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# **A causal relationship between Information Technology and customer satisfaction - a case study on Indian public sector banks**

## **Abstract**

In the present hyper-competitive, complex and uncertain business environment any organization need to be ready to take on the challenges unleashed by various external forces such as competition, globalization, shrinking margins etc. Indian public sector banks (PSBs) are not out of the periphery of this changing business environment. Customer satisfaction being a prerequisite for organizational survival and growth, Indian PSBs are also getting equipped with more and more new products and services which demands more technological solutions

This paper focuses on the impact of information technology on Indian PSBs and how this is affecting the level of their customer satisfaction. Various literatures and articles on this topic are ensuring the fact that these two issues are closely related. But we don't get any idea about the exact nature and the degree of interdependence of these two closely related issues. Firstly, this paper will try to investigate those factors related to information technology which affects the satisfaction level of the customers of Indian PSBs. Then, the paper will try to explore into the extent at which those factors of information technology has an implication on the level of customer satisfaction in the context of Indian PSBs.

**Key words:** E-banking, customer satisfaction, Indian public sector banks

## **INTRODUCTION**

The world is approaching to an era of information as a result of rapid technological advancement. But the life of people is becoming more hectic and they are facing a problem of time constraint for their day-to-day activities. Even for their very personal activities like financial ones (such as account management, bill payment, loan application and approval) they don't want to stand in queue for hours. At the same time when e-banking concept was introduced it revolutionized the whole banking system. Now the customers don't have to wait for hours to withdraw/ deposit money from/to bank, applying for loans, bill payments etc. They are using Internet facilities provided by banks to get their work done in minutes. This is

supported by the fact that nearly 13% of world population is now online (showing a growth of 290% in past 7 years) of which 56% uses e-banking. Even in rising economies like India where total online population is around 4%, 1% is getting benefit from e-banking and the number is rising quickly.

### *Basic expectations from any IT-enabled system*

The highly competitive, complex and uncertain business environment of today is compelling the firms to find out ways to excel at containing cost, improving quality and innovating delivery system. Such emergent compulsions have fostered the growing use of IT by firms as a means to achieve excellence in performance. IT also helps in distribution of informational knowledge enabling the firms to disperse the decision making process down to operational levels. An IT-enabled process helps in gaining strategic advantage over the competitors by way of:

- Compression of time
- Ensuring accuracy
- Assuring ease of use
- Overcoming restrictions of geography / distance

### *Information technology and banking*

E-banking is one of the few emerging areas in banking operations which has started with the rapid advancement of technology and the availability of Internet facility. It is time savvy, reduces the cost of operation (.01\$ to process an internet transaction as compared to 1.07\$ for an in-person transaction) for the banks, customer friendly but with a certain degree of risk attached with it. By going through the recent literatures and surveys it is found that e-banking is attaining mass popularity and it might be possible that one day will come when there will be no physical branch of a bank as all the transactions will be done online. Then the customer can dream of satisfaction to its peak as technology attains great height.

E-banking can be defined as an umbrella term for the process by which traditional banking products and services are directed to customers through electronic, interactive communication channels. E-banking includes the systems that enable its customers or individuals to access accounts, transact business, or obtain information on banking products and services through a public or private network, including the Internet. Customers access e-banking services using

an intelligent electronic device, such as a personal computer (PC), personal digital assistant (PDA), automated teller machine (ATM), kiosk, or Touch Tone telephone.

Although Internet banks offer many of the same financial services, as do traditional physical banks, analysts view Internet banking as a means of retaining increasingly sophisticated customers, developing a new type of customer base, and capturing a greater share of depositor assets. Because Internet banks generally have lower operational and transactional costs than do traditional brick-and-mortar banks, they are often able to offer low-cost cheque-facility and high-yield Certificates of deposit. Keeping in mind these unique features, the strategic issues for e-banking are:

- Adequacy of management information systems (MIS) to track e-banking usage and profitability.
- Costs involved in monitoring e-banking activities or costs involved in overseeing e-banking vendors and technology service providers
- Design, delivery, and pricing of services which can generate sufficient customer demand
- Competition from other e-banking providers
- Adequacy of technical, operational, compliance, or marketing support for e-banking products and services.

As e-banking is less time consuming and easily available, it is attracting larger number of customers than traditional banking. But it is also being observed that customers are still reluctant to use e-banking because of the fear of hacking, losing privacy of account related information, technical uncertainty etc. Hence to overcome these drawbacks of e-banking, institutions have to consider the following:

- Security controls for safeguarding customer information
- Authentication processes necessary to initially verify the identity of genuine customers who access e-banking services
- Liability for unauthorized transactions
- Losses from fraud if the institution fails to verify the identity of individuals or businesses applying for new accounts or credit on-line

## **RESEARCH OBJECTIVES**

This research paper is an effort to find the causal relationship between information technology and customer satisfaction in the backdrop of Indian PSBs and also to investigate whether

information technology enabled Indian PSBs provide better customer satisfaction. Therefore, the research objectives of the study are:

- To study the usage of Information technology in Indian PSBs
- To identify those factors related to information technology, which are affecting the satisfaction level of the customers of Indian PSBs.
- To cluster the factors under several broad dimensions.
- To find out the relative importance of the factors within each broad dimension.

The observations of the study have been restricted to the IT applications in Indian e-banking scenario. In this study we have gathered data on customer expectation and their level of satisfaction in using the bank's ATM facility, core banking facility, banking website, website accessibility aspect, website design issues, ease of use of the banking website, website transactions, ease of e-transaction, accuracy and security aspect of e-transaction.

## **LITERATURE REVIEW**

Considerable work has been done by Michael Hammer (1990), Thomas H. Davenport (1993), and Gerstner (2003) in the area of application of information technology for business process reengineering. Also Jagadish Seth (1969), Oliver (1977-81) and Vavra (1997) have done significant work in the area of consumer behaviour. But not much work has been done in India in the area of e-banking. Nevertheless the works done by i) G.V. Chalam (2002) studied the growth and trend of IT application in banking sector, ii) V. Mehta (2003) researched the impact of IT on banks with productivity reference to J&K Bank Ltd.. and iii) Peeru H. Mohamed (2005) carried out a study with six banks (HDFC Bank, ICICI Bank, Indian Overseas Bank, State Bank of India, Standard Chartered / ANZ Grindlays Bank and Citi Bank) from Chennai city to examine CRM in banking industry are worth mentioning.

