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EXECUTIVE SUMMARY

The research has been carried out to understand the customer's experience with internet banking and their expectations. In the process of research it was also aimed at finding out customer satisfaction with online banking and prospects of Internet Banking in India. The respondents for this research include software engineers, BPO employees, Sales Executives, and students who use internet banking. The sample unit for the research was chosen as the users of Internet banking as the research objective was to find out customer's experience who have already used internet banking. The sample size selected for the sake of research was 100.

The major findings of the research are that Younger generations are more likely to adopt internet banking than older generations. People with higher education (university or above) are more likely to adopt Internet banking than those with less education. High-income group is more likely to adopt internet banking than low-income group. Frequent visitors to banks' websites are more likely to adopt internet banking. Men are more likely to adopt internet banking than women.

Some suggestions have also been made at the end of the study, Banks should maintain secrecy and confidentiality of customer's account and take adequate risk control measures against hacking and technology failures, Banks should ensure that proper security infrastructure is in place like the use of at least 128-bit SSL for securing browser to web server communications and, in addition, encryption of sensitive data like passwords in transit within the enterprise itself, Banks should use latest versions of software or upgrade existing software which gives better security & control to remove bugs and loopholes, Banks should concentrate on providing more technical support to its customers, these were some of the suggestions made.

By the study conducted on "Customer's experience with Internet Banking" we can conclude that in all respects the customers are satisfied with their internet bank. Major concerns of customers include security and privacy because of the growing number of online frauds, cheating cases and hacking.

INTRODUCTION:

Background:

With cyber cafés and kiosks springing up in different cities access to the Net is going to be easy. Internet banking (also referred as e banking) is the latest in this series of technological wonders in the recent past involving use of Internet for delivery of banking products & services. Internet banking is changing the banking industry and is having the major effects on banking relationships. Banking is now no longer confined to the branches were one has to approach the branch in person, to withdraw cash or deposit a cheque or request a statement of accounts. In true Internet banking, any inquiry or transaction is processed online without any reference to the branch (anywhere banking) at any time. Providing Internet banking is increasingly becoming a "need to have" than a "nice to have" service. The net banking, thus, now is more of a norm rather than an exception in many developed countries due to the fact that it is the cheapest way of providing banking services.

Internet banking refers to the use of the Internet as a remote delivery channel for banking services. Such services include traditional ones, such as opening a deposit account or transferring funds among different accounts, and new banking services, such as electronic bill presentment and payment (allowing customers to receive and pay bills on a bank's Web site).

Wells Fargo was the first U.S. bank to add account services to its web site in 1995. As the use of the Internet exploded in the late 1990s, the advantages of using this channel of distribution for banking and other financial services became obvious. In the United States this occurred in the context of a dynamic environment that included the blurring of traditional market boundaries between different types of financial service providers, deregulation, technological change, and a wave of consolidation and mergers. In the context of that time, Internet Banking was seen as more than just another distribution channel. The banking industry at that time was having trouble maintaining its traditional profit margins and Internet Banking was seen as an approach to banking that would both lower costs and increase revenues by expanding market share in its traditional product

areas as well as allowing banks to sell higher margin nontraditional products (e.g., insurance, brokerage services, etc.) For similar reasons, the Internet was expected to revolutionize retailing in general. By the end of 1999, less than .4% of households in the U.S. were using Internet Banking.

Banks have traditionally been in the forefront of harnessing technology to improve their products, services and efficiency. They have, over a long time, been using electronic and telecommunication networks for delivering a wide range of value added products and services. The delivery channels include direct dial – up connections, private networks, public networks etc and the devices include telephone, Personal Computers including the Automated Teller Machines, etc. With the popularity of PCs, easy access to Internet and World Wide Web (WWW), Internet is increasingly used by banks as a channel for receiving instructions and delivering their products and services to their customers. This form of banking is generally referred to as Internet Banking, although the range of products and services offered by different banks vary widely both in their content and sophistication.

Broadly, the levels of banking services offered through Internet can be categorized in to three types:

1. The Basic Level Service is the banks' websites which disseminate information on different products and services offered to customers and members of public in general. It may receive and reply to customers' queries through e-mail.
2. In the next level are Simple Transactional Websites which allow customers to submit their instructions, applications for different services, queries on their account balances, etc, but do not permit any fund-based transactions on their accounts.
3. The third level of Internet banking services are offered by Fully Transactional Websites which allow the customers to operate on their accounts for transfer of funds, payment of different bills, subscribing to other products of the bank and to transact purchase and sale of securities, etc. The above forms of Internet banking services are offered by traditional banks, as an additional method of serving the customer or by new banks, who deliver banking services primarily through Internet or other electronic delivery channels as the value added services. Some of these banks are known as 'virtual' banks or 'Internet only' banks and may not

have any physical presence in a country despite offering different banking services.

Drivers of Change:

Advantages previously held by large financial institutions have shrunk considerably. The Internet has leveled the playing field and afforded open access to customers in the global marketplace. Internet banking is a cost-effective delivery channel for financial institutions. Consumers are embracing the many benefits of Internet banking. Access to one's accounts at anytime and from any location via the World Wide Web is a convenience unknown a short time ago. Thus, a bank's Internet presence transforms from 'brouchreware' status to 'Internet banking' status once the bank goes through a technology integration effort to enable the customer to access information about his or her specific account relationship. The six primary drivers of Internet banking includes, in order of primacy are:

- Improve customer access
- Facilitate the offering of more services
- Increase customer loyalty
- Attract new customers
- Provide services offered by competitors
- Reduce customer attrition

Internet banking – Indian Scenario

Internet banking, both as a medium of delivery of banking services and as a strategic tool for business development, has gained wide acceptance internationally and is fast catching up in India with more and more banks entering the fray. India can be said to be on the threshold of a major banking revolution with net banking having already been unveiled.

Only about 1% of Internet users did banking online in 1998. This increased to 16.7% in March 2000. The growth potential is, therefore, immense. Further incentives provided by banks would dissuade customers from visiting physical branches, and thus get 'hooked' to the convenience of arm-chair banking. The facility of accessing their accounts from anywhere in the world by using a home computer with Internet connection, is particularly fascinating to multiple bank accounts. Costs of banking service through the Internet form a fraction of costs through conventional methods. The cost-conscious banks in the country have therefore actively considered use of the Internet as a channel for providing services. Fully computerized banks, with better management of their customer base are in a stronger position to cross-sell their products through this channel.

Products and services offered

Banks in India are at different stages of the web-enabled banking cycle. Initially, a bank, which is not having a web site, allows its customer to communicate with it through an e-mail address; communication is limited to a small number of branches and offices which have access to this e-mail account. As yet, many scheduled commercial banks in India are still in the first stage of Internet banking operations.

With gradual adoption of Information Technology, the bank puts up a web-site that provides general information on the banks, its location, services available.

E.g.: loan and deposits products, application forms for downloading and e-mail option for enquiries and feedback. It is largely a marketing or advertising tool. For example, Vijaya Bank provides information on its web-site about its NRI and other services. Customers are required to fill in applications on the Net and can later receive loans or other products requested for at their local branch. A few banks provide the customer to enquire into his demat account (securities/shares) holding details, transaction details and

status of instructions given by him. These web sites still do not allow online transactions for their customers.

Some of the banks permit customers to interact with them and transact electronically with them. Such services include request for opening of accounts, requisition for cheque books, stop payment of cheques, viewing and printing statements of accounts, movement of funds between accounts within the same bank, querying on status of requests, instructions for opening of Letters of Credit and Bank Guarantees etc. These services are being initiated by banks like ICICI Bank Ltd., HDFC Bank Ltd. Citibank, Global Trust Bank Ltd., UTI Bank Ltd., Bank of Madura Ltd., Federal Bank Ltd. etc. Recent entrants in Internet banking are Allahabad Bank (for its corporate customers through its 'Allnet' service) and Bank of Punjab Ltd. Certain banks like ICICI Bank Ltd., have gone a step further within the transactional stage of Internet banking by allowing transfer of funds by an account holder to any other account holder of the Bank

Some of the more aggressive players in this area such as ICICI Bank Ltd., HDFC Bank Ltd., UTI Bank Ltd., Citibank, Global Trust Bank Ltd. and Bank of Punjab Ltd. offer the facility of receipt, review and payment of bills on-line. These banks have tied up with a number of utility companies. The 'Infinity' service of ICICI Bank Ltd, also allows online real time shopping mall payments to be made by customers. HDFC Bank Ltd. has made e-shopping online and real time with the launch of its payment gateway. It has tied up with a number of portals to offer business-to-consumer (B2C) ecommerce transactions. The first online real time e-commerce credit card transaction in the country was carried out on the Easy3shoppe.com shopping mall, enabled by HDFC Bank Ltd. on a VISA card. Banks like ICICI Bank Ltd., HDFC Bank Ltd. etc. are thus looking to position themselves as one stop financial shops. These banks have tied up with computer training companies, computer manufacturers, Internet Services Providers and portals for expanding their Net banking services, and widening their customer base. Centurion Bank Ltd. has taken up equity stake in the teauction.com portal, which aims to bring together buyers, sellers, registered brokers, suppliers and associations in the tea market and substitute their physical presence at the auctions announced.

The race for market supremacy is compelling banks in India to adopt the latest technology on the Internet in a bid to capture new markets and customers. HDFC Bank Ltd. with its 'Freedom- the e-Age Saving Account' Service, Citibank with 'Suvidha' and ICICI Bank Ltd. with its 'Mobile Commerce' service have tied up with cell

phone operators to offer Mobile Banking to their customers. Under Mobile Banking services, customers can scan their accounts to seek balance and payments status or instruct banks to issue cheques, pay bills or deliver statements of accounts. Mobile banking will further minimize the need to visit a bank branch.

India's Net Banking almanac:

Bank Name	**Technology Vendor**	**Service offering**
ABN AMRO Bank	Infosys (BankAway)	Net Banking
Bank of India	I-flex	BOI online
Centurion Bank	Logica	MyCBOL
Citibank	Orbitech (now Polaris)	Citibank Online
Corporation Bank	I-flex	CorpNet
Deutsche Bank	----	db direct
Federal Bank	Sanchez	FedNet
Global Trust Bank	Infosys (BankAway)	ibank@gtb
HDFC Bank	i-flex/ Satyam	Net Banking
HSBC	-----	Online@hsbc
ICICI Bank	Infosys, ICICI InfoTech	Infinity
IDBI Bank	Infosys (BankAway)	i-net banking
IndusInd Bank	CR2	IndusNet
Punjab National Bank	Infosys (BankAway)	---
Saraswat Bank	-----	---
Standard Chartered Bank	In-House	Me Standard Chartered Online
State Bank of India	Satyam/Broad vision	onlinesbi.com
UTI Bank	Infosys (BankAway)	IConnect

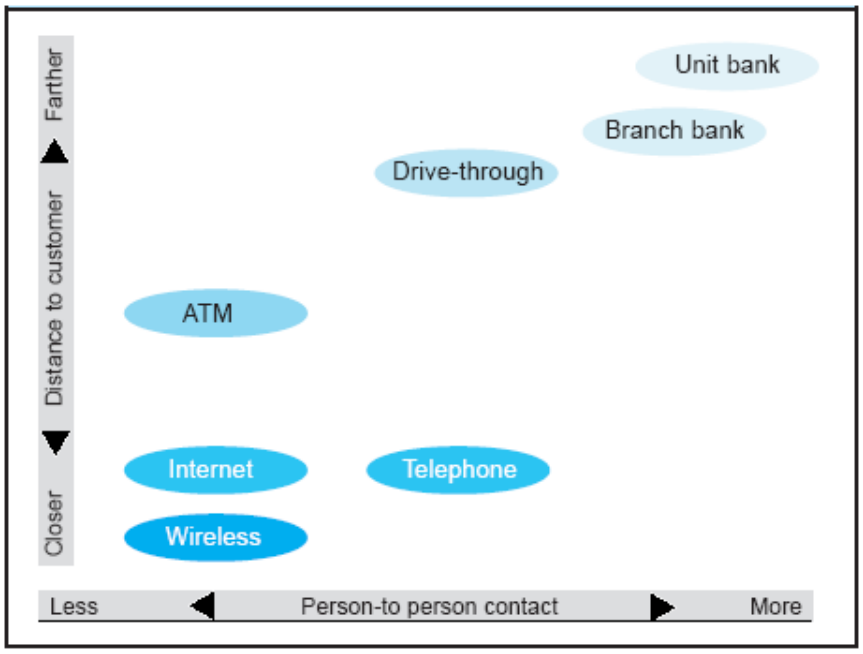
Services available in Online Banking:

- View Account Balances & Statements
- Transfer Funds between accounts
- Create Fixed Deposits Online
- Request a Demand Draft
- Payment of Bills
- Order a Cheque Book
- Request Stop Payment on a Cheque
- Manage Demat Account
- New account opening
- Standing instructions
- Setting up SMS alerts for transaction information
- Credit card dues payments
- 24 hour account access
- Quality customer service with personal attention

Points to be considered by banks before going Online:

1. Possibility of new business generated.
2. Additional floating funds expected from new as well as the existing customers.
3. Expansion in the geographical reach of bank's business.
4. Plans to integrate with other banks or the total banking system.
5. The image value, the image of a tech-savvy bank, especially if the bank is targeting Generation X.
6. The chances of bank's customers shifting loyalty if the bank does not modernize.

