difference in the role of Information Systems (IS) in the banking industry. The study indicates that IS plays a supportive role in public sector banks and a strategic role in private and foreign sector banks. The study also indicates that the future impact of IS does not vary significantly with the banking groups.

**Sonja Grabner-Krauter and Rita Faullant (2008)** confirm the influence of internet trust on risk perception and consumer attitudes towards internet banking. Propensity to trust is a determinant not only for interpersonal relationships but also for trust in technological systems.

**Ganesan R and Vivekanandan K (2009)** analyzed that Internet banking has made it easy to carry out the personal or business financial transaction without going to bank and at any suitable time. This facility enables to transfer money to other accounts and checking current balance alongside the status of any financial transaction made in the account.

**Sunayna Khurana (2009)** aimed to identify customer preferences towards online banking and to find out various service quality dimensions that affect customer satisfaction. The five factors that influence the satisfaction level of customers are responsiveness, reliability, efficiency, privacy of information and easiness to use. The researcher believes the present study can make its contribution in two ways. First, it describes the customer preferences towards internet banking. Secondly, it explains the various service quality dimensions that effect customer's satisfaction and importance of each factor. Responsiveness and reliability on the banks website are most important factors that affect customer's satisfaction. Various banks must take important steps to make their website more reliable and more responsive to give more value and satisfaction to customers.

**Malhotra and Singh (2010)** presented the status of Internet banking in India and the extent of Internet banking services offered by Internet banks. It also examined the factors affecting the extent of Internet banking services. Study found that the private and foreign Internet banks had performed well in offering a wider range and more advanced services of Internet banking in comparison with public sector banks.

**Rao G.R and Prathima K, (2011)** provide a theoretical analysis of Internet banking in India and found that as compared to banks abroad, Indian banks offering online services still have a long way to go. From online banking to reach a critical mass, there must be sufficient number of users and the sufficient infrastructure in place information technology has introduced new business paradigms and is increasingly playing a significant role in improving the services in the banking industry.

**Subsorn and Limwiriyakul (2012) i**nvestigated that there was a distinct lack of internet banking security information provided on all the selected Thai banks' websites as compared to the selected Australian banks which provided better internet banking security information.

**Harshad Patel and Vijay Pithadia, (2013)** found that "Advancement achieved in the Information Technology and communication Technology in the last two decades has resulted in the successful implementation of Electronic Banking in India". Today, the banks able to offer the choice of customer services to provide banking business across the bank counter, over the telephone or through computer or internet. "The key to survival, therefore, is maintenance of customer loyalty by providing them with value added services customized to their needs. The focus of study is to certain the role of value added services to satisfy and retain customer loyal. Some of these value-added services Automated Teller Machines cards (ATM), Credit card, Debit card, Internet banking, Tele banking, Mobile banking, Home Banking and so on.

R**ajpreet Kaur Jassal and Ravinder kumar Sehgal (2013)** Online banking had become increasingly important to the profitability of financial institutions and adding convenience for the customers. As the number of customers started using online banking increases, online banking systems are becoming more desirable targets for criminals to attack. To maintain the customers' trust and confidence in the security of their online bank accounts and financial institutions identifies how attackers compromise accounts and develop methods to protect them. Security breaches are not only because of banks faults and banks inadequate polices but customers are equally responsible for it, because customer's awareness regarding security is equally important.

**Sven Kiljan (2017)** examined 80 banks across the globe over 2 years' period. The researcher focused on home and mobile banking application which is using the standard web technologies. Based on study the mobile banking is larger attack target like home banking in the past. The use of authentication methods and their ways to secure is being examined by the researcher. Communication security is mostly uniform and good enough for daily use. The researcher dedicated mechanisms to compare and evaluate online banking user authentication and transaction authorization methods. An existing mechanism that quantifies the qualities of user authentication methods on three levels was expanded with aspects related to online banking. This mechanism was used by seven ratters to evaluate four implemented and eight proposed sets of user authentication and transaction authorization methods. Another evaluation mechanism the researcher designed that focused on user testing is a modular web framework that allows the testing of new ideas for authentication and authorization methods,

without developing from scratch and without using a physical test center. A proof of concept was developed and used by test candidates. Usage data was retrieved from which conclusions could be made, which warrants the usefulness of such a framework.

## III. Research Methodology and Analysis

### 3.1 Objective:

To analyze the factors that influences the security system of Online/Net banking a part of e-banking services and to evaluate customers' satisfaction towards various factors of security system in e-banking services

### 3.2. Path Analysis

The above path analysis is run on a sample of 422 respondents to know the correlation and regression of independent variables with respect to satisfaction level regarding security on using Online/ Net Banking. Likewise, the independent variables are accessibility, security awareness, reliability, cost effectiveness, responsiveness, service quality and technical improvement and the second dependent variables or mediator variables are service factors and Technical factors on security of Online/Net Banking.