In their work Avashti and Sharma (2000-2001) describes that advances in technology are set to change the face of banking business. Technology has transformed both the delivery channels used by banks in retails banking.

Bajaj (2000) highlighted e-commerce related issues due to adoption of recent IT. All over the world banks traditional business of taking advances and lending out the proceeds is in terminal decline. IT is also helping in cutting costs by providing cheaper ways to deliver products to customers. He concluded that electronic payment system are emerging and getting accepted in the market place.

Heggade (2000) did his work analyzing the banker-customer relationship in Indian PSBs. It is unique work since it analyses the wide range of customer services provided by the banks and the role of bank staff in its delivery.

Shapiro (2000) studied the effects of cyber space as evolving in ways that threaten privacy and other constitutional rights. It is eroding the liberty. It may end up controlling our lives in ways we have never imagined.

Also Shroff, T. (2004) describes how variety of services can be provided through the electronic channels by banks and financial institutions. According to him, employees are considered as a regular service-provider and they are the one who directly cares for the customers and their needs. The environment in the banking industry is going through rapid changes due to the impact of technology. The concept of 'Brick-and-Mortar' banking is gradually changing into the concept of 'Universal banking'. During the last decade, Internet and the concept of E-commerce, M-commerce, etc. have entered into the scenario of global banking and financial institutions. With the advent of technology in computing, development of Internet and networking technology and advancement of telecommunication facilities, global players like Citi Bank and GE Capital are now able to reach vast number of clientele spread geographically in different areas through limited branches they have set up. The bank employees have turned out to be a knowledge worker with improved productivity (along with higher compensation package), no longer bored with monotonous repetitive figure calculation and duplication of records.

### *Information technology in banking and customer centric management*

Organizational functioning is the result of interactions among four variables: task, structure, technology, and people. (Leavitt, 1965). A change in work technology or task brings about changes in the others. The inter-relatedness of the functioning of the social and technological sub-systems of organizations and the relation of the organization as a whole to its environment have to be considered in this context. (Trist and Bamforth, 1951)

Indian banking is faced with major external challenges, which includes customer lifestyle changes, deregulation, globalisation, the emergence of new competitors, the impact of technology, and convergence in the market place between banks and other service providers such as insurance companies. The cost per transaction has declined as full service branches have been replaced in part by telephone service, ATMs and, increasingly the Internet. But overall transaction volumes have soared, making it more expensive for banks to meet

customer demand and giving them more distribution channels to manage. Market research shows that many customers crave a relationship with their bank based on convenience, trust and intelligent proactivity on the part of qualified, accountable staff that know and value the customer.

The banks have adopted a fragmented approach to improving customer service, drawing on everything from psycho-demographics to branch redesign, loyalty schemes, personal banking, segmentation modelling, customer value management, cross selling, data warehouses, data mining, call centres and internet delivery. Customer Centric Management (CCM) is an integrated model for the retail banking industry. In this model the integrated management and use of customer information is the key. CCM focuses on *knowledge acquisition* (the acquisition and storage of customer data covering static, dynamic, financial and external data feeds), *behaviour modelling* (managing customer data to acquire new business and influence customer behaviour) and *delivery* (meeting customer expectations through product service proposition, delivery channel management and relationship management).

The bank must then be reshaped around customer priorities. For top performers, customer service quality is an obsession. Banks need to ask themselves what trapped value they are losing, why they are losing it, how they intend to capture it and how they should set about building a sustainable customer centric organisation. Overall, they should address the key question of the size of the lost opportunity, why the bank is not tapping that lost value and what it must do to get there.

#### *Indian banking – then and now*

Computerization of the workplace is beginning to gather momentum in India. Development of a sound and adequate information system has become a necessity to meet the new challenges of growth and diversification of the banking activities. The Banking Commission and the Reserve Bank of India have appointed various committees from time to time to study the situation. The Tandon Committee was appointed in 1974, which gave the guidelines to banks for the follow-up of credit, the Talwar Committee was appointed to look into the customer services in the banks, and the Goipuria Committee reported on accounting procedures and maintenance of records at bank branches. The Talwar Committee on Customer Service in Banks had recommended computerization of some functions to avoid delays in customer service.

To get a holistic picture of how the technology and its public acceptance has evolved over the years, we can refer to what some banking experts in India says. According to N Ravichandran (Professor, IIMA), the economic reforms have generated new and powerful customers (huge Indian middle class) as well as new mix of players (public sector units, private banks, and foreign banks). The emerging competition has generated new expectations from the existing and the new customers. Banks need to find out innovative ways of to deliver the existing products in an innovative and cost-effective way by taking full advantage of emerging technologies beside introduction of new products.

In the opinion of K V Kamath (MD and CEO, ICICI Bank) a combination of developments arising from technological advancements and a liberalized marketplace – disintermediation, blurring of traditional roles and boundaries, emphasis on shareholder value creation – has led to a transformation of the banking sector. The biggest opportunity for the Indian banking system today is the demographic shifts in terms of income levels and cultural shifts in terms of lifestyle aspirations of the Indian consumer. The prerequisite for capitalizing on these opportunities is technology as it is key to servicing all customer segments – offering convenience to the retail customer and operating efficiencies to corporate and government clients.

According to P S Shenoy (CMD, Bank of Baroda) currently in India, there are two types of customers – one who are a multi-channel user and the others who still rely on a branch as the anchor channel. The primary challenge is to give consistent service to customers irrespective of the kind of channel they choose to use. A retail customer selects a bank based on two criteria – convenience and relationship and would continue with a bank if it provides good service. For customers who are multi-channel users, consistent information across all channels is the key requirement of modern retail banking. Although online-only banking has been less successful than was anticipated, with several online-only banks running into difficulties, incumbent banks have started to offer banking services electronically.

P T Kuppuswamy (Chairman and CEO, The Karur Vysya Bank) says that consumers may be broadly categorized into corporate, institutional clients, high net worth individuals, and retail consumers. The challenge is how to service mass-market customers profitably. It should be the business imperative to understand a customer's expectations and appetite for risk. India will shortly become home to the second largest number of elderly persons in the world. The population of our elderly, at present estimated at 76 million, is expected to increase to 100 million in 2013. Therefore, banks should focus on unmet financial needs of the pensioners



and senior citizens. Banks may have to go for mobile banking services for a cluster of villages.