Banking Distribution Channels:



Choosing a distribution strategy:

Not all banking products, and not all banking customers, adapt well to the Internet channel. Transferring funds, paying bills, and applying for a credit card do not require personal contact or a large physical space, and are therefore well suited for Internet delivery. But applying for a business loan, closing on a home mortgage, and estate planning are complex transactions, which typically require a secure physical space and/or person to- person communication. And getting cash is impossible over the Internet, requiring either branches or ATMs. Because of such limitations, most banks that offer Internet delivery do not rely on it entirely. The mix of delivery channels a bank chooses has consequences for its expenses, the convenience of its customers, and the quality of the products and services it delivers. The above figure categorizes bank delivery channels according to the distance that customers typically must travel to use them (vertical axis) and the amount of in-person service that customers receive (horizontal axis). As a bank's mix of delivery channels shifts vertically from the top of the figure toward the bottom, there are benefits for both the customer and the bank: convenience increases because

customers don't have to travel as far to perform transactions, and bank expenses tend to fall because less physical overhead is necessary to facilitate the transaction. Shifting to a more convenient, lower cost mix of delivery channels also tends to reduce person-to-person contact with the customer. As a bank's mix of delivery channels shifts horizontally from right to left in the above figure , some customers will experience a reduction in (either actual or perceived) service quality.

One potentially successful distribution strategy is to occupy the entire space in the above figure. A *click and mortar* bank augments its existing brick and mortar branches, ATM locations, and other delivery channels with a transactional Internet website.

Another potentially successful strategy is to occupy only the bottom left corner Of the above figure. An *Internet-only* or *pure play* Internet bank operates no brick and mortar branches. With the exception of arrangements for customers to get cash and deposit checks at ATM machines, banks using this distribution strategy deliver all of their sproducts and services over the Internet. The very nature of this delivery channel precludes person-to-person customer service, and although this can limit the ability of a pure play Internet bank to charge premium prices, reduced spending on physical overhead may potentially offset these revenue limitations. Internet-only banking is often regarded as a niche strategy that focuses only on the most Internet-savvy banking customers and/or delivers only a limited array of financial services.

A final strategy is to occupy only the top right corner of the previous figure 2. A *brick and mortar* bank does not operate a transactional website, but may operate a non-transactional website where customers can check account balances and get information on products and prices. Banks that use this distribution strategy deliver all of their products and services through traditional full service branches, augmented by ATM machines. Although this traditional approach is likely to remain a profitable strategy for some community banks into the near future, any strategy that completely excludes Internet banking options is unlikely to be profitable in the long run. As time passes and a greater percentage of the population want to do at least some of their banking on the Web, these banks are likely to lose an increasing number of their high-value loan and deposit customers.

Opportunities provided by the Internet:

1. Internet provides an ever-growing market both in terms of number of potential customers and geographical reach. Technological development has made access to Internet both cheaper and faster. More and more people across the globe are accessing the net either through PCs or other devices. The purchasing power and need for quality service of this segment of consumers are considerable. Anybody accessing Internet is a potential customer irrespective of his or her location. Thus, any business targeting final consumers cannot ignore the business potential of Internet.
2. Internet offers a unique opportunity to register business presence in a global market. Its effectiveness in disseminating information about one's business at a relatively cost effective manner is tremendous. Time sensitive information can be updated faster than any other media. A properly designed website can convey a more accurate and focused image of a product or service than any other media. Use of multimedia capabilities, i.e., sound, picture, movies etc., has made Internet as an ideal medium for information dissemination.
3. The quality of service is a key feature of any e-commerce venture. The ability to sell one's product at anytime and anywhere to the satisfaction of customers is essential for e-business to succeed. Internet offers such opportunity, since the business presence is not restricted by time zone and geographical limitations. Replying to customers' queries through e-mail, setting up (Frequently Asked Questions) FAQ pages for anticipated queries, offering interactive help line, accepting customers' complaints online 24 hours a day and attending to the same, etc. are some of the features of e-business which enhance the quality of service to the customers. It is of crucial importance for an e-venture to realize that just as it is easier to approach a customer through Internet; it is equally easy to lose him. The customer has the same facility to move over to another site.
4. Cost is an important issue in an e-venture. It is generally accepted that the cost of overhead, servicing and distribution, etc. through Internet is less compared to the traditional way of doing business.

Strategies adopted by banks in creating internet websites:

Brochure Strategies: The brochure was the most common early approach to utilizing the Internet. This passive strategy uses the Internet as a brochure to advertise and promote its products and services. This approach requires no change in bank culture, infrastructure, product mix, or business strategy. The Internet is thought of as an alternative advertising media. Such sites are devoid of opportunities for interaction with the customer. These sites commonly feature pictures of the bank's officers, vault doors, or bank buildings and provide customers with a history of the organization, maps of branches and ATM locations, phone numbers to call for further information, and a simple listing of products and services. This strategic response to the Internet does not constitute a suitable vehicle to develop customer relationships or create customer value.

Supermarket Strategies: Supermarket strategies are functionally oriented to provide the customer with the opportunity to serve themselves by picking and choosing among the bank's products and services. These products and services are often attractively presented with an emphasis their benefits to the customer Limited opportunities for interaction are available. Customers can check account balances, transfer funds, apply for a variety of loans. Customers like the power and convenience of this approach and feels it enhances value of such services and products. Bankers like the low transactions cost. This currently the modal strategy of U.S. banks with a web presence.

Personal Bank Strategies: Personal bank strategies are organized around creating customer value by directly harnessing the power of the Internet. Virtual banks reorganize their business strategy, business processes, and operations around their Internet interface with the customer in an effort to enhance a distinct strategic competency and create customer value. The Internet is no longer an alternate distribution channel for an existing set of products and services, but becomes a mechanism to transform those services and products in new ways uniquely made possible by the Internet. Instead of Internet banking supporting the "bricks and mortar" banking business, the physical structure is seen as having its role in supporting the virtual bank.

Banks have both advantages and disadvantages in implementing a personalization strategy. Banks are trusted and they already have substantial knowledge of their customers, so customers may be willing to provide sufficient information to create a virtual personalized bank for themselves. This strategy tends to empower the consumer and cedes a lot of control the bank has traditionally had to the customer.

Portal Bank Strategies

Portal bank strategies are at the heart of creating differentiated products through adding value. The object of portal bank strategies is to become the means by which a bank's customers or potential customers enter the Internet. This is accomplished by creating an interface that is so entertaining, so attractive, so useful, and so convenient that an individual chooses to consistently enters the Internet (or the financial products and services potions thereof) through this site. If this site is not their home page (and that is the most desirable type of portal) , at least it is bench marked and is the first place the consumer goes to anytime they want to do anything with money or their finances.

Competition for consumers and financial services is likely to become so intense at some point in the future that having portal status with your customer will be the single most important factor in retaining that customer and in generating larger wallet share. Further, getting individuals who are not now customers to use a bank's portal will be the critical fist step in acquiring them as customers. The competitive pressure in the industry is likely to be so great that having a customer who uses another organization's financial portal will mean the eventual loss of that customer.

Benefits of Internet Banking To Banks:

Cost Savings:

Electronic processing dramatically reduces the cost per transaction. Also, there are opportunities for banks to present customer bills electronically. The cost of delivering bills electronically is substantially lower than if the bill was in paper form delivered through the mail. These cost savings can offer customers and banks alike reduced cost of banking and still provide efficient and varied services.

Loyal Customers:

Web sites that offer financial convergence for the customer will create a more involved banking customer who will more frequently patronize the banking site and more likely use the services offered. The idea is that by creating a more loyal customer who depends on a bank for many financial services, more bundling can occur and higher revenue per customer can be generated.

Offer Additional Services

Many banks are moving towards offering clients a financial portal. This portal concept offers banks a new role in the business of serving clients. Simply having an Internet presence does not provide banks a revenue stream. However, by offering a wide array of products and services, banks can benefit from Internet integration. By creating financial portals where consumers can manage a broad range of financial activities such as stocks and mortgages, banks can profit from offering Internet capabilities to clients

Internet Profit Generation

E-commerce, when properly integrated into existing banking operations, can lead to substantial cost savings and higher profitability. Cost savings occur by virtue of automating customer transactions such as funds transfers, payments, account balance inquiries, etc. Strategic alliances with insurance companies, mortgage companies, and stock brokerage forms can lead to additional business opportunities that otherwise will go unrealized. Furthermore, banks are able to retain customers more effectively when offering services that are value-added. This has been clearly demonstrated in the case of Wells Fargo bank. When customers moved online with Wells Fargo, the percentage of customers taking their business elsewhere dropped 50 percent.

Benefits of Internet Banking To Consumers

Cost Savings

Cyberspace is cheaper to operate in than bricks-and-mortar structure and this cost benefit is often passed along to consumers. The Internet banking cost structure allows consumers to receive cost savings and/or financial benefits for banking online.

Access to Additional Services

Basic transactional web sites allow customers to review account balances, holdings and recent banking statements. Systems that allow customers to initiate transactions online, such as transferring money between accounts or making payments, provide additional advantages to the customer. These enhanced web sites enable customers to pay bills, apply for and review loans and mortgages, and check credit card bills. The financial institutions that offer expanded services online are well positioned to be market leaders. By offering this large umbrella of service from one trusted banking institution, these forms will be able to garner a greater share of a customer's financial business. Customers will benefit by having a wider selection of services available from one trusted institution

Convenient One-stop Shopping

Banks are adding real-time loan applications, and the opportunity to trade stocks through their web sites. The trend towards "convergence banking" is predicted to shape the future of Internet banking. This concept of "ones top" shopping is convenient and leads to more satisfied customers.

Risks associated with Online Banking:

A major driving force behind the rapid spread of internet -banking all over the world is its acceptance as an extremely cost effective delivery channel of banking services as compared to other existing channels. However, Internet is not an unmixed blessing to the banking sector. Along with reduction in cost of transactions, it has also brought about a new orientation to risks and even new forms of risks to which banks conducting internet -banking expose themselves. Regulators and supervisors all over the world are concerned that while banks should remain efficient and cost effective, they must be conscious of different types of risks this form of banking entails and have systems in place to manage the same.

1. **Operational risk (Transactional Risk):** It is the most common form of risk associated with internet -banking. It takes the form of inaccurate processing of transactions, non enforceability of contracts, compromises in data integrity, data privacy and confidentiality, unauthorized access / intrusion to bank's systems and

transactions etc. Besides inadequacies in technology, human factors like negligence by customers and employees, fraudulent activity of employees and crackers / hackers etc. can become potential source of operational risk.

2. **Security risk:** Security risk arises on account of unauthorized access to a bank's critical information stores like accounting system, risk management system, portfolio management system, etc. A breach of security could result in direct financial loss to the bank. For example, hackers operating via the Internet could access, retrieve and use confidential customer information and also can implant virus. This may result in loss of data, theft of or tampering with customer information, disabling of a significant portion of bank's internal computer system thus denying service, cost of repairing these etc. Other related risks are loss of reputation, infringing customers' privacy and its legal implications etc. Thus, access control is of paramount importance. Controlling access to banks' system has become more complex in the Internet environment which is a public domain and attempts at unauthorized access could emanate from any source and from anywhere in the world with or without criminal intent. Attackers could be hackers, unscrupulous vendors, disgruntled employees or even pure thrill seekers.
3. **Reputational risk:** Reputational risk is the risk of getting significant negative public opinion, which may result in a critical loss of funding or customers. Such risks arise from actions which cause major loss of the public confidence in the banks' ability to perform critical functions or impair bank-customer relationship. It may be due to banks' own action or due to third party action. The main reasons for this risk may be system or product not working to the expectations of the customers, significant system deficiencies, significant security breach (both due to internal and external attack), inadequate information to customers about product use and problem resolution procedures, significant problems with communication networks that impair customers' access to their funds or account information especially if there are no alternative means of account access. Such situation may cause customer-discontinuing use of product or the service. Directly affected customers may leave the bank and others may follow if the problem is publicized.
4. **Legal risk:** Legal risk arises from violation of, or non-conformance with laws, rules, regulations, or prescribed practices, or when the legal rights and obligations of parties to a transaction are not well established. Given the relatively new nature

of Internet banking, rights and obligations in some cases are uncertain and applicability of laws and rules is uncertain or ambiguous, thus causing legal risk. Other reasons for legal risks are uncertainty about the validity of some agreements formed via electronic media and law regarding customer disclosures and privacy protection. A customer inadequately informed about his rights and obligations, may not take proper precautions in using Internet banking products or services, leading to disputed transactions, unwanted suits against the bank or other regulatory sanctions. In the enthusiasm of enhancing customer service, bank may link their Internet site to other sites also. This may cause legal risk. Further, a hacker may use the linked site to defraud a bank customer.

5. **Cross border risks:** Internet banking is based on technology that, by its very nature, is designed to extend the geographic reach of banks and customers. Such market expansion can extend beyond national borders. This causes various risks. It includes legal and regulatory risks, as there may be uncertainty about legal requirements in some countries and jurisdiction ambiguities with respect to the responsibilities of different national authorities. Such considerations may expose banks to legal risks associated with non-compliance of different national laws and regulations, including consumer protection laws, record-keeping and reporting requirements, privacy rules and money laundering laws. If a bank uses a service provider located in another country, it will be more difficult to monitor it thus, causing operational risk.
6. **Strategic Risk:** This risk is associated with the introduction of a new product or service. Degree of this risk depends upon how well the institution has addressed the various issues related to development of a business plan, availability of sufficient resources to support this plan, credibility of the vendor (if outsourced) and level of the technology used in comparison to the available technology etc. For reducing such risk, banks need to conduct proper survey, consult experts from various fields, establish achievable goals and monitor performance. Also they need to analyze the availability and cost of additional resources, provision of adequate supporting staff, proper training of staff and adequate insurance coverage. Due diligence needs to be observed in selection of vendors, audit of their performance and establishing alternative arrangements for possible inability of a vendor to fulfill its obligation .