### 3.3. Model Fit

**Table I. Model Fit.**

| Chi Square | P | DF | RMSEA | GFI | AGFI | CFI | NFI |
|---|---|---|---|---|---|---|---|
| 1.372 | 0.504 | 0.244 | 0.000 | 0.999 | 0.982 | 1.000 | 1.000 |

From the above table it is found that the calculated chi-square value is 1.372, p value is 0.504 which is greater than 0.05, which indicates perfectly fit. Here GFI (Goodness of Fit Index) value and the AGFI (Adjusted Goodness of Fit Index) value is greater than 0.90 which represent it is a good fit. The calculated CFI (Comparative Fit Index) value and NFI (Normed Fit Index) values are greater than 0.90 which means that it is perfectly fit. It is found that RMSEA (Root Mean Square Error of Approximation) value is 0.000 and which is less than 0.08, which indicates it is perfectly fit.

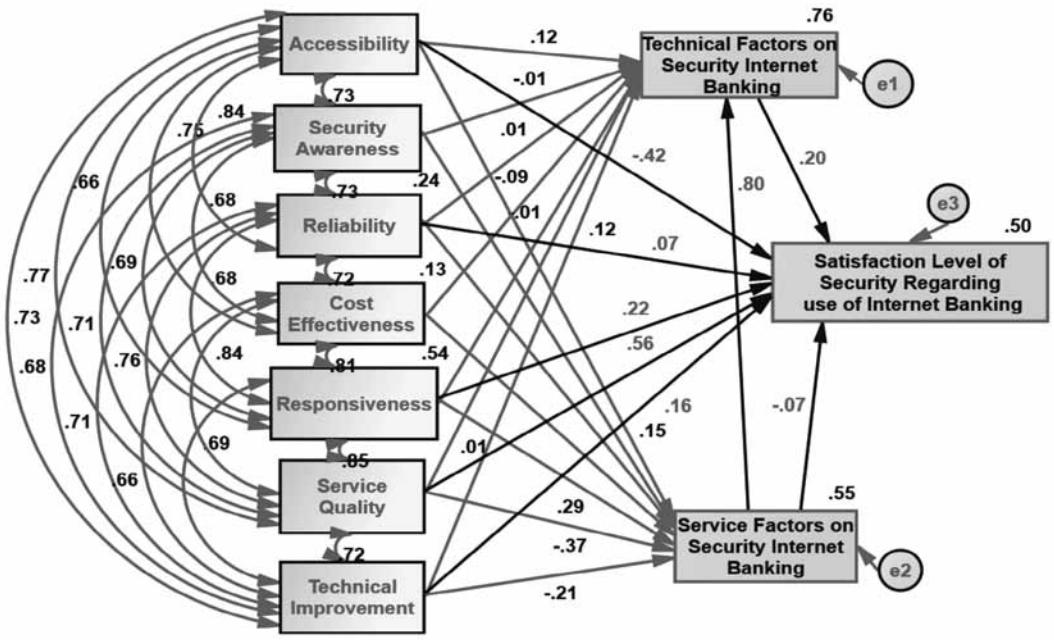



**Fig. I. Model Fit.**

## Table II. Regression Weights

| DV | Path | IV | Estimate | S.E | C.R. | B | p |
|---|---|---|---|---|---|---|---|
| Service factors on security internet banking | <--- | Accessibility | .115 | .053 | 2.194 | .151 | 0.028 |
| Service factors on security internet banking | <--- | Security Awareness | .171 | .040 | 4.337 | .235 | 0.000 |
| Service factors on security internet banking | <--- | Reliability | .111 | .057 | 1.949 | .129 | 0.051 |
| Service factors on security internet banking | <--- | Cost Effectiveness | .437 | .054 | 8.097 | .542 | 0.000 |
| Service factors on security internet banking | <--- | Responsiveness | .206 | .049 | 4.216 | .287 | 0.000 |
| Service factors on security internet banking | <--- | Service quality | -.221 | .045 | -4.857 | -.374 | 0.000 |
| Service factors on security internet banking | <--- | Technical Improvement | -.108 | .028 | -3.884 | -.208 | 0.000 |
| Technical factors on security internet banking | <--- | Accessibility | .095 | .041 | 2.300 | .117 | 0.021 |
| Technical factors on security internet banking | <--- | Security Awareness | -.004 | .031 | -.123 | -.005 | 0.902 |
| Technical factors on security internet banking | <--- | Reliability | .009 | .044 | .210 | .010 | 0.834 |
| Technical factors on security internet banking | <--- | Cost Effectiveness | -.081 | .045 | -1.793 | -.094 | 0.073 |
| Technical factors on security internet banking | <--- | Responsiveness | -.005 | .039 | -.130 | -.007 | 0.897 |
| Technical factors on security internet banking | <--- | Service quality | .007 | .036 | .183 | .011 | 0.855 |
| Technical factors on security internet banking | <--- | Technical Improvement | .064 | .022 | 2.902 | .116 | 0.004 |
| Technical factors on security internet banking | <--- | Service factors on security internet banking | .848 | .038 | 22.358 | .798 | 0.000 |
| satisfaction level of security regarding use of internet banking | <--- | Technical Improvement | .196 | .071 | 2.768 | .158 | 0.006 |
| satisfaction level of security regarding use of internet banking | <--- | Service quality | .790 | .109 | 7.224 | .561 | 0.000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| satisfaction level of security regarding use of internet banking | <--- | Responsiveness | .368 | .122 | 3.025 | .215 | 0.002 |