The first steps towards mechanisation of banking operation were taken by installing what was known as ICL 40-column punched card equipment in late 50s or early 60s in the Calcutta office of the SBI for the reconciliation of inter-branch transactions. The trend of Non-Branch-Service Delivery in banking started with the growing popularity of electronic payment services in early 1990's with private and foreign banks. It started with Electronic Funds Transfers (EFT). Then, there were credit cards. ATMs and smart cards were next in the evolutionary history. Gradually, with the advance of computing technology, telephone banking and Computer Telephony Integration (CTI) became a powerful medium of delivering banking services. The banks are differentiating their services to the consumers to gain their loyalty. Technology is enabling banks to provide the convenience of anytime-anywhere-banking.

One of the eminent banking service providers the ICICI Bank kicked off online banking in 1996, followed by a host of other banks. But even for the Internet as a whole, 1996 to 1998 marked the adoption phase, while usage increased only in 1999, owing to lower ISP online charges, increased PC penetration and a tech-friendly atmosphere. At ICICI Bank, only 18.3 per cent of total customer transactions are online, says officials. At Standard Chartered, which has a registered base close to six hundred thousands for its Internet banking services-about 20 per cent of its retail customer base-around eight hundred thousands transactions are conducted every month. A survey by Internet and Mobile Association of India (IAMAI) also reveals that only four per cent of the 6,365 respondents approached conducted financial transactions online.

According to IDC (premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications, and consumer technology markets) estimate, there are over two million registered users for Internet banking in India which is 15 per cent of India's Internet user population but just 0.096 per cent of the total population.

Some important statistics regarding the usage of e-banking in India:

- From just nine hundred thousands netizens in 2001, the number is about to reach 100 million in 2007-08. 16 million Indians are already hooked on to e-banking till 2007 according to a recent IAMAI survey.
- 81 per cent use online banking only to view their account balances.
- Net banking is growing at 70 per cent per annum in terms of the number of users.

- 89% of bank consumers use ATMs.

According to the latest IAMAI Report on the online banking trends in India, the Internet population in India is 38.5 million and is set to grow to 100 million by 2007-'08. The number of customers who bank online is expected to grow over 16 million (inclusive of Internet and Mobile Banking) by 2007-'08. Today, their population stands at an estimated 4.6 million (not a complete representation). Interestingly, online banking in tier-two cities and towns – with tremendous growth potential - is reported to be at 26 per cent. The report identifies two trends among Indians for getting hooked onto Internet banking: a) for information transactions such as checking account balances, cheque clearance, and b) for high-end transactions like transfer of funds.

This growing number of Internet users and increase in financial activities online provide an opportunity for the banking industry to get a better understanding of this dynamic channel as an additional and mandatory touch point to serve their customers.

In a competitive market where services command market share, banks are constantly vying for customers. Banking has become a process of choice and convenience; better the service, higher the customer's inclination to a bank, and vice-versa, and Internet Banking is vital for both the industry and the customer. The future of banking would be in terms of integration, as people will have less time for banking. This is already becoming a reality with new-age banks such as YES Bank, and others too adopting a single-PIN, where the customer needs to use a single PIN number for transacting both online, and as well as offline – namely ATMs.

People will want to process more transactions on the Internet. There will be more activity in terms of applications and services on the mobile. Geography will not be an inhibitor any more as everything is executable on the net. In the Internet banking system, information is considered as an asset and so worthy of protection. However, the present system of authentication does not address the security aspect in full. This calls for an urgent need to acclimatize the whole system. According to Online Banking Association, there is a dual requirement to protect customers' privacy and protection against fraud. Another major issue is that of Data Protection and the need for a legal and regulatory framework. Currently, India has no law on data protection. Information security in e-banking presents two main areas of risk: preventing unauthorized transactions and maintaining integrity of customers' transactions. Data protection falls in the latter. Data protection laws primarily aim to safeguard the interest of the individual whose data is handled and processed by others. 'Interests' are usually expressed in terms of privacy, autonomy and/or integrity.

## RESEARCH METHODOLOGY

As the intention behind the research paper is to find out the interrelationship of usage of information technology in Indian PSBs and its implication on the satisfaction level of the customers, we have identified the various IT enabled tools that are now being used by the Indian public sector banks and accordingly the expectations and current satisfaction level of the customers related to those IT enabled tools has been captured.

The population for the study can be considered as the customers of those Indian PSBs which are adopting the new technologies in banking. For this purpose customers of Indian PSBs banks which are implementing information technology were chosen and questionnaire was distributed. There were 28 questions altogether divided under two subheadings:

- Customer's expectation from IT enabled banking
- Customer's satisfaction with the present service level of IT enabled banking.

We have used five point Likert-type Scales, consisting of a number of statements which express either a favourable or unfavourable attitude towards the given object to which the respondent is asked to react. The respondent indicated his agreement or disagreement with each statement in the instrument. Each response is given a numerical score, indicating its favourableness or unfavourableness, and the scores are totaled to measure the respondent's attitude. In other words, the overall score represents the respondent's position on the continuum of favourableness-unfavourableness towards an issue.

It was decided that sample would be collected from customers of public sector banks from different service segments such as professionals (doctors, lawyers etc.), businessmen, IT officials, banking professionals etc. located in and around Kolkata. This was done following the concept of Convenience Sampling method. A total of 388 customers were given the questionnaires out of which 265 were usable the average response rate being 68.29%.

One of the prime objectives of this research study was to take direct feedback from the customers through these questionnaires. The customers were selected at random by the interviewer on the basis of judgmental method because the researcher (who is also the interviewer in this study) felt they have more useful information related to the study. This sort of practice is well accepted in accounts and auditing process and as per the Auditing Practices Board "judgemental sampling is an accepted method of selection provided the auditors are satisfied that the sample is not unrepresentative of the entire population" (APB, 1993)

## DATA ANALYSIS & RESEARCH FINDINGS

The data gathered on different aspects of IT enabled banking has been analysed using univariate, bivariate and multivariate analysis. The analysis has been shown under three categories :

- a) Analysis on what the customers expects from IT enabled banking
- b) Analysis on customer's present level of satisfaction
- c) Analysis of the gap between the customer expectation and the present satisfaction level

SPSS ver 13.0 has been used to do the analysis on the data. The variables are identified from the questionnaire and the values against each answer of the questions are recorded against each variable.