7. **Credit risk:** It is the risk that a counter party will not settle an obligation for full value, either when due or at any time thereafter. Banks may not be able to properly evaluate the credit worthiness of the customer while extending credit through remote banking procedures, which could enhance the credit risk. Presently, banks generally deal with more familiar customer base. Facility of electronic bill payment in Internet banking may cause credit risk if a third party intermediary fails to carry out its obligations with respect to payment.

Legal Issues involved in Internet Banking:

The legal framework for banking in India is provided by a set of enactments, viz., the Banking Regulations Act, 1949, the Reserve Bank of India Act, 1934, and the Foreign Exchange Management Act, 1999. Broadly, no entity can function as a bank in India without obtaining a license from Reserve Bank of India under Banking Regulations Act, 1949. Different types of activities which a bank may undertake and other prudential requirements are provided under this Act. Accepting of deposit from public by a non-bank attracts regulatory provisions under Reserve Bank of India Act 1934. Under the Foreign Exchange Management Act 1999, no Indian resident can lend, open a foreign currency account or borrow from a non resident, including non-resident banks, except under certain circumstances provided in law. Besides these, banking activity is also influenced by various enactments governing trade and commerce, such as, Indian Contract Act, 1872, the Negotiable Instruments Act, 1881, Indian Evidence Act, 1872, etc.

Internet banking is an extension of the traditional banking, which uses Internet both as a medium for receiving instructions from the customers and also delivering banking services. Hence, conceptually, various provisions of law, which are applicable to traditional banking activities, are also applicable to Internet banking. Cross border transactions carried through Internet pose the issue of jurisdiction and conflict of laws of different nations.

The dichotomy between integration of trade and finance over the globe through ecommerce and divergence of national laws is perceived as a major obstacle for ecommerce/ internet -banking and has set in motion the process of harmonization and standardization of laws relating to money, banking and financial services. A major initiative in this direction is the United Nations Commission on International Trade Law

(UNICITRAL)'s Model law, which was adopted by the General Assembly of United Nations and has been recommended to the member nations for consideration while revising / adopting their laws of electronic trade.

Government of India has enacted The Information Technology Act, 2000, in order to provide legal recognition for transactions carried out by means of electronic data interchange and other means of electronic communication, commonly referred to as 'electronic commerce'…The Act, which has also drawn upon the Model Law, came into force with effect from October 17, 2000. The Act has also amended certain provisions of the Indian Penal Code, the Indian Evidence Act, 1872, The Bankers Book of Evidence Act, 1891 and Reserve Bank of India Act 1934 in order to facilitate ecommerce in India.

Authentication Techniques, Processes, and Methodologies:

Authentication methodologies are numerous and range from simple to complex. The level of security provided varies based upon both the technique used and the manner in which it is deployed. Single-factor authentication involves the use of one factor to verify customer identity. The most common single-factor method is the use of a password. Two factor authentication is most widely used with ATMs. To withdraw money from an ATM, the customer must present both an ATM card and a password or PIN. Multifactor authentication utilizes two or more factors to verify customer identity. Authentication methodologies based upon multiple factors can be more difficult to compromise and should be considered for high-risk situations. The effectiveness of a particular authentication technique is dependent upon the integrity of the selected product or process and the manner in which it is implemented and managed.

1. **Shared Secrets:** Shared secrets are information elements that are known or shared by both the customer and the authenticating entity. Passwords and PINs are the best known shared secret techniques but some new and different types are now being used as well. Shared secrets that never change are described as "static" and the risk of compromise increases over time. The use of multiple shared secrets also provides increased security because more than one secret must be known to authenticate. Shared secrets can also be used to authenticate the institution's Web site to the customer.

2. **Tokens:** are physical devices and may be part of a multifactor authentication scheme. Three types of tokens are discussed here: the 'USB token device', 'the smart card', and 'the password-generating token'.

A. USB Token Device

The USB token device is typically the size of a house key. It plugs directly into a computer's USB port and therefore does not require the installation of any special hardware on the user's computer. Once the USB token is recognized, the customer is prompted to enter his or her password (the second authenticating factor) in order to gain access to the computer system. USB tokens are one-piece, injection-molded devices. USB tokens are hard to duplicate and are tamper resistant; thus, they are a relatively secure vehicle for storing sensitive data and credentials. The USB token is generally considered to be user-friendly. Its small size makes it easy for the user to carry and, as noted above, it plugs into an existing USB port; thus the need for additional hardware is eliminated.

B. Smart Card

A smart card is the size of a credit card and contains a microprocessor that enables it to store and process data. Inclusion of the microprocessor enables software developers to use more robust authentication schemes. To be used, a smart card must be inserted into a compatible reader attached to the customer's computer. If the smart card is recognized as valid (first factor), the customer is prompted to enter his or her password (second factor) to complete the authentication process.

Smart cards are hard to duplicate and are tamper resistant; thus, they are a relatively secure vehicle for storing sensitive data and credentials. Smart cards are easy to carry and easy to use. Their primary disadvantage as a consumer authentication device is that they require the installation of a hardware reader and associated software drivers on the consumer's home computer.

C. **Password-Generating Token**

A password-generating token produces a unique pass-code, also known as a one-time password (OTP) each time it is used. The token ensures that the same OTP is not used consecutively. The OTP is displayed on a small screen on the token. The customer first enters his or her user name and regular password (first factor), followed by the OTP generated by the token (second factor). The customer is authenticated if (1) the regular password matches and (2) the OTP generated by the token matches the password on the

authentication server. A new OTP is typically generated every 60 seconds—in some systems, every 30 seconds. This very brief period is the life span of that password. OTP tokens generally last 4 to 5 years before they need to be replaced. Password-generating tokens are secure because of the time-sensitive, synchronized nature of the authentication. The randomness, unpredictability, and uniqueness of the OTPs substantially increase the difficulty of a cyber thief capturing and using OTPs gained from keyboard logging.

4. Biometrics:

Biometric technologies identify or authenticate the identity of a living person on the basis of a physiological or physical characteristic. Physiological characteristics include fingerprints, iris configuration, and facial structure. The process of introducing people into a biometrics-based system is called "enrollment." In enrollment, samples of data are taken from one or more physiological or physical characteristics; the samples are converted into a mathematical model, or template; and the template is registered into a database on which a software application can perform analysis.

Once enrolled, customers interact with the live-scan process of the biometrics technology. The live scan is used to identify and authenticate the customer. The results of a live scan, such as a fingerprint, are compared with the registered templates stored in the system. If there is a match, the customer is authenticated and granted access.

Various biometric techniques and identifiers are being developed and tested, these include:

- Fingerprint recognition
- Face recognition
- Voice recognition
- Handwriting recognition
- Finger and hand geometry
- Retinal scan
- Iris scan.

Two biometric techniques that are increasingly gaining acceptance are fingerprint recognition and face recognition.

Fingerprint Recognition

Fingerprint recognition technologies analyze global pattern schemata on the fingerprint, along with small unique marks known as minutiae, which are the ridge endings and

bifurcations or branches in the fingerprint ridges. The data extracted from fingerprints are extremely dense and the density explains why fingerprints are a very reliable means of identification. Fingerprint recognition systems store only data describing the exact fingerprint minutiae; images of actual fingerprints are not retained. Fingerprint scanners may be built into computer keyboards or pointing devices (mice), or may be stand-alone scanning devices attached to a computer. Fingerprints are unique and complex enough to provide a robust template for authentication. Using multiple fingerprints from the same individual affords a greater degree of accuracy. Fingerprint identification technologies are among the most mature and accurate of the various biometric methods of identification.

Face Recognition

Most face recognition systems focus on specific features on the face and make a two-dimensional map of the face. Newer systems make three-dimensional maps. The systems capture facial images from video cameras and generate templates that are stored and used for comparisons. Face recognition is a fairly young technology compared with other biometrics like fingerprints.

Mutual Authentication

Mutual authentication is a process whereby customer identity is authenticated and the target Web site is authenticated to the customer. Currently, most financial institutions do not authenticate their Web sites to the customer before collecting sensitive information. One reason phishing attacks are successful is that unsuspecting customers cannot determine they are being directed to spoofed Web sites during the collection stage of an attack. The spoofed sites are so well constructed that casual users cannot tell they are not legitimate. Financial institutions can aid customers in differentiating legitimate sites from spoofed sites by authenticating their Web site to the customer.

Techniques for authenticating a Web site are varied. The use of digital certificates coupled with encrypted communications (e.g. Secure Socket Layer, or SSL) is one; the use of shared secrets such as digital images is another. Digital certificate authentication is generally considered one of the stronger authentication technologies, and mutual authentication provides a defense against phishing and similar attacks.

Challenges Faced in India

- A majority of customers are not computer savvy.

- Availability of Internet Bandwidth and connectivity is not uniform.
- Non availability of safe computing facilities across the country
- Banks are not networked and many of the banks still have legacy systems, where providing Internet Banking Solutions is not cost effective and efficient
- Customer confidence in internet banking needs to be built.
- Ensuring Security including privacy and confidentiality of customer information is a challenge.
- Convincing older generation people to use internet banking.

Future Ahead:

Compared to banks abroad, Indian banks offering online services still have a long way to go. For online banking to reach a critical mass, there has to be sufficient number of users and the sufficient infrastructure in place. Though various security options like line encryption, branch connection encryption, firewalls, digital certificates, automatic signoffs, random pop-ups and disaster recovery sites are in place or are being looked at, there is as yet no Certification Authority in India offering Public Key Infrastructure which is absolutely necessary for online banking. The customer can only be assured of a secured conduit for its online activities if an authority certifying digital signatures is in place. The communication bandwidth available today in India is also not enough to meet the needs of high priority services like online banking and trading. Banks offering online facilities need to have an effective disaster recovery plan along with comprehensive risk management measures. Banks offering online facilities also need to calculate their downtime losses, because even a few minutes of downtime in a week could mean substantial losses. Some banks even today do not have uninterrupted power supply unit or systems to take care of prolonged power breakdown. Proper encryption of data and effective use of passwords are also matters that leave a lot to be desired. Systems and processes have to be put in place to ensure that errors do not take place. Domestic customers, for whom other access points such as ATMs, Telebanking, personal contact, etc. are available, are often hesitant to use the Internet banking services offered by Indian banks because of security reasons. Internet Banking, as an additional delivery channel, may, therefore, be attractive / appealing as a value added service to domestic customers.

Non-resident Indians for whom it is expensive and time consuming to access their bank accounts maintained in India find net banking very convenient and useful.

The Internet is in the public domain whereby geographical boundaries are eliminated. Cyber crimes are therefore difficult to be identified and controlled. In order to promote Internet banking services, it is necessary that the proper legal infrastructure is in place. Government has introduced the Information Technology Bill, which has already been notified in October 2000. Section 72 of the Information Technology Act, 2000 casts an obligation of confidentiality against disclosure of any electronic record, register, correspondence and information, except for certain purposes and violation of this provision is a criminal offence. Comprehensive enactments like the Electronic Funds Transfer Act in U.K. and data protection rules and regulations in the developed countries are in place abroad to prevent unauthorized access to data, malafide or otherwise, and to protect the individual's rights of privacy. The legal issues are, however, being debated in our country and it is expected that some headway will be made in this respect in the near future.

Notwithstanding the above drawbacks, certain developments taking place at present, and expected to take place in the near future, would create a conducive environment for online banking to flourish. For example, Internet usage is expected to grow with cheaper bandwidth cost. The Department of Telecommunications (DoT) is moving fast to make available additional bandwidth, with the result that Internet access will become much faster in the future. Today state owned BSNL is offering Broad band internet at Rs 250/- per month. This is expected to give a fillip to Internet banking in India. In this background, banks are moving in for technological up gradation on a large scale. Internet banking is expected to get a boost from such developments.

With the increasing demand for higher bandwidth capacity, which is growing by 350% a year in India, Companies like Reliance, Bharti Telecom and the Tata Group are investing billions of rupees to build fibre optic lines and telecom infrastructure for data, voice and Internet telephony. The online population has increased from just 500,000 in 1998 to 5 million in 2000. By 2015, the online population is expected to reach 70 million. Keeping

in view all the above developments, Internet banking is likely to grow at a rapid pace and most banks will enter into this area soon

E-Service Quality:

Dimensions of Traditional service quality:

- **Reliability:** Ability to perform the promised service dependably and accurately.
- **Responsiveness:** willingness to help customers and provide prompt service.
- **Assurance:** Employee's knowledge and courtesy and their ability to inspire trust and confidence.
- **Empathy:** Caring, individualized attention given to customers.
- **Tangibles:** Appearance of physical facilities, equipment, personnel, and written materials.

E-service quality is defined as the extent to which a website facilitates efficient and effective shopping, purchasing, and delivery.

Customers do not perceive quality in a one-dimensional way, but rather judge quality based on multiple factors relevant to the context. In case of Internet Banking quality of service is judged by such factors as ease of navigation, efficiency, flexibility, reliability, personalization, security/privacy, responsiveness, assurance/trust, site aesthetics, and price knowledge .Four core dimensions that consumers used to evaluate sites are:

Efficiency: The ease and speed of accessing and using the site.

Fulfillment: The extent to which the site's promises about order delivery and item availability are fulfilled.

Reliability: The correct technical functioning of the site.

Privacy: The degree to which the site is safe and protects customer information.

When the customers have problems or questions with the sites, they use three additional dimensions to judge the e-service quality:

Responsiveness: handling of problems and returns through the site.

Compensation: The degree to which customers are compensated for problems.