| satisfaction level of security regarding use of internet banking | <--- | Reliability | .138 | .141 | .972 | .067 | 0.331 |
| satisfaction level of security regarding use of internet banking | <--- | Technical factors on security internet banking | .441 | .157 | 2.807 | .197 | 0.005 |
| satisfaction level of security regarding use of internet banking | <--- | Service factors on security internet banking | -.171 | .171 | -1.000 | -.072 | 0.317 |
| satisfaction level of security regarding use of internet banking | <--- | Accessibility | -.772 | .131 | -5.889 | -.425 | 0.000 |

Considering the significant individual path coefficients, it is seen that the influence of independent variables on service factors on security internet banking, accessibility shows (C.R. – 2.194, beta – 0.151, p – 0.028), security awareness shows (C.R. – 4.337, beta – 0.235, p – 0.000), cost effectiveness shows (C.R. – 8.097, beta – 0.542, p – 0.000), responsiveness shows (C.R. – 4.216, beta – 0.287, p – 0.000), service quality shows (C.R. – -4.857, beta – -0.374, p – 0.000), technical improvement shows (C.R. – -3.884, beta – -0.208, p – 0.000). Hence the p values are less than 0.05 and the hypothesis are rejected and significant influence over service factors on security internet banking at 1% level. Other remaining independent variable is reliability not influencing over dependent variable of service factors on security internet banking.

Considering the significant individual path coefficients, it is seen that the influence of independent variables on technical factors on security internet banking, accessibility shows (C.R. – 2.300, beta – 0.117, p – 0.021), technical improvement shows (C.R. – -3.884, beta – 0.208, p – 0.021) and service factors on security internet banking shows (C.R. – 22.358, beta – 0.798, p – 0.000). Hence the p values are less than 0.05 and the hypothesis are rejected and significant influence over technical factors on security internet banking at 1% level. Other remaining independent variables are security awareness, reliability, cost effectiveness, responsiveness and service quality not influencing over dependent variable of technical factors on security internet banking.

Considering the significant individual path coefficients, it is seen that the influence of independent variables on satisfaction level of security regarding use of internet banking, technical improvement shows (C.R. – 2.768, beta – 0.158, p – 0.006), service quality shows (C.R. – 7.224, beta – 0.561, p – 0.000), responsiveness shows (C.R. – 3.025, beta – 0.215, p – 0.002,) accessibility shows (C.R. – -5.889, beta – -0.425, p – 0.000) and technical factors on security internet banking shows (C.R. – 2.807, beta – -0.197, p – 0.005). Hence the p values are less than 0.05 and the hypothesis are rejected and significant influence over on satisfaction level of security regarding use of internet banking at 1% level.

Other remaining independent variables are reliability and service factors on security internet banking not influencing over dependent variable of satisfaction level of security regarding use of internet banking.