The table 1 given below shows the variables and their description on which data has been collected and analyzed.

Sl no.	Variable name	Description
1	EATM	Banks should have ATM facility
2	ECBS	Bank branch should provide core banking facility (i.e., you can access your account from any branch)
3	EWBSTE	Banks should have website
4	EWBESY	Bank website should be easily accessible
5	EWSTRNS	The bank website should support transaction
6	EUSRFND	e-transaction procedures should be user friendly
7	ETNSSCUR	e-transaction should be secured-do you agree?
8	ETNSACRT	e-transaction should be accurate-do you agree?
9	HAVATM	Does your bank's branch have ATM facility?
10	SATM	Your satisfaction level with the performance of ATM services
11	HAVCBS	Does your bank's branch provide core-banking facility (i.e., you can access your Account from any branch)?
12	SCBS	Your satisfaction level with the performance of core banking facility
13	HAVWEBS	Does your bank have website?
14	SWEBACC	Your satisfaction level with the accessibility of the website
15	COFWEBS	"I find the it comfortable to browse the bank website for any product information"

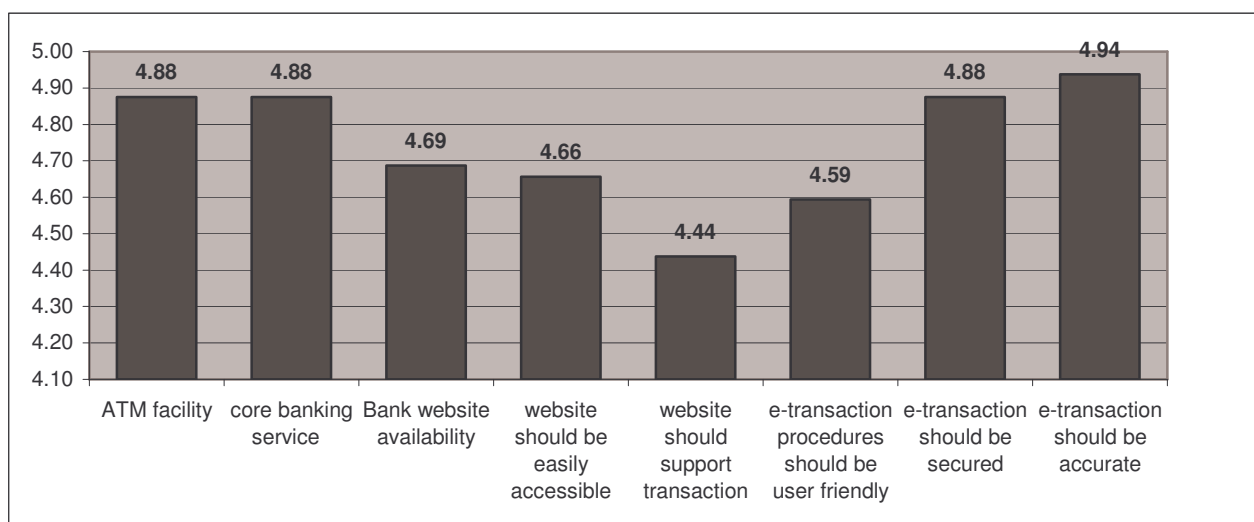
Sl no.	Variable name	Description
16	TMSVWEBS	“I find it more timesaving (quickness to navigate from one link to another within the banks website) to browse the website than to go to the bank branch for a product information”
17	TOTWBSAT	Overall satisfaction level with the bank website
18	WEBTRANS	Does the bank’s website support transaction?
19	TSAVTRAN	“I find it more timesaving to browse the website than to go to the bank branch for any banking transaction”
20	ESYTRANS	“I find the procedure to be difficult to transact over the website”
21	TRASSEC	“I feel the e-transaction to be secured”
22	SACCTRAN	Your satisfaction level with the accuracy in e-transaction
23	SWEBTRAN	Your satisfaction level with e-transaction services

**Table 1: Name and description of the variables used in SPSS ver 13.0**

### Analysis on what the customers expects from IT enabled banking

#### *Univariate analysis*

The results of the answer to the questions on customer’s expectation from IT enabled banking of public sector banks are shown in the bar chart below:



**Figure 1: Customers’ expectation from IT enabled banking**

We can see from the above results that the customer expectation on most of the attributes of e-banking is very high. Whereas the accuracy of the e-transaction (mean value 4.94) gets the

highest importance in customer expectation list, the security aspect of e-banking transaction, the availability of core banking facility and ATM facility (all having mean value 4.88) are the attributes of e-banking which customers consider next in terms of their importance.

The availability of bank's website (mean value 4.69) and the accessibility of the website (mean value 4.66) has more or less has the same degree of importance in the customers mind. The customer has attached much lesser importance to the user-friendliness of the e-transaction (mean value 4.59) whereas least importance has been given to the availability of the e-transaction facility (mean value 4.44) of the bank websites.

### *Bivariate analysis*

	EATM	ECBS	EWBSTE	EWBESY	EWSTRNS	EUSRFND	ETNSSCUR	ETNSACRT
EATM	1.000	.143	.357	.522	.271	.175	.429	-.098
ECBS	.143	1.000	-.051	-.075	.116	.175	.143	-.098
EWBSTE	.357	-.051	1.000	.364	.484	.357	.357	.104
EWBESY	.522	-.075	.364	1.000	.304	.577	.522	.357
EWSTRNS	.271	.116	.484	.304	1.000	.323	.427	.185
EUSRFND	.175	.175	.357	.577	.323	1.000	.429	.206
ETNSSCUR	.429	.143	.357	.522	.427	.429	1.000	.293
ETNSACRT	-.098	-.098	.104	.357	.185	.206	.293	1.000