Contacts: The degree to which help can be accessed by telephone or online representatives.

Some of the E-service quality dimensions are explained below:

e-Service Quality Dimensions	Descriptions
Reliability	It is included correctness of order fulfillment, prompt delivery, and billing accuracy.
Attentiveness	It is included individualized attention, personal thank-you notes from online retailers and availability of a message area for customer questions or comments.
Easy of use	It is related to easy-to-remember URL address, well-organized, well structured, and easy-to-follow catalogues, site navigability, and concise and understandable contents, terms and conditions.
Access	It is included the list of the company's street and e-mail address, phone and fax number, accessibility of service representatives, availability of chat room, bulletin board and other communication channels.
Security	It is included security of personal information and minimal online purchase risks.
Credibility	It refers to the business history of online retailers, special rewards or discounts, and referral banners on other Web site.

In comparing the dimensions of traditional service quality and E-service quality, efficiency and fulfillment are core dimensions in e-service quality and both share some elements of the traditional reliability and responsiveness dimensions. The personal (that is, friendly emphatic, and understanding) flavor of perceived service quality's empathy dimension is not required on the internet except in non- routine or problem situations. While not emerging as a dimension of e-service quality, tangibles are clearly relevant given that the entire service is delivered through technology, and the tangible, visual elements of site will be critical to efficiency as well as to overall perceptions of the firm and the brand.

IMPORTANT BANK:

ICICI BANK - OVERVIEW

ICICI Bank is India's second-largest bank with total assets of Rs. 3,744.10 billion (US$ 77 billion) at December 31, 2008 and profit after tax Rs. 30.14 billion for the nine months ended December 31, 2008. The Bank has a network of 1,438 branches and about 4,644 ATMs in India and presence in 18 countries. ICICI Bank offers a wide range of banking products and financial services to corporate and retail customers through a variety of delivery channels and through its specialised subsidiaries and affiliates in the areas of investment banking, life and non-life insurance, venture capital and asset management. The Bank currently has subsidiaries in the United Kingdom, Russia and Canada, branches in United States, Singapore, Bahrain, Hong Kong, Sri Lanka, Qatar and Dubai International Finance Centre and representative offices in United Arab Emirates, China, South Africa, Bangladesh, Thailand, Malaysia and Indonesia. Our UK subsidiary has established branches in Belgium and Germany.

ICICI Bank's equity shares are listed in India on Bombay Stock Exchange and the National Stock Exchange of India Limited and its American Depositary Receipts (ADRs) are listed on the New York Stock Exchange (NYSE).

HISTORY

ICICI Bank was originally promoted in 1994 by ICICI Limited, an Indian financial institution, and was its wholly-owned subsidiary. ICICI's shareholding in ICICI Bank was reduced to 46% through a public offering of shares in India in fiscal 1998, an equity offering in the form of ADRs listed on the NYSE in fiscal 2000, ICICI Bank's acquisition of Bank of Madura Limited in an all-stock amalgamation in fiscal 2001, and secondary market sales by ICICI to institutional investors in fiscal 2001 and fiscal 2002. ICICI was formed in 1955 at the initiative of the World Bank, the Government of India and representatives of Indian industry. The principal objective was to create a development financial institution for providing medium-term and long-term project financing to Indian businesses. In the 1990s, ICICI transformed its business from a development financial institution offering only project finance to a diversified financial services group offering a wide variety of products and services, both directly and through a number of subsidiaries and affiliates like ICICI Bank. In 1999, ICICI become the first

Indian company and the first bank or financial institution from non-Japan Asia to be listed on the NYSE.

After consideration of various corporate structuring alternatives in the context of the emerging competitive scenario in the Indian banking industry, and the move towards universal banking, the managements of ICICI and ICICI Bank formed the view that the merger of ICICI with ICICI Bank would be the optimal strategic alternative for both entities, and would create the optimal legal structure for the ICICI group's universal banking strategy. The merger would enhance value for ICICI shareholders through the merged entity's access to low-cost deposits, greater opportunities for earning fee-based income and the ability to participate in the payments system and provide transaction-banking services. The merger would enhance value for ICICI Bank shareholders through a large capital base and scale of operations, seamless access to ICICI's strong corporate relationships built up over five decades, entry into new business segments, higher market share in various business segments, particularly fee-based services, and access to the vast talent pool of ICICI and its subsidiaries. In October 2001, the Boards of Directors of ICICI and ICICI Bank approved the merger of ICICI and two of its wholly-owned retail finance subsidiaries, ICICI Personal Financial Services Limited and ICICI Capital Services Limited, with ICICI Bank. The merger was approved by shareholders of ICICI and ICICI Bank in January 2002, by the High Court of Gujarat at Ahmedabad in March 2002, and by the High Court of Judicature at Mumbai and the Reserve Bank of India in April 2002. Consequent to the merger, the ICICI group's financing and banking operations, both wholesale and retail, have been integrated in a single entity.

CANARA BANK - OVERVIEW

A Brief Profile of the Bank Widely known for customer centricity, Canara Bank was founded by Shri Ammemba Subba Rao. A Brief Profile of the Bank Widely known for customer centricity, Canara Bank was founded by Shri Ammembal Subba Rao Pai, a great visionary and philanthropist, in July 1906, at Mangalore, then a small port in Karnataka. The Bank has gone through the various phases of its growth trajectory over hundred years of its existence. Growth of Canara Bank was phenomenal, especially after nationalization in the year 1969, attaining the status of a national level player in terms of geographical reach and clientele segments. Eighties was characterized by business diversification for the Bank. In June 2006, the Bank completed a century of operation in the Indian banking industry. The eventful journey of the Bank was strewn with many

memorable milestones. Today, Canara Bank occupies a premier position in the comity of Indian banks. With an unbroken record of profits since its inception, Canara Bank has several firsts to its credit. These include:

- Launching of Inter-City ATM Network
- Obtaining ISO Certification for a Branch
- Articulation of 'Good Banking' – Bank's Citizen Charter
- Commissioning of Exclusive Mahila Banking Branch
- Launching of Exclusive Subsidiary for IT Consultancy
- Issuing credit card for farmers
- Providing Agricultural Consultancy Services

Over the years, the Bank has been scaling up its market position to emerge as a major **'Financial Conglomerate'** with as many as nine subsidiaries/sponsored institutions/joint ventures in India and abroad. As at September 2008, the Bank has further expanded its domestic presence, with 2710 branches spread across all geographical segments. Keeping customer convenience at the forefront, the Bank provides a wide array of alternative delivery channels that include over 2000 ATMs- the highest among nationalized banks- covering 698 centres, 1351 branches providing Internet and Mobile Banking (IMB) services and 2027 branches offering 'Anywhere Banking' services. Under advanced payment and settlement system, all branches of the Bank have been enabled to offer Real Time Gross Settlement (RTGS) and National Electronic Funds Transfer (NEFT) facilities.

Not just in commercial banking, the Bank has also carved a distinctive mark, in various corporate social responsibilities, namely, serving national priorities, promoting rural development, enhancing rural self-employment through several training institutes and spearheading financial inclusion objective. Promoting an inclusive growth strategy, which has been formed as the basic plank of national policy agenda today, is in fact deeply rooted in the Bank's founding principles. **"A good bank is not only the financial heart of the community, but also one with an obligation of helping in every possible manner to improve the economic conditions of the common people"**. These insightful

words of our founder continue to resonate even today in serving the society with a purpose.

The growth story of Canara Bank in its first century was due, among others, to the continued patronage of its valued customers, stakeholders, committed staff and uncanny leadership ability demonstrated by its leaders at the helm of affairs. We strongly believe that the next century is going to be equally rewarding and eventful not only in service of the nation but also in helping the Bank emerge as a **"Global Bank with Best Practices"**. This justifiable belief is founded on strong fundamentals, customer centricity, enlightened leadership and a family like work culture.

STATE BANK OF TRAVANCORE – OVERVIEW

State Bank of Travancore (SBT) was originally established as Travancore Bank Ltd. in 1945 sponsored by the erstwhile Princely State of Travancore. Under a special statute of the Indian Parliament (SBI subsidiary Banks Act 1959) it has been made an **Associate of the State Bank of India** and a member of the State Bank Group, the largest banking group in India.

Regd. office/Head Office at: Poojapura, Trivandrum 695 012, Kerala state, India

Highlights

- More than 60 years of dedicated service
- Network of 712 branches and 389 ATMs spanning 16 states of the country
- Using World class technology through the implementation of 100% Core Banking Solution
- Premier bank in Kerala state with 580 branches
- The Largest ATM Network in Home State
- Member of the Largest ATM network in the country
- Internet Banking, E-Payments, Utility Bill Payments, Fee payments, E-Rail etc
- 24 Hours working Exchange Bureau, Calicut
- Total business of Rs. 66644 Crores
- NRI business of Rs.8755 Crores

- History of uninterrupted profits and Dividend payments
- 100% dividend to shareholders for the Third year in succession
- Every THIRD remittance to the Home State from the Middle East is to SBT
- 2 out of every 3 Small Scale Units in the Home State are financed by SBT
- 15% of the total branch network and 22 % of the Banking Business in the Home State is with SBT
- Every second public sector unit in the Home State is financed by SBT

FEDERAL BANK - OVERVIEW

Understanding Federal Bank is all about understanding relationships. Knowing how our relationships helped to make us the largest traditional private sector bank in the country. Of how we nurtured our relationships for more than seven decades, gaining us the reputation of being an agile, technology savvy and customer friendly bank. Learning how we built our wide network of branches, reaching out to cover all the major cities of the country, to be accepted as one of the leading private sector banks in the country. And rejoicing on the fact that we are a dominant presence in the state of Kerala.

PIONEERS IN ENHANCING CUSTOMER CONVINENCE

Federal Bank has played a pioneer role in developing and deploying new technology assisted customer friendly products and services. A few of its early moves are cited below:

- First, among the traditional banks in the country to introduce Internet Banking Service through FedNet
- First among the traditional banks to have all its branches automated.
- First and only Bank among the traditional Banks in India to have all its branches inter-connected
- First Electronic Telephone Bill Payment in the country was done through Federal Bank.
- First and only bank among the older Banks to have an e-shopping payment gateway.

- First traditional Bank to introduce Mobile Alerts and Mobile Banking service.
- First Bank to implement an Express Remittance Facility from Abroad
- First in India to provide RTGS facility in all its branches.

The Bank has also the distinction of being one of the first banks in the country to deploy most of these technology enabled services at the smaller branches including rural and semi-urban areas.

AnyTime-AnyWhere-AnyWayBanking

The Bank has the full range of delivery channels including, Internet Banking, Mobile Banking and Alerts, Any Where (Branch) Banking, Interconnected Visa enabled ATM network, E-mail Alerts, Telephone Banking and a Centralized customer Call Centre with toll free number. Customers thus have the ability to avail 24 hour banking service from the channel of his choice, according to his convenience. Federal Bank already has the largest number of ATMs in Kerala, taking round-the-clock banking convenience to even many rural areas. The Bank's ATM card also doubles as a International Visa Debit Card enabling the Bank's customers to use the card at any of the over 8,40,000 networked ATMs round the world and pay for shopping at over 12 million retail establishments across the state. The Bank has launched its anywhere banking service, enabling customers to bank at any branch of his / her choice regardless of the place where the account is maintained.

HDFC – OVERVIEW

Against the milieu of rapid urbanisation and a changing socio-economic scenario, the demand for housing has grown explosively. The importance of the housing sector in the economy can be illustrated by a few key statistics. According to the National Building Organisation (NBO), the total demand for housing is estimated at 2 million units per year and the total housing shortfall is estimated to be 19.4 million units, of which 12.76 million units is from rural areas and 6.64 million units from urban areas. The housing industry is the second largest employment generator in the country. It is estimated that the

budgeted 2 million units would lead to the creation of an additional 10 million man-years of direct employment and another 15 million man-years of indirect employment.

Having identified housing as a priority area in the Ninth Five Year Plan (1997-2002), the National Housing Policy has envisaged an investment target of Rs. 1,500 billion for this sector. In order to achieve this investment target, the Government needs to make low cost funds easily available and enforce legal and regulatory reforms.

Background

HDFC was incorporated in 1977 with the primary objective of meeting a social need - that of promoting home ownership by providing long-term finance to households for their housing needs. HDFC was promoted with an initial share capital of Rs. 100 million.

Business Objectives

The primary objective of HDFC is to enhance residential housing stock in the country through the provision of housing finance in a systematic and professional manner, and to promote home ownership. Another objective is to increase the flow of resources to the housing sector by integrating the housing finance sector with the overall domestic financial markets..

ORGANISATIONAL GOALS

HDFC's main goals are to

a) develop close relationships with individual households,

RESEARCH DESIGN

Statement of the problem:

- To understand the customers experience with internet banking and their expectations.

Objectives of the research:

- To find out the customer satisfaction with online banking.
- To study the internet banking scenario in India.
- To find out the prospects of Internet Banking in India.
- To find out the various authentication techniques available in Internet banking.

Purpose – Review of Literature:

Banks have had a harder time protecting customers' money since the hank robbers followed customers online. And it becomes harder still when customers don't cooperate with banks' efforts to secure their accounts.