Relationship between Service quality and Technical Improvement (C.R. = 11.991, r = 0.720 and p = 0.000), relationship between Service quality and Responsiveness (C.R. = 13.260, r = 0.847 and p = 0.000), relationship between Responsiveness and Cost Effectiveness (C.R. = 12.915, r = 0.810 and p = 0.000), relationship between Cost Effectiveness and Reliability (C.R. = 12.011, r = 0.722, p = 0.000) and relationship between Reliability and Security Awareness (C.R. = 12.142, r = 0.734 and p = 0.000), relationship between Security Awareness and Accessibility (C.R. = 12.065, r = 0.727 and p = 0.000), relationship between Technical Improvement and Accessibility (C.R. = 12.064, r = 0.727, p = 0.000), relationship between Technical Improvement and Security Awareness (C.R. = 11.581, r = 0.684 and p = 0.000), relationship between Technical Improvement and Reliability (C.R. = 11.919, r = 0.714 and p = 0.000), relationship between Technical Improvement and Cost Effectiveness (C.R. = 11.360, r = 0.665 and p = 0.000), relationship between Technical Improvement and Responsiveness (C.R. = 11.656, r = 0.690 and p = 0.000), relationship between Service quality and Accessibility (C.R. = 12.492, r =0.767 and p = 0.000), relationship between Service quality and Security Awareness (C.R. = 11.918, r = 0.714 and p = 0.000), relationship between Service quality and Reliability (C.R. = 12.416, r = 0.760 and p = 0.000), relationship between Service quality and Cost Effectiveness (C.R. = 13.180, r = 0.838 and p = 0.000), relationship between Responsiveness and Accessibility (C.R. = 11.339, r = 0.663 and p = 0.000), relationship between Responsiveness and Security Awareness (C.R. = 11.656, r = 0.690 and p = 0.000), relationship between Responsiveness and Reliability (C.R. = 11.569, r = 0.683 and p = 0.000), relationship between Cost Effectiveness and Accessibility (C.R. =12.283, r = 0.747 and p = 0.000), relationship between Cost Effectiveness and Security Awareness (C.R. = 11.488, r = 0.676 and p = 0.000) and relationship between Reliability and Accessibility (C.R. = 13.188, r = 0.839 and p = 0.000). Hence the p values are less than 0.05 and the hypotheses are rejected. It is concluded that positive relationship among the variables.

### 3.4 Findings

Service factors that influencing on security of e-banking is significant with reliability and cost effectiveness of e-banking service. Technical factors of e-banking security services are significant with easy accessibility of security systems provided by the bankers, cost effectiveness of the services and system server responsiveness. Service quality of

the e-banking security system is highly significant with technical factors and technical improvement activities done by the service provider banks. Online/ net banking services are also highly perceived by its customers towards technically strong on security when compared to other banks online or net banking services.

Satisfaction of customers towards e-banking security system is significant with service quality, technical improvement activities and responsiveness of system server and easy accessibility of system.

## IV. Suggestions

- E-banking security system should be reliable with customers' standards and their profile. It should alter based on their individual needs and expertise.
- E-banking security system should be easy accessible by ordinary person who have the customers of their bank, highly complicated system administration may lose their customers.
- E-banking security system should be affordable cost with respect to their security system. High cost may charge by the service provider bank; customers may shift their banking activities to other low cost providers.
- E-banking security system should be high speed responses, due to security issues, it may take more time to response, and customer may get irritation.

**Recommended solution for secured Electronic payment transaction via Online/Net Banking**

- Bio Metric to be incorporated to Online/Net banking like face/Palm/ finger/skin which reads via laser sensors devices and touch screen.
- To have unique hologram stickers or identification on banking/e-payment websites.
- In case of fund transfer based on the level of amount transactions the security authentication needs to be increased i.e. Rs. 50,000 above answering security question and auth code, 1 Lakh and above biometric / voice / face recognition via web cam etc.
- For internet, online or e-payment -need to generate and use a duplicate one time or one day debit/credit card details called as E-debit card or E-credit card by logging into either net banking or another secured bank website. i.e. generates duplicate E-debit/credit card number, CVV no., expiry/issue date, password, OTP Pin etc. for e- payment
- Also, to use encryption format wherein if the bank credentials or auth code is given it is encrypted in a code format and sent to the bank

servers so that it is difficult to be tracked/traced when the credentials are entered

- An emergency contact no. like 100 e.g. 500, 1000 etc to be provided by the banks/RBI, this needs to be notified to customers and displayed in ATM centres.
- To stick precautionary steps to be taken by customers along with emergency contact no. especially on the ATM Machine, vendor outlet and online webpage and Advertisement
- To develop and bring more secured Anti-virus software's which can be installed by the banks and in the customer's system and biometric password protection for the front and back end programs. To check if the programs are not cut/paste from the websites but written on own
- To send a list of licensed anti-virus software and low cost bio-metric devices to be installed by the customers and if possible to sell them in the bank either at a very low or free of cost which can be purchased by everyone.
- Copy of Back ground check report of bank officials, security guard and technicians etc to be sent periodically to police department

## V. Conclusion

Online/net banking is one of the user-friendly banking technologies for bank and customers. Many banking transactions and banking services are being added and incorporated in the Online and net banking. But on the contrary there is a rise of cyber-crimes/frauds/threats and if banks and customer adhere and follow strictly the precautionary steps and security measures then surely even more major development and innovation will take place for advanced user friendly digitized online/net banking.

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