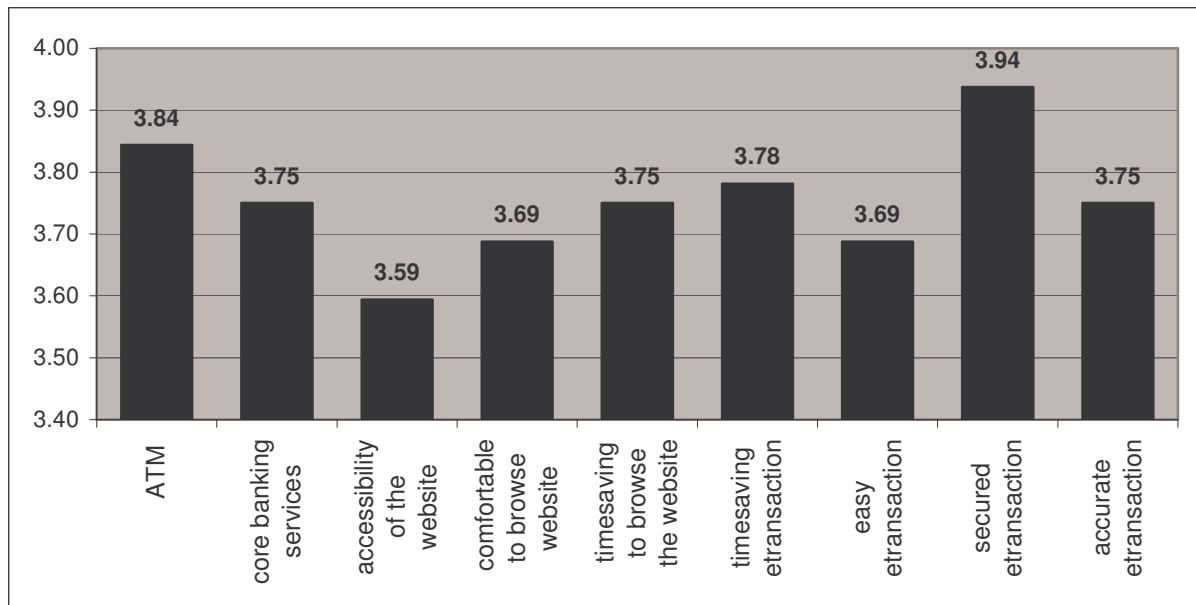
**Table 2:** Correlation matrix of customer expectation of IT enabled banking

From the above correlation matrix it is observed that none of the variables are very strongly correlated with each other and a moderate correlation exists between some of the variables. Though most of the variables are positively correlated with each other, some negative correlation can also be seen.

The variable EWBESY (ease of browsing banking website) and EUSRFND (user-friendly e-transaction process) are moderately correlated (correlation coefficient .577) but lesser degree of correlation (correlation coefficient .522) exists between the variables EATM (banks should have ATM facility) and EWBESY (ease of browsing banking website), which again is similarly correlated (correlation coefficient .522) with ETNSSCUR (e-transaction should be secured). This reflects that customer perceives them in terms of their convenience and security. A transaction based website is a part of customer expectation list as the correlation coefficient of .484 exists between the variables EWBSTE (Banks should have website) and EWSTRNS (The bank website should support transaction).

## Analysis on customer's present level of satisfaction

### *Univariate analysis*



**Figure 2:** Mean value explaining present level of customer satisfaction

The above result reflects that the present level of customer satisfaction is not too high as the mean varies from 3.59 to 3.94 on different attributes and all values are less than 4 in a 5- point Likert scale. But their satisfaction on the security of e-transaction is highest (mean value of 3.94). Next in order comes their satisfaction from the use of ATM facility and time saving through e-transaction (mean value 3.84 and 3.78 respectively). These two variables are transactional in nature and give convenience to the customer.

Satisfaction level out of the usage of core banking facility, timesavings for using banking website and accuracy of e-transaction have a same mean value of 3.75. All these attributes reflect the operational nature of e-transaction.

But their satisfaction level on both the comfort aspect of browsing bank website and the ease of e-transaction is having the same mean of 3.69. Lastly the customer satisfaction level for accessibility of website is the lowest (mean value 3.59) and can be considered a very moderate one.

### *Bivariate analysis*

Here we shall try to analyze the data from two perspectives:

1. From the non-transactional aspect of e-banking as shown in table 3
2. From the transactional aspect of e-banking as shown in table 4

	SWEBACC	COFWEB	TMSVWEB	TOTWBSAT
SWEBACC	1.000	.360	.032	.590
COFWEB	.360	1.000	.673	.481
TMSVWEB	.032	.673	1.000	.375
TOTWBSAT	.590	.481	.375	1.000

**Table 3:** correlation matrix of customer satisfaction related to banking website (non-transactional)

This correlation matrix reflects how different factors influence the total satisfaction level of customers while using banks’ website for other than transactional purpose. Here we find that the variables COFWEB (comfortability to browse the bank website) and TMSVWEB (timesaving to browse the website) are strongly correlated with a correlation coefficient of 0.673. The variables SWEBACC (accessibility of the website) and TOTWBSAT (overall satisfaction level with the bank website) are also sharing a strong correlation (correlation coefficient .590). The correlation coefficient between the variables COFWEB (comfortability to browse the bank website) and TOTWBSAT (overall satisfaction level with the bank website) being .481 reflects that they are less than moderately correlated.

All other variables are not significantly correlated and can be assumed to be independent of each other. This is important because each independent variable may call for independent banking policies.

	TSAVTRAN	ESYTRANS	TRASSEC	SACCTRAN	SWEBTRAN
TSAVTRAN	1.000	.654	.115	.275	.221
ESYTRANS	.654	1.000	-.016	.543	.441
TRASSEC	.115	-.016	1.000	.071	.243
SACCTRAN	.275	.543	.071	1.000	.723
SWEBTRAN	.221	.441	.243	.723	1.000

**Table 4:** Correlation matrix of customer satisfaction related to transactional website

The above correlation matrix, related to the transactional aspects of bank’s website reflects the following:



- Correlation between the variables SACCTRAN (satisfaction with the accuracy of e-banking) and SWEBTRAN (satisfaction with e-transaction services) is quite high. The value of the correlation coefficient being .723.
- The variable TSAVTRAN (time saving attribute of web browsing) is moderately correlated to variable ESYTRANS (easiness of transaction through web), the correlation coefficient being .654.
- The variables SACCTRAN (satisfaction with the accuracy of e-banking) are also moderately correlated to the variable ESYTRANS (easiness of transaction through web), the correlation coefficient being .543.
- Security aspect is more or less considered to be an independent factor as this attribute is not showing any considerable correlation with any other variable

The above correlation matrix also brings out the fact that accuracy contributes most to the total satisfaction of e-transaction. Easiness contributes next and security and time saving aspect respectively comes to the last in order.