Article By Debora Gage:

Consider Bank of America, which claims 19 million customers online, more than any of its competitors. The bank now processes more transactions online than it does through ail of its physical banking centers. Still, online popularity has its price. In February 2005, Bank of America was sued by a customer—Ahlo, a wholesaler of ink and toner cartridges in Miami —that held the hank responsible for ;in unauthorized transfer of more than $90,000 from Ahlo's account to a bank in Latvia. The company's *PC* was infected with a (". (core flood Trojan, a bit of malware that can be spread by a phishing attack and hands control of its victim PCs to hackers. According to reports in the south *Florida Sun-Sentinel* and other publications. Ahlo's attorney, Karen Backer of Patino & Associates in C-oral Gables, Fla., says the suit has been "amicably resolved" and includes a gag order that prohibits Ahlo from talking about it. Bank of America spokeswoman .Shirley Norton says the bank has no comment. The bank also says it does not discuss individual phishing attempts and has posted information on its Web site *{www.bofa.com/privacy)* to educate customers about online fraud, according to Betty Riess, another Bank of America spokeswoman. Since December 2004, there have been more than 350 phishing attempts

— fraudulent e-mails that try to trick customers into giving up their account information, sometimes by infecting their computers with malware that logs their keystrokes—against Bank of America, according to Fraud Watch International, a vendor of anti-phishing products. This works out to about one attempt every other day. Out of 339 financial institutions tracked by Fraud Watch, Bank of America is currently the roth favorite target of phishers- behind JPMorgan Chase, Washington Mutual and Citibank, among others.
Bank of America's struggle against phishing shows how hard it is for businesses — especially big ones that have grown by acquiring companies with Incompatible information-technology systems — to protect unwary and sometimes uncooperative customers from cyber crime

About 18 months ago, the bank initiated a project to test and install anti-phishing software for all of its customers. That project is still underway The bank's senior vice president of e-commerce customer support solutions, Katherine Claypool, says Bank of America currently has three separate back-end processing systems — one for California, one for the Pacific Northwest, and one for the rest of the country. Bank of America has been battling phishers since early 2004,
Claypool says, The bank spent several months during that year conducting focus groups and online surveys to figure out what type of protection customers would tolerate something that was not as intrusive as hardware token — which can be inserted into a PC. to generate one-time passwords — but that would still assure customers they were doing business on the bank's Web site and not one thrown up by fraudsters.
The bank decided to use software to fight phishing and briefly considered developing its own. Instead, it went with Site Key, this was developed by startup Postmark Security of Menlo Park, Calif.; the package closely resembles what the bank's customers said they wanted, Claypool says. Site Key identifies the bank to customers and customers to the bank before allowing them to log in to their accounts. an image from an archive, name that image, and create answers to various secret Questions (such as. what high school did you graduate from?) that the bank can use to verity their identity. The software will not let them enter their password into the bank's Web site until they see and acknowledge their image, a sign they are in the real banking site and not a fake one. This reduced the frauds.

The above research article shows that the bank's business online is more than the offline business, this means that there is a great potential for Online banking. But there are numerous concerns regarding online banking because of safety of transactions. In America instead of stringent cyber laws many online fraud cases are reported, Bank of America's case depicts the extent of frauds taking place online. In India too Online banking is gaining acceptance these days among Urban Customers as banks are taking initiatives to keep customers away from visiting the bank branches. So there is huge opportunity for banks to use this online medium. But in India Cyber Laws are not stringent, giving chances to fraudsters to do their job without any hesitation. So customers have reservations about Online Banking.

This made the researcher to find out customers experience and expectations with online banking, and the safety measures provided by banks to protect customers from frauds.

Scope of the research:

The scope of this research can be identified from the study is based on the survey conducted in Bangalore only and the respondents for this research include software engineers, BPO employees, Sales Executives, and students who use internet banking. The study aims to cover the areas such as customer expectations, customer satisfaction and experience of the customers.

Research Methodology:

Type of Research: The study is based on descriptive research.

Sample design:

Sampling Technique: The sampling technique used in the study is **Non-probability, Judgemental sampling**.

Sample Size: A sample of 100 people has been selected for the study.

Sample Description: The sample includes Software Engineers, BPO Employees, Sales Executives, and Students who use Internet Banking facility.

Sources of Data Collection: The primary data was collected through structured questionnaire & the secondary data was collected through journals, websites and text books.

Instrumentation Techniques: structured questionnaire was used for data collection.

Plan of analysis:

The collected data was checked, classified and tabulated. Histograms with frequency curves were drawn to represent the data wherever it was required.

Limitations of the study:

- The study is restricted to Bangalore city only.
- The responses given by the respondents may not be always correct. The responses are personal opinions.
- It may not be possible to generalize the results with out conducting a thorough study.

Overview of chapter scheme:

Chapter 1: Introduction to the topic and review of research literature.

Chapter 2: Design of the study covering statement of problem, objectives of the study, scope, sampling, methodology, limitations, plan of analysis.

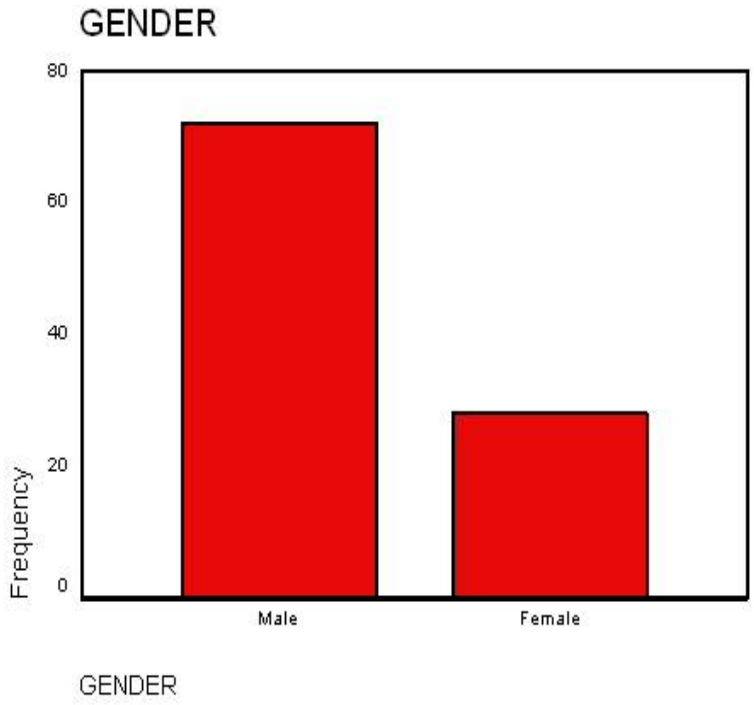
Chapter 3: Data analysis and interpretation

Chapter 4: Summary of findings, conclusions and suggestions.

Bibliography

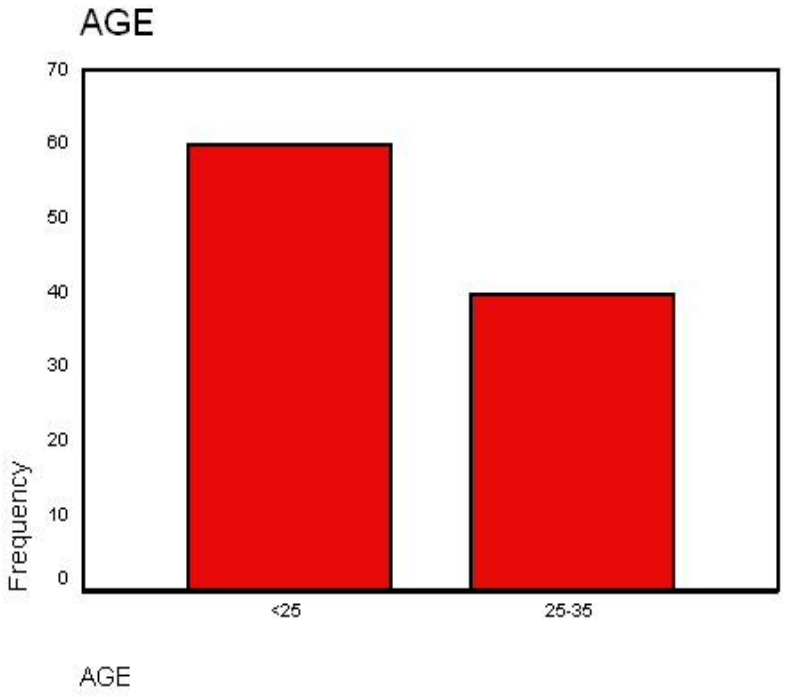
Annexure

ANALYSIS AND INTERPRETATION OF DATA



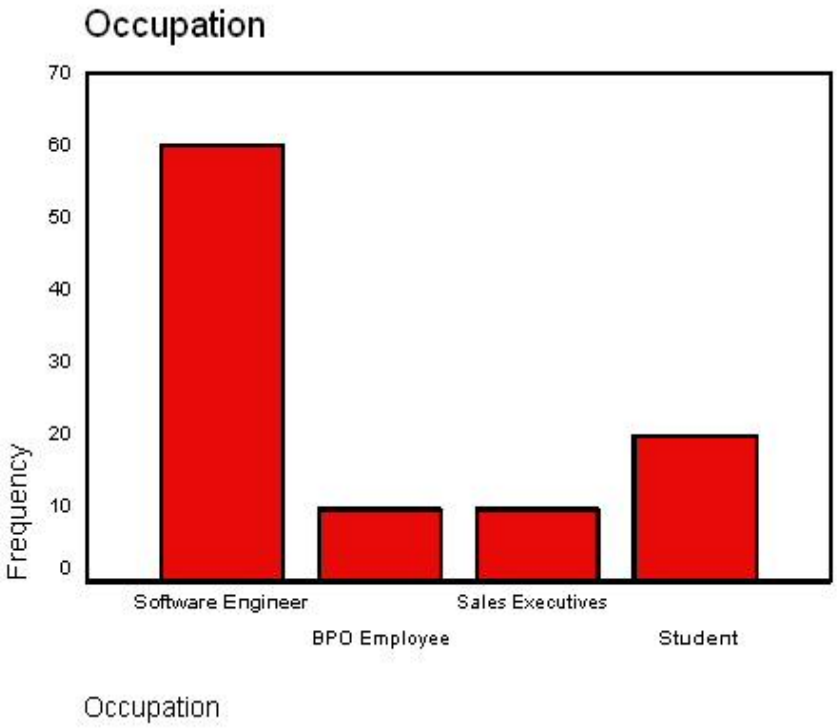
Gender	Frequency
Male	72
Female	28
Total	100

The above chart shows that 72% of the respondents who use internet banking are men, and 28% are women.



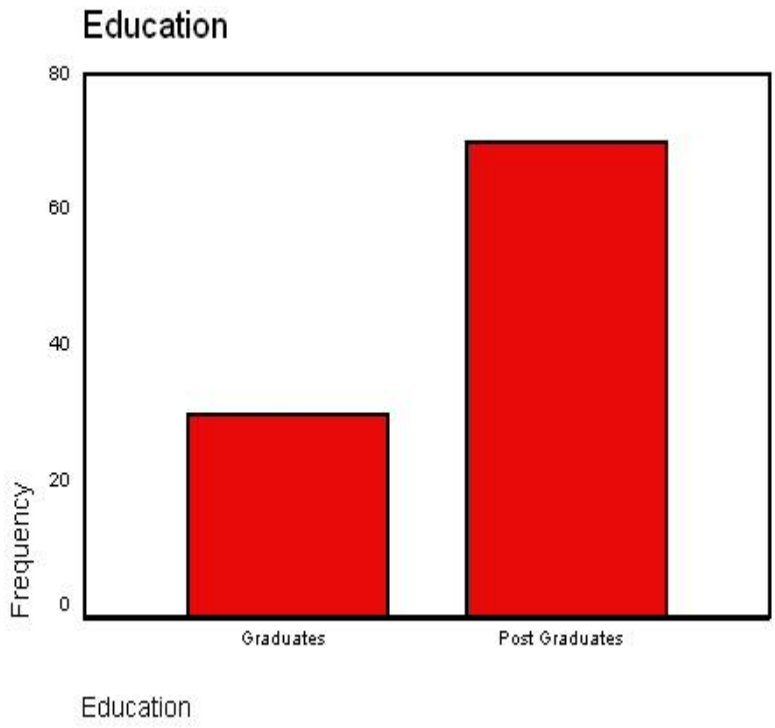
Age	Frequency
<25	60
25-35	40

The above data shows that 60% of the respondents are less than 25 years of age. 40% are in the age group of 25-35.



Occupation	Nos
Software Engineer	60
BPO Employee	10
Sales Executives	10
Student	20

Of the 100 respondents 60 are software engineers,10 are BPO employees, 10 are sales executives and 20 are students.

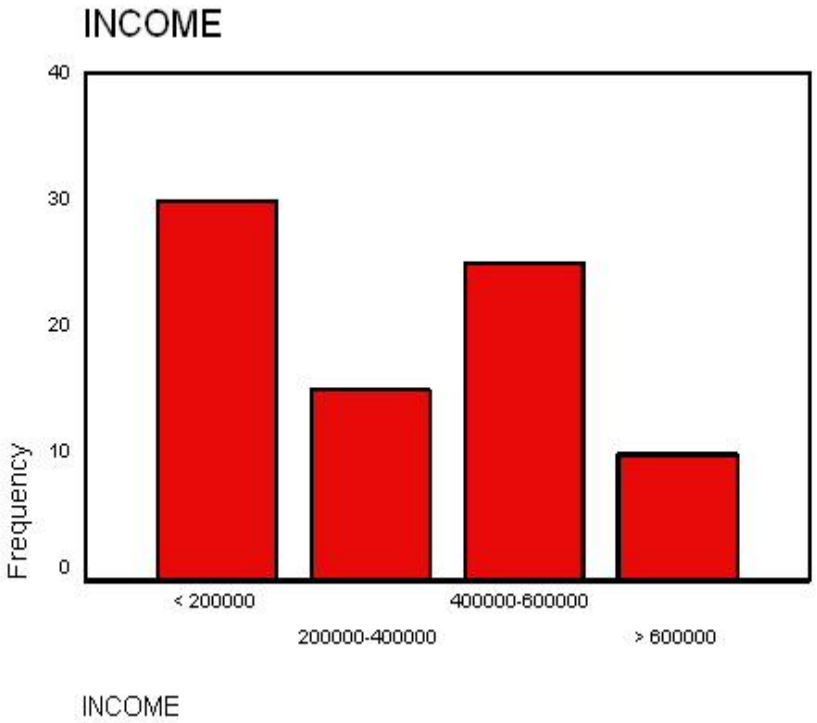


Education	Frequency
Graduates	30
Post Graduates	70

Of the 100 respondents 70 are post-graduates and 30 are graduates.