### *Multivariate analysis*

	Component	
	1	2
TSAVTRAN	.900	
TMSVWEBS	.844	
COFWEB	.789	
ESYTRANS	.730	
SWEBACC		.831
SCBS		.787
SATM		.701
SACCTRAN		.628

**Table 5:** Rotated Component Matrix of satisfaction out of IT enabled banking  
(Considering values above 0.5 only)

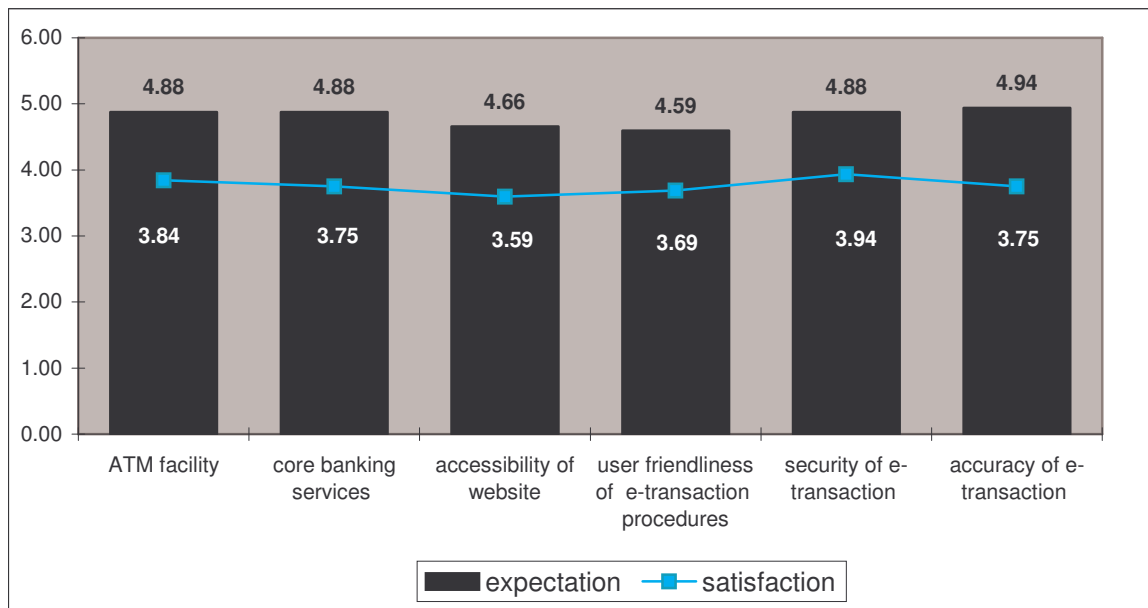
Table 5 shows the result of factor analysis. The component matrix was rotated using varimax rotation method with Kaiser Normalization. Two factors were extracted through above method that converged in 3 (three) iterations.

Factor loadings above .25 were considered to be significant.

Factor 1 comprises variables namely TSAVTRAN, TMSVWEBS, ESYTRANS, COFWEB, indicating *Customer Centric Dimension* of Indian e-banking sector.

Factor 2 comprises variables SWEBACC, SATM, SCBS, SACCTRAN indicating *Anywhere Anytime Dimension* of Indian e-banking sector.

### Analysis of the gap between the customer expectation and the present satisfaction level



**Figure 3:** Mean value of customer expectation and present level of customer satisfaction on different attributes of e-banking

In the above bar and line graph, we have plotted the mean values of customer expectation and customer satisfaction level on certain common attributes of IT enabled banking services. The observations from the analysis of above graph are presented below:

- The present satisfaction levels of customers on attributes of e-banking as shown by the line are below their expectation level on the same attribute as shown by the bars.
- The difference between the mean value of the expectation and that of satisfaction related to user-friendliness of e-transaction is the least where as it is highest in case of accuracy of e-transaction.
- The difference between the mean value of the expectation and that of satisfaction in the security attribute of e-transaction is second lowest followed by differences regarding attributes of ATM facility, website accessibility and CBS facility in ascending order.

## DISCUSSIONS AND CONCLUSIONS

The univariate, bivariate and multivariate analysis on the gathered data reveals the following facts about the variables related to the usage of information technology in Indian banking:

Significantly high mean values of customer expectation on different attributes of IT-enabled banking reassures that information technology application has a very prospective future in Indian PSBs.

High expectation on accuracy and security aspect of e-transaction and least expectation on the availability of e-transaction reflect that though customers of Indian PSBs are ready to accept information technology in their day-to-day banking activities but still they are not quite confident about the performance of e-transaction.

From the correlation analysis of the e-transactional website it can be seen that a high level of customer satisfaction calls for a very high level of accuracy of e-transaction.

Moderately high correlation between easiness of e-transaction and time saving aspect of e-transaction reveals that easy procedure of transaction ensures less time for transaction. Same is applicable to any non-transactional website where the comfortability to browse the website ensures time saving also.

From the multivariate analysis, we can identify the IT related factors which are affecting the satisfaction level of customers of Indian PSBs and they can be clustered under two major dimensions: *Customer centric dimension* and *Anywhere anytime dimension*.

1. *Customer centric dimension* comprising of variables (in accordance of their comparative weightage within the dimension) such as
  - ✓ timesaving to browse the e-transactional website
  - ✓ timesaving to navigate through the web site for product information
  - ✓ comfortable to browse the bank website for any product information and
  - ✓ easy procedure to transact over the website.
2. *Anywhere anytime dimension* comprising of the variables (in accordance of their comparative weightage within the dimension) such as
  - ✓ accessibility of the website
  - ✓ performance of ATM
  - ✓ performance of core banking facility and
  - ✓ security aspect of e-transaction

The satisfaction level of the customer on all attributes of e-banking are less than their expectation level reveals that the performance of e-banking operations are below the customer

expectation level. Hence the bank has to take steps to improve their performance and also bring new technologies for banking operations.

Hence in the conclusion we can say that though application of information technology in Indian banking has made significant inroads to their customer base, it still lacks in several dimensions of its performance. Therefore this needs to be taken care of by significantly improving the operational efficiency and introduction of innovative technologies. One of the future technologies, which Internet Banking could witness, is of Biometrics approach as against the password authentication system of individual's claimed identity. It needs to be recognized that such high cost technological initiatives need to be undertaken only after the viability and feasibility of the technology and its associated applications have been thoroughly examined.

The Internet and its underlying technologies will change and transform not just banking, but also all aspects of finance and commerce. It represents much more than a new distribution opportunity. It will enable nimble players to leverage their brick and mortar presence to improve customer satisfaction and gain share. It will force lethargic players who are struck with legacy cost basis, out of business since they are unable to bring to play in the new context.

## REFERENCES

1. Achim, Machauer and Sebastian, Morgner (2001), "Segmentation of bank customers by expected benefits and attitudes", *The International Journal of Bank Marketing*, 19:1, pp 6-15.
2. Agarwal, Manoj K., Muthukumaran, N.S. and Sharma, C.K. (1990), "The Psychographic Segmentation of the Indian Youth Market", *Journal of the Market Research Society*. 32:2, pp 251-259
3. Anthony, Beckett., Paul, Hewer. and Barry, Howcroft (2000), "An exposition of consumer behaviour in the financial services industry", *The International Journal of Bank Marketing*, 18:1, pp 15-25
4. Avasthi, G.P. and Sharma, M. (2000-2001), "Information Technology in Banking: Challenges for Regulators", *Prajnan*, Vol. XXIX, No. 4. pp 17
5. Bagchi, A. K. (2006), "The Evolution of The State Bank of India", vol.1 — the roots 1806-1876, Penguin Books India, New Delhi
6. Bajaj, K K (1999), "E-Commerce, The Cutting Edge of Business", Tata Mc.Graw Hill Publishing Co. Ltd., New Delhi
7. Bhatnagar, D. (1986). "Some Organisational Ramifications of Computerisation," *Indian Management*, 24(2), pp 32-38
8. Boyd. William, L. Leonard, Lyros and White. Charles (1994), "Customer preferences for financial services", *The International Journal of Bank Marketing*, 12:1, pp 9-15
9. Chalam, Dr. G.V. (July 2002), "Impact of Information Technology on the Performance of the Banking Sector", *Research Bulletin of the ICWAI*, Volume XXI, pp. 17-27
10. Davenport, J. (1993), "Process Innovation: Reengineering work through Information Technology", HBS Press, Boston
11. Davenport, Thomas & Short, J. (1990), "The New Industrial Engineering: Information Technology and Business Process Redesign", *Sloan Management Review*, Summer 1990, pp 11-27
12. Davenport, Thomas (1995), "Reengineering - The Fad That Forgot People", *Fast Company*, November 1995
13. David, Bejou., Christine,T,Ennew. And Adrian, Palmer. (1998), "Trust, Ethics and relationship satisfaction", *The International Journal of Bank Marketing*, pp 170-175

14. Delener, Nejd. and Katzenstein, Herbert. (1994), "Credit card possession and other payment systems: Use patterns among Asian and Hispanic consumers", *The International Journal of Bank Marketing*, pp 13-24
15. Dr.R.Srinivasan Sturdy, Andrew. and Morgan., Glenn (1993), "Segmenting the market: A review of marketing trends in French retail banking", *The International Journal of Bank Marketing*, pp 11-19.
16. Durkin. Mark (2004), "In search of the Internet-banking customer", *The International Journal of Bank Marketing*, pp 484-503.
17. Geoffrey,Bick., Andrew,Beric,Brown.and Russell,Abratt. (2004) 'Customer perceptions of the value delivered by retail banks in South Africa', *The International Journal of Bank Marketing*, pp 300-318
18. Gerstner, Jr., Louis V. (2003), "Who Says Elephants Can't Dance?", HarperCollins Publishers, Hammersmith, London
19. Goipuria , M. N.(1987), "Emerging Banking Challenges", *The Journal of India Institute of Bakers* (July-September)
20. Gruenfeld, L W, and Folman, F F. (1967). "Relationship among Supervisors' Integration, Satisfaction, and Acceptance of a Technological Change," *Journal of Applied Psychology*, pp 74-77
21. Hammer and Champy (1993), "Reengineering the Corporation", HarperCollins Publishers, Hammersmith, London
22. Hammer, Michael (1990), "Reengineering Work: Don't automate, obliterate", *Harvard Business Review*, Jul/Aug 1990, pp 104-112
23. Heggade, O.D, (2000), "Banker Customer Relationship in India", Mohit Publication, New Delhi
24. Howard, John and Sheth, Jagdish (1969), "The Theory of Buyer Behaviour", John Wiley and Sons Inc., New York
25. Hunt (1997), "Conceptualization and Measurement of Consumer Satisfaction and Dissatisfaction", *Marketing Science Institute*, MA
26. James,W,Peltier.,John,A,Schibrowsky., Don,E,Schultz. and John,Davis. (2002) "Interactive Psychographics: Cross – selling in the banking industry", *Journal of advertising research*, March-April, pp 7-22
27. Jane,M,Kolodinsky., Jeaane,M,Hogarth. And Marianne,A,Hilgert. (2004), "The adoption of electronic banking technologies by US consumer", *The International Journal of Bank Marketing*, pp 238-258