Income:

Income(p.a)	Frequency
< 200000	30
200000-400000	15
400000-600000	25
> 600000	10

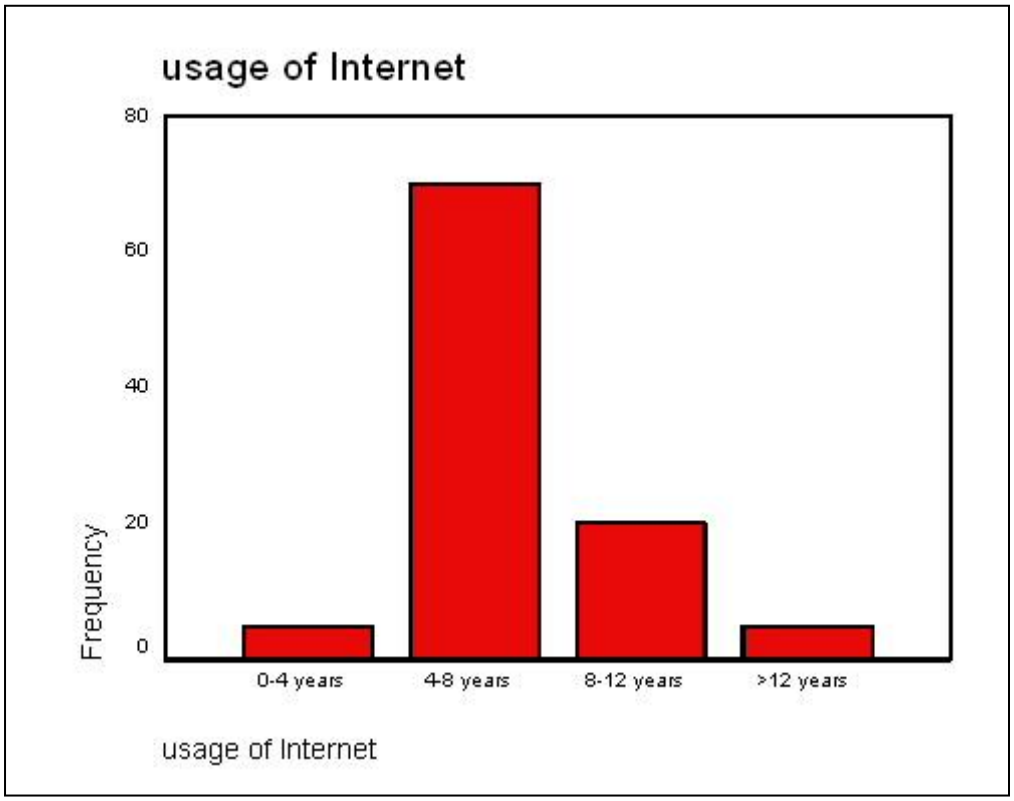


Of the 100 respondents 30 are in the income group of less than 200000, 15 are in 2-4 lakhs group, 25 are in 4-6 lakhs group and 10 are in the income group of more than 6 lakhs.

1. **Since how many years are you using the Internet?**

Table 1: Usage of Internet

	Frequency
0-4 years	5
4-8 years	70
8-12 years	20
>12 years	5
Total	100



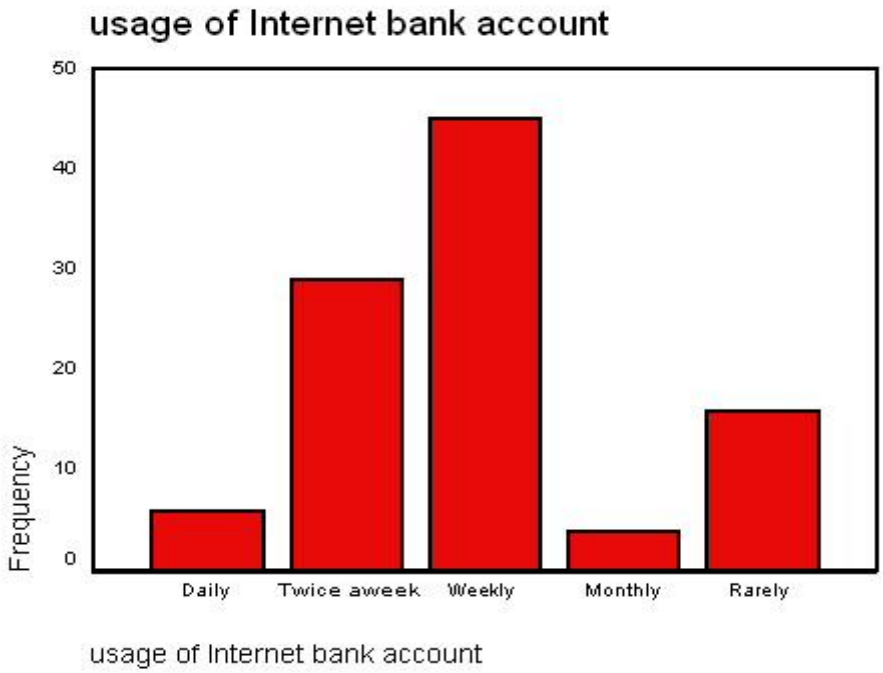
Graph 1: Usage of Internet

The above data shows that majority of the respondents (70%) are using the Internet from last 4-8 years, followed by 20% of the respondents who are using it from last 8-12 years.

2. How often do you use your internet bank account?

Table 2: Usage of Internet Bank account

	Frequency
Daily	6
Twice a week	29
Weekly	45
Monthly	4
Rarely	16
Total	100



Graph 2: Usage of Internet Bank account

From the above data of 100 respondents surveyed, 45 respondents use their Internet Bank account once in a week and 29 respondents use their Internet Bank account twice a week.

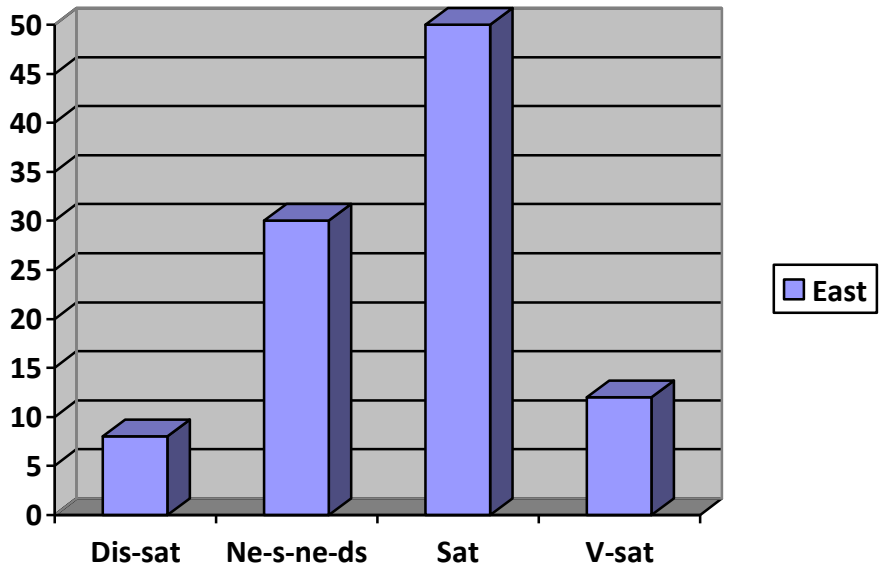
The above data reveals that customers use their Internet Bank account at least once in a week.

3. **Rate the following factors of service quality in terms of your level of satisfaction with reference to internet banking.**

- **Reliability**

Table 3: Reliability of Service

	Frequency
Dissatisfied	8
Neither satisfied nor dissatisfied	30
Satisfied	50
Very Satisfied	12
Total	100



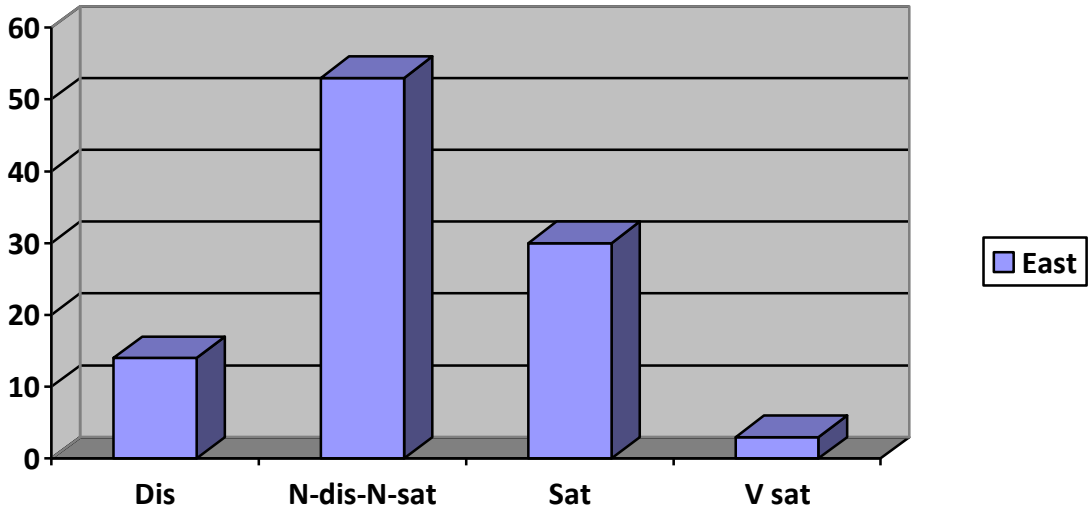
Graph 3: Reliability of Service

The above chart shows that 12% of the respondents are Very much satisfied with the reliable service of their Internet Bank, and 50% of the respondents are satisfied with the reliable service of their Internet Bank.

- **Responsiveness**

Table 4: Satisfaction with Responsiveness

	Frequency
Dissatisfied	14
Neither satisfied nor dissatisfied	53
Satisfied	30
Very Satisfied	3
Total	100



Graph 4: Satisfaction with Responsiveness

Of the 100 respondents surveyed 3 are very satisfied with the responsiveness of their internet bank, 30 respondents are satisfied and 53% are neither satisfied nor dissatisfied.

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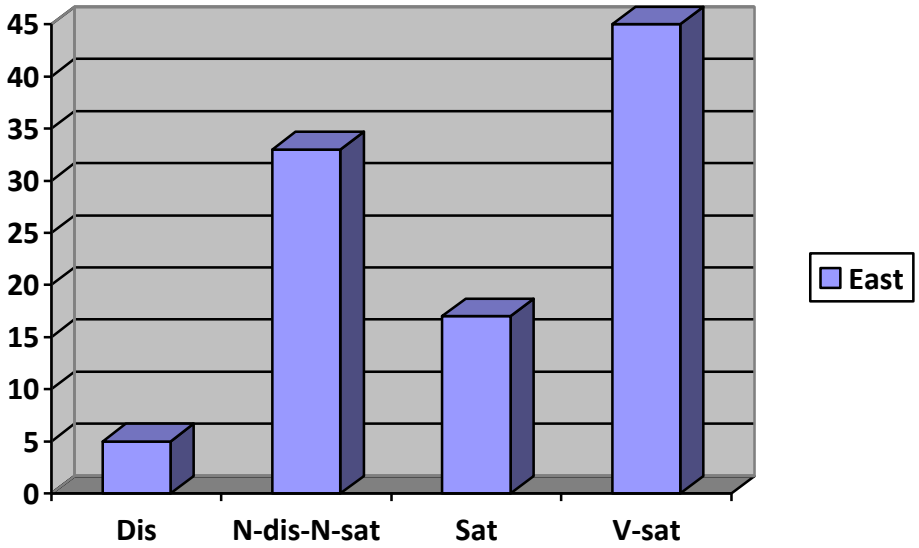
- **Personalization**

Table 5: Satisfaction with personalization

	Frequency
Dissatisfied	5
Neither satisfied nor dissatisfied	33
Satisfied	17
Very Satisfied	45
Total	100



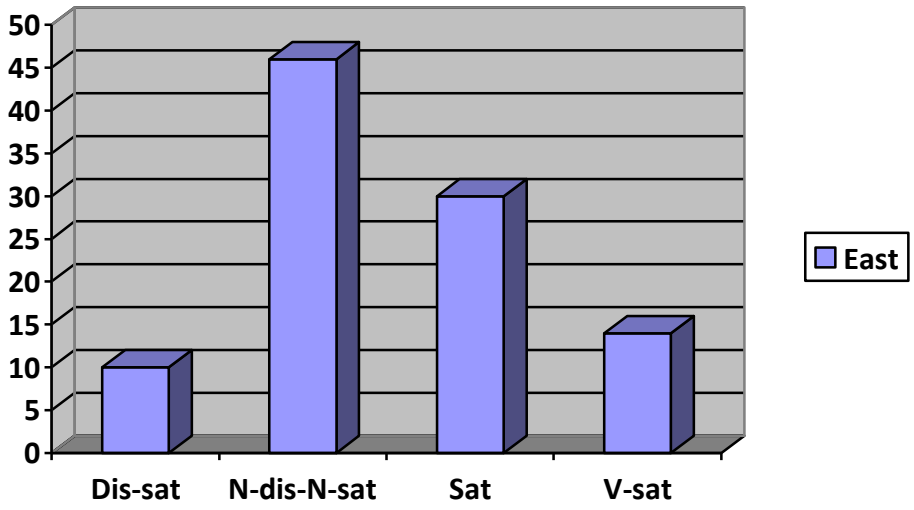
Graph 5: Satisfaction with personalization

The above data shows that 45% of the respondents are Very Satisfied with the personalization factor of Banks website, 17% of the respondents are satisfied with the personalization factor of Bank's website.

- **Technical Support**

Table 6: Satisfaction with Tech Support

	Frequency
Dissatisfied	10
Neither satisfied nor dissatisfied	46
Satisfied	30
Very Satisfied	14
Total	100



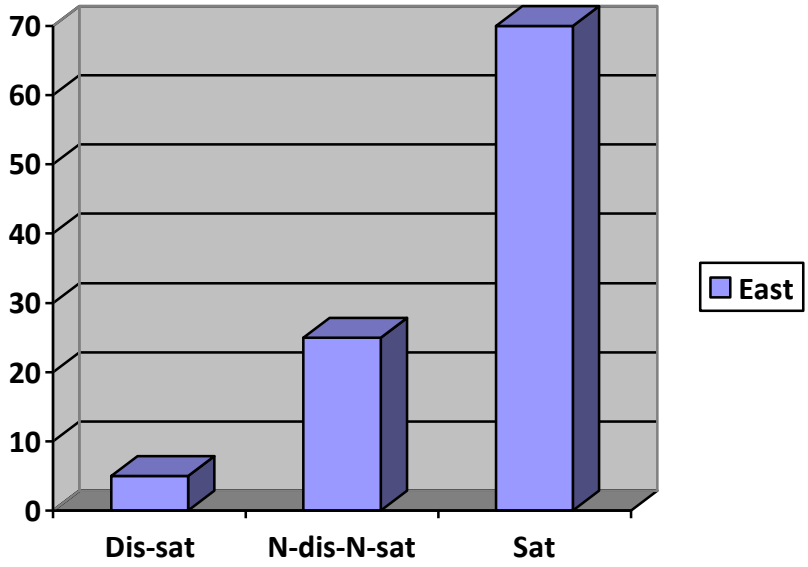
Graph 6: Satisfaction with Tech Support

Of the 100 respondents surveyed, 14 %are Very satisfied with the technical support of their Internet bank account, 30% are satisfied and 46% are neither satisfied nor dissatisfied with the technical support of their Internet bank account.

- **Efficiency**

Table 7: Efficiency of service

	Frequency
Dissatisfied	5
Neither satisfied nor dissatisfied	25
Satisfied	70
Total	100



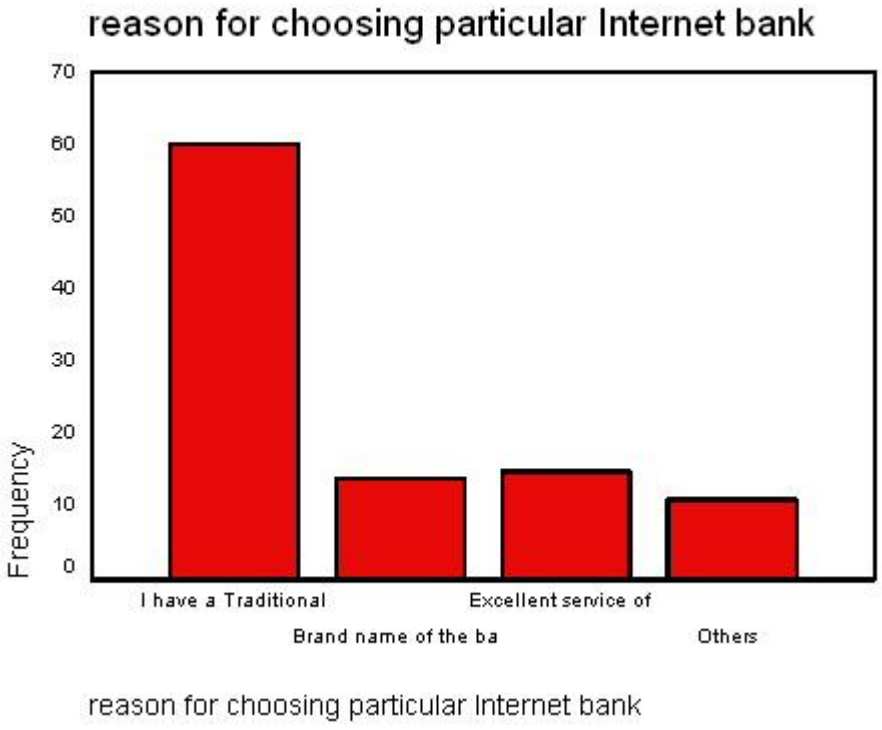
Graph 7: Efficiency of service

The above data shows that 70% are satisfied with the efficiency of their Internet Bank.25% are neither satisfied nor dissatisfied with the efficiency of their Internet Bank.

4. **What is the single most reason that made you to choose this particular bank as your internet bank?**

Table 8: Reason for choosing particular Internet Bank

	Frequency
I have a Traditional bank account	60
Brand name of the bank	14
Excellent service offered by the bank	15
Others	11
Total	100



Graph 8: Reason for choosing particular Internet Bank

60% of the respondents feel that they opened an online account because they had a traditional bank account with the same bank.

15% of the respondents said that excellent service of the bank made them to choose a particular internet bank.

14% of the respondents considered Brand name of the bank to choose a bank as their internet bank.

5. Have you ever done online shopping using your internet bank account?

Table 9: Online Shopping using Internet Bank

	Frequency
Yes	55
No	45
Total	100

Graph 9: Online Shopping using Internet Bank

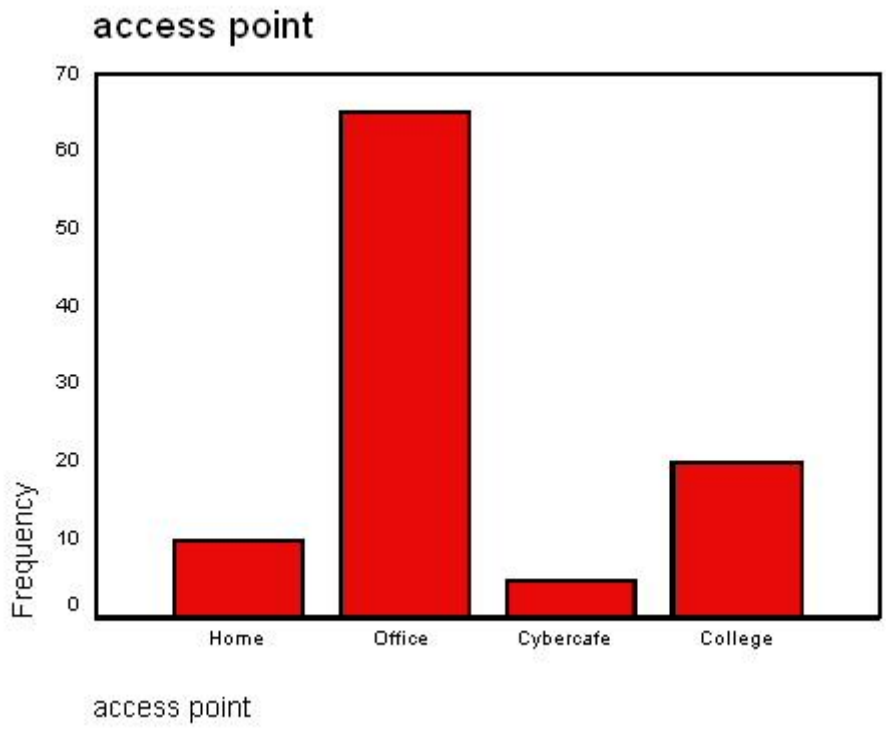
55% of those with Internet bank accounts claim to have purchased some product over the Worldwide Web, while only 45% of those with an Internet bank account have not made such a purchase.

This shows that customers who have an internet bank account tend to try shopping online.

6. **From where do you access the internet most, to use your internet bank account?**

Table 10: Internet Access Point

	Frequency
Home	10
Office	65
Cyber café	5
College	20
Total	100



Graph 10: Internet Access Point

Of the 100 respondents surveyed, 65% access the Internet from their office where as 20% access the Internet from their college.

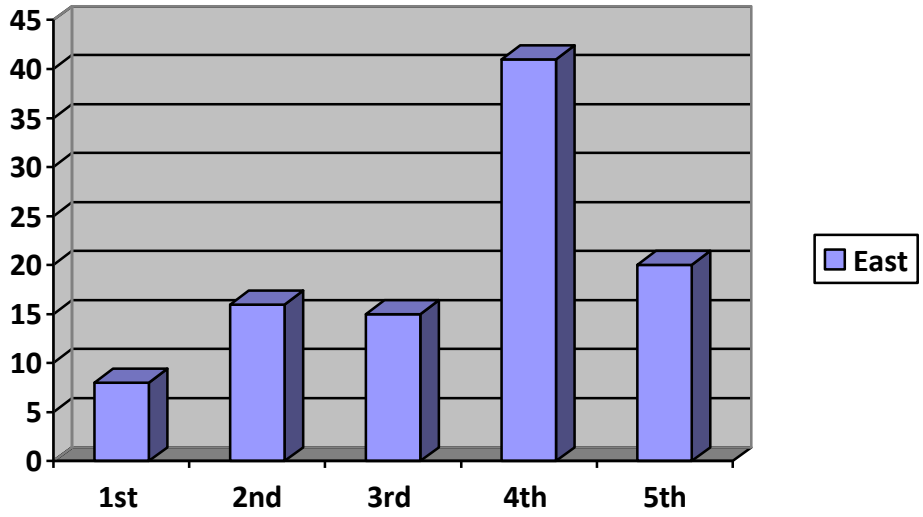
As majority of the respondents are working people who usually access the Internet from office. Respondents who are college students generally access the internet from their colleges.

7. **Rate the following services in terms of their level of utility (Services you use most) which your internet bank offers.**

- **Seeking Product Information**:

Table 11: Utility of seeking product information

	Frequency
Not at all useful	8
Not useful	16
Neither useful nor not useful	15
Useful	41
Very useful	20
Total	100



Graph 11: Utility of seeking product information

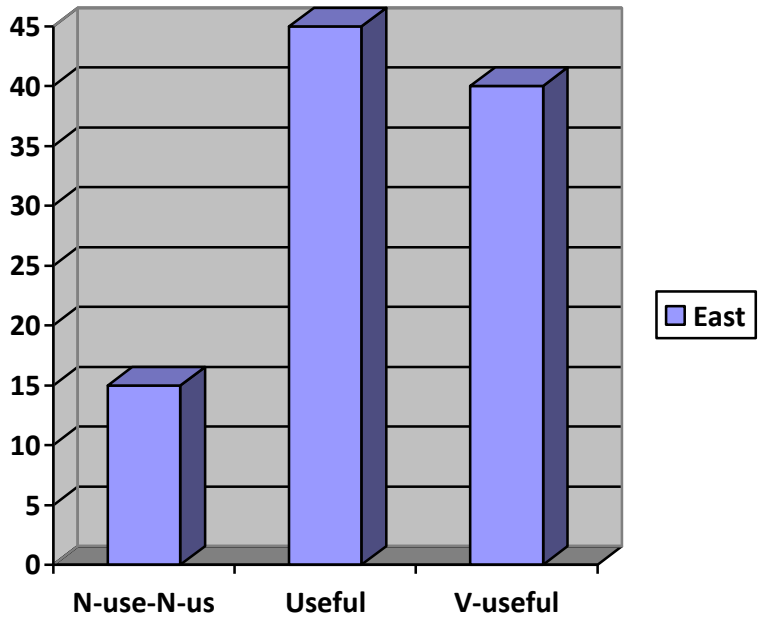
Of the 100 respondents 20% believe that seeking product information is very useful, 41% believe that it's useful.

It shows that customers use their bank account to seek information related to products and services of banks.

- **Download Banking Transaction List**

Table 12: Utility of downloading Banking Transaction list

	Frequency
Neither useful nor not useful	15
Useful	45
Very useful	40
Total	100



Graph 12: Utility of seeking product information

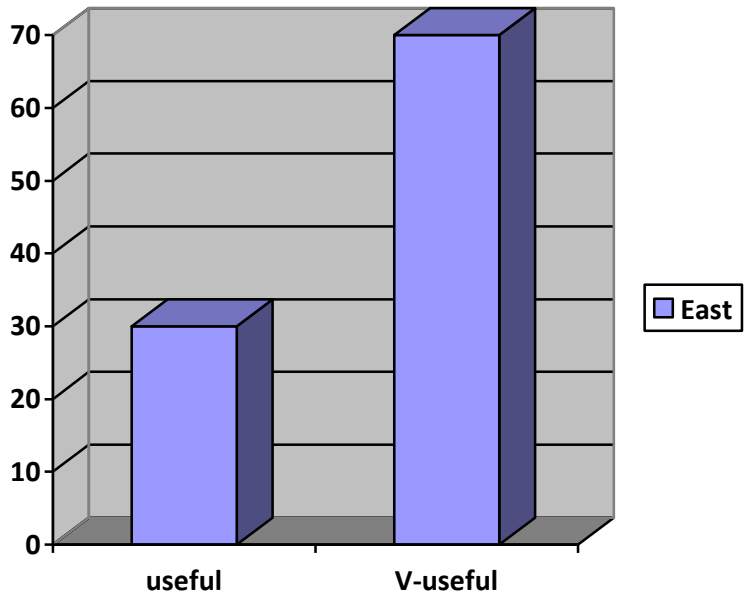
The above data shows that 40% of the respondents feel that downloading banking transaction list is very useful, 45% believe that it's useful.

It shows that majority of the respondents use their online account to know the summary of transactions without visiting the bank branch.

- **Check Balances Online**

Table 13: Utility of checking balances online

	Frequency
useful	30
Very useful	70
Total	100



Graph 13: Utility of checking balances online

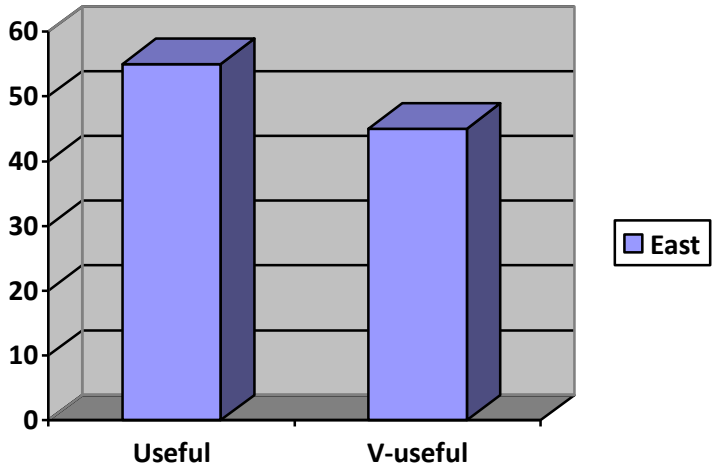
70% of the respondents stated that checking balances online is a Very useful service, where as 30% stated that it is useful.

This shows that every customer who has an online account uses it for checking balances online.

- **Inter Account Transfers**

Table 14: Utility of inter account transfer service

	Frequency
useful	55
Very useful	45
Total	100



Graph 14: Utility of inter account transfer service

The above data shows that:

55% of the respondents feel that Inter account transfer service is very useful.

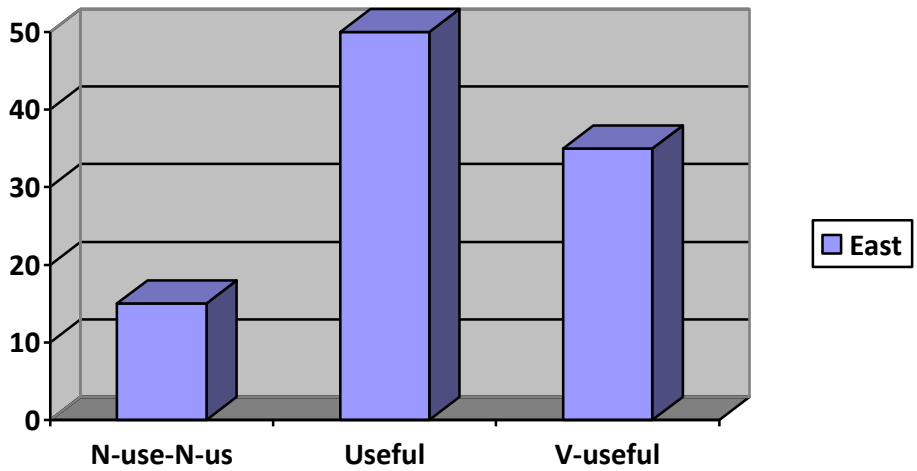
45% of the respondents feel that Inter account transfer service is useful.

It shows that the utility of the Inter account transfer is very high among online account holders.

- **Online Bill Payment**

Table 15: Online bill payment usage

	Frequency
Neither useful nor not useful	15
Useful	50
Very useful	35
Total	100



Graph 15: Online bill payment usage

Of the 100 respondents surveyed 35% feel that online bill payment is very useful service, 50% feel it's useful and 15% feel that it's neither useful nor not useful.

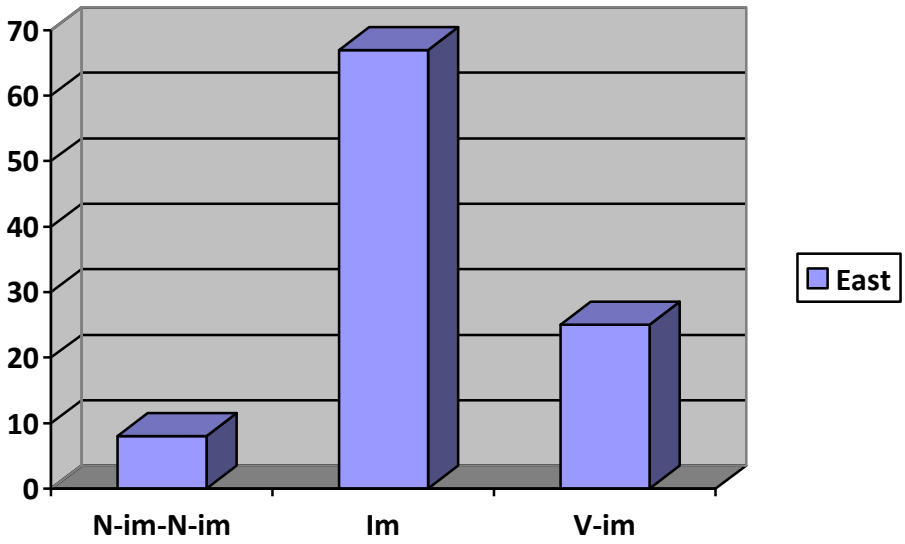
Customers' usage of this service is high because they don't have to wait in long queues to pay their utility bills. It saves the time.

8. **Rate the following factors in terms of their importance with reference to a bank's website contents**

- **Ease of use**

Table 16: Importance of ease of use

	Frequency
Neither important nor Unimportant	8
Important	67
Very Important	25
Total	100



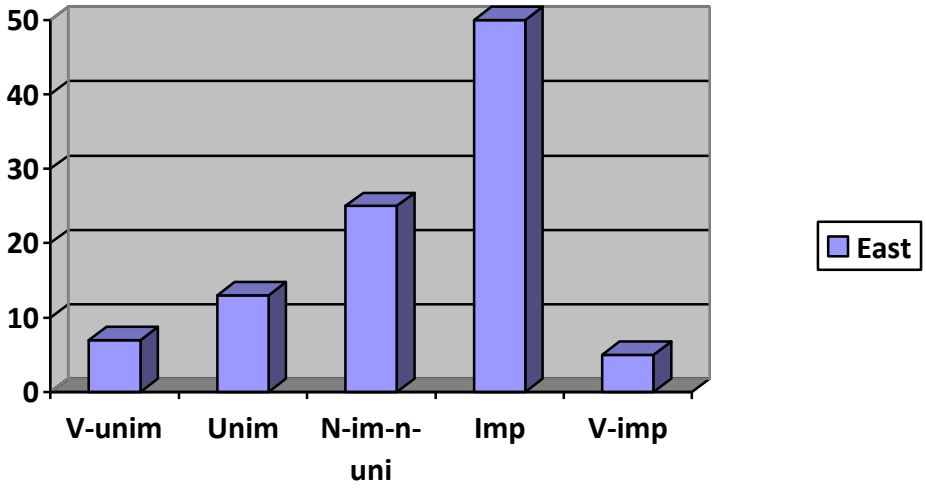
Graph 16: Importance of ease of use

The above data shows that 25% of the respondents stated that ease of use is very important in bank's website.67% of the respondents stated that ease of use is important in a bank's website

- **Application Downloads**

Table 17: Importance of application Downloads

	Frequency
Very Unimportant	7
Unimportant	13
Neither important nor Unimportant	25
Important	50
Very Important	5
Total	100



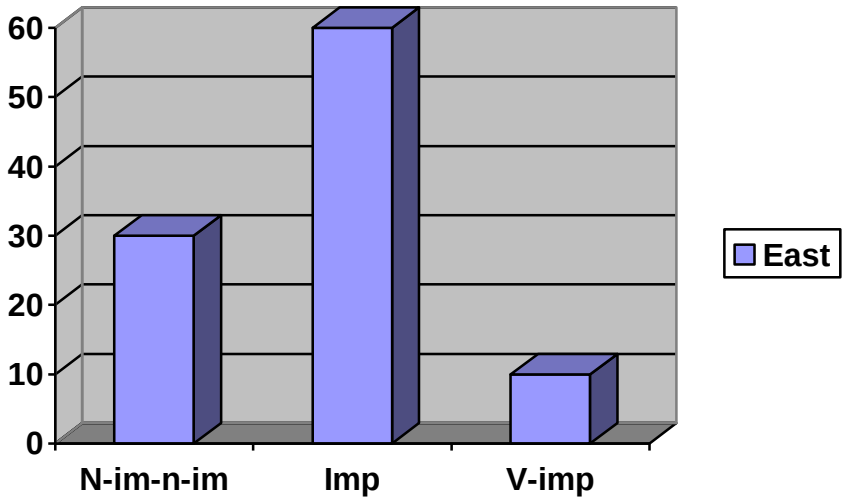
Graph 17: Importance of application Downloads

Of the 100 respondents 5% stated that application downloads are Very important contents of a bank's website.50% stated that its important.25% stated that it's neither important nor un-important.

- **Easy Navigation**

Table 18: Importance of easy navigation

	Frequency
Unimportant	30
Important	60
Very Important	10
Total	100



Graph 18: Importance of easy navigation

The above chart shows that:

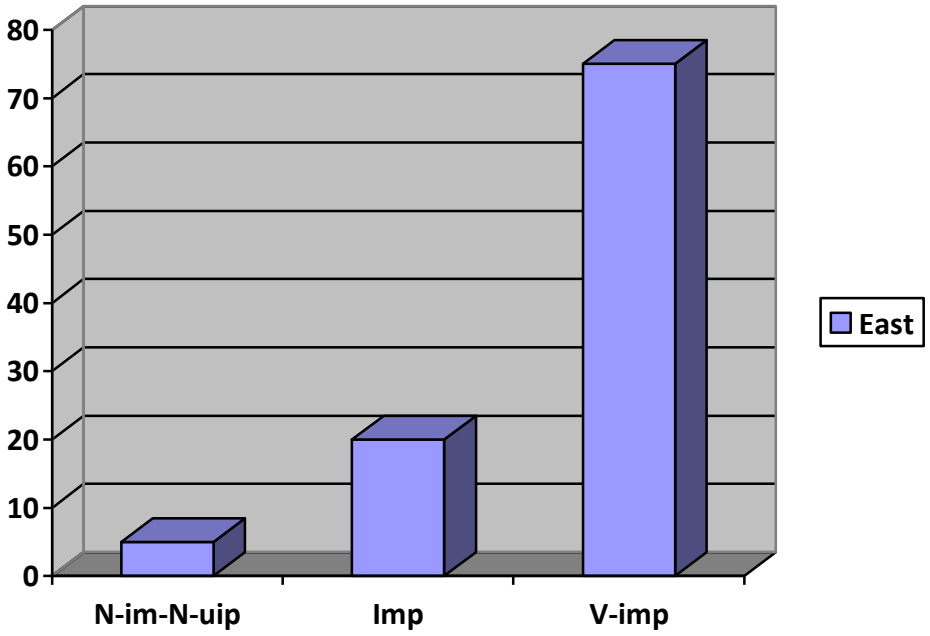
10% of the respondents feel that Easy navigation is very important in a bank's website.60% of the respondents feel that Easy navigation is important in a bank's website.

This shows that the customer does not want to waste his time in finding his requirement. So the website must navigate the customer to his section.

- **Security**

Table 19: Importance of security

	Frequency
Neither important nor Unimportant	5
Important	20
Very Important	75
Total	100



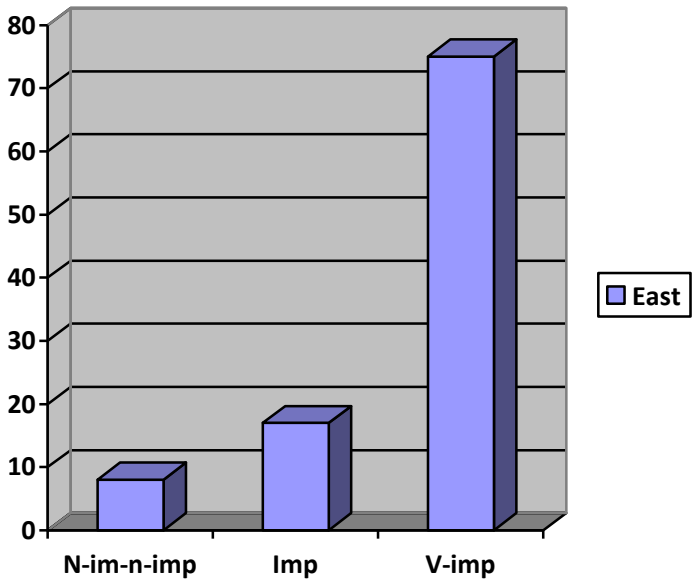
Graph 19: Importance of security

Of the 100 respondents surveyed, 75% feel that a bank's website's security is very important.20% feel that it's important.

- **Privacy**

Table 20: Importance of privacy

	Frequency
Neither important nor Unimportant	8
Important	17
Very Important	75
Total	100



Graph 20: Importance of privacy