28. Jinhook, Lee. and Julia, Marlowe. (2003), "How consumers choose a financial institution: decision making criteria and heuristics", *The International Journal of Bank Marketing*, pp 53-71
29. Johri & Jauhari, (1994), "Role of Computers in Banking Operation System", Himalaya Publishing House, New Delhi
30. Josee, Bloemer., Ko,De,Ruyter. and Pascal, Peeters. (1998), "Investigating drivers of bank loyalty: the complex relationship between image, service quality and satisfaction", *The International Journal of Bank Marketing*, pp 276-285
31. Julie Napoli. and Michael,T,Ewing. (2001), "The net generation: An analysis of lifestyles, attitudes and media habits", *Journal of International Consumer Marketing*, pp 21-34
32. Kohli, S.S. (2001), "Indian Bnking Industry : Emerging challenges", *IBA Bulletin*, Vol XXIII, No. 3 (March)
33. Leavitt, H J. (1965). "Applied Organisational Change in Industry" in James March (ed). *Handbook of Organisations*. Chicago: Rand McNally.
34. Lizar,Alfansi. and Adrian, Sargeant. (2000), "Market segmentation in the Indonesian banking sector: the relationship between demographics and desired customer benefits", *The International Journal of Bank Marketing*, pp 64-73
35. Lovelock, Christopher H. (1996), "Services Marketing", Prentice Hall Inc., NJ
36. Mathur and Archana (April, 1988), "Customer Service in Public Sector Banks – A Comparative Study", *Indian Journal of Marketing*, pp 3
37. Mehta, Dr. Varsha (January 2000), "Information Technology and Productivity in Banks – A Case of Jammu & Kashmir Bank Ltd.", *Prabandh, Journal of Faculty of Management Studies, Mohanlal Sukhadia University*, pp 1-25
38. Michael,T,Ewing. (1999), "Affluent Asia: Towards a cross-national psychographic Typology", *Journal of International Consumer Marketing*, pp 25-35.
39. Mukherjee. Avinandan and Nath. Prithwiraj (2003), "A model of trust in online relationship banking", *The International Journal of Bank Marketing*, pp 5-15
40. Nancy,Jo,Black., Andy,Lockett., Christine,Ennew., Heidi,Winkhofer. and Sally, Mckechnie (2002), "Modeling consumer choice of distribution channels: an illustration from financial services", *The International Journal of Bank Marketing*, pp161-173.
41. Naveen Donthu. and David,I,Gilliland. (2002), "The Single Consumers", *Journal of Advertising Research*, Nov, pp 77-84.

42. Oliver, R. L. (Nov,1980), "A Cognitive Model of the Antecedents and Consequences of Satisfaction Decision", *Journal of Marketing Research*, pp 460-69
43. Oliver, R. L. (fall 1981), "Measurement and Evaluation of Satisfaction Process in Retail Setting", *Journal of Retailing*, pp 25-48
44. Oliver, R.L. (1997), "Satisfaction: A Behavioral Perspective on the Consumer", The McGraw-Hill Companies Inc., New York
45. Padval, S M and Naidu, CAS. (1985). "Computerisation in Indian Bank and its Training Implications", *Pro/nan*, pp 309-15
46. Philip, Gerard. and Barton,J,Cunnigham. (1999), "The multiple banking behavior of Singaporeans", *The International Journal of Bank Marketing*, pp 26-35
47. Philip, Gerrard. and Barton, J, Cunnigham., (2001), "Singapore's undergraduates: How they choose which bank to patronize", *The International Journal of Bank Marketing*, 104-114.
48. Rangarajan, C. (2000), "Banking in the Hi-tech, Environment", *The journal of the Indian Institute of Bankers (Jan-March)*
49. Report by Mr. N. Vaghul (1987).
50. Report of Sukhmoy Chakravarthi Committee (1985).
51. Reserve Bank of India. (1984). Report of the Committee on Mechanisation in Banking Industry.
52. Rob Lawson. And Sarah Todd. (2003), "Consumer Preferences for payment methods: a segmentation analysis", *International Journal of Bank Marketing*, pp 72-79
53. Sarah Todd., Rob Lawson.and Fiona Faris. (1998), "A Lifestyle Analysis of New Zealand Consumers", *Asia Pacific Journal of Marketing and Logistics*, pp 30-47
54. Saxena, K.K (1985), *Evolution of Bank Marketing in India*", *SBI Monthly review (January)*, pp 3-11
55. Saxena, M (2001), "Banker's Choice : Tech it or Leave it", *Strategic Marketing (Feb)*, pp 42-50
56. Serkan,Akinci.,Safak,Aksoy. and Eda, Atilgan. (2004), "Adoption of Internet banking among sophisticated consumer segments in an advanced developing country", *The International Journal of Bank Marketing*, pp 212-232.
57. Shapiro, C. (2000), "Will E-commerce Erode Liberty", *Harvard Business Review (May-June)*
58. Shroff, Dr. Firdos T. (January 2004), "Impact of Technology on Banking", *IBA Bulletin Special Issue*, pp 174-181



59. Spreng, Richard A., Scott B. Mackenzie, and Richard W. Olshavsky (July 1996), "A Reexamination of the determinants of Consumer Satisfaction", *Journal of Marketing*, pp 15-31
60. Susan,H,C,Tai. And Jackie,L,M,Tam (1996) 'A Comparative study of Chinese Consumers in Asian Markets – A Lifestyle Analysis', *Journal of International Consumer Marketing*, 25-42.
61. Talwar Committee. (1977). *Customer Service in Banks.-Final Report*. Bombay: Indian Bank's Association.
62. *The Hindu Survey of Indian Industry 1999*, The Hindu Group Publication, Chennai
63. Trail, G. T. Fink, J. S., & Anderson, D. F. (2003), "Sport spectator consumption behavior", *Sport Marketing Quarterly*, pp 12, 8-17.
64. Uppal, R.K. (2006), "Indian banking Industry and Information Technology", New Century Publications, New Delhi
65. Vavra, Terry G. (1998), "Improving your Measurement of Customer Satisfaction", A Wheeler Publishing, New Delhi
66. Venkataraman, N. (Winter, 1994), "IT-Enabled Business Transformation: From Automation to Business Scope Redefinition", *Sloan Management Review*
67. Vittal (2001), "The Emerging Challenges: strategies and solutions for Indian Banking", *IBA Bulletin*, Vol XXIII, No. 3 (March), pp 9-15
68. Walfriend,M,Lassar., Chris,Manolis. And Sharon,Lassar. (2005).'The relationship between consumer innovativeness, personal characteristics, and online banking adoption', *The International Journal of Bank Marketing*, pp 176-198.
69. Wendy,W,N,Wan., Chung-Leung,Luk. And Cheris,W,C,Chow (2005) 'Customers' adoption of banking channels in Hong Kong', *The International Journal of Bank Marketing*, pp 255-272.
70. Yi, Youjae (1991), "A Critical Review of Consumer Satisfaction" in Zeithaml, Valerie (ed.) *Review of Marketing 1989*. Chicago: American marketing Association, 1991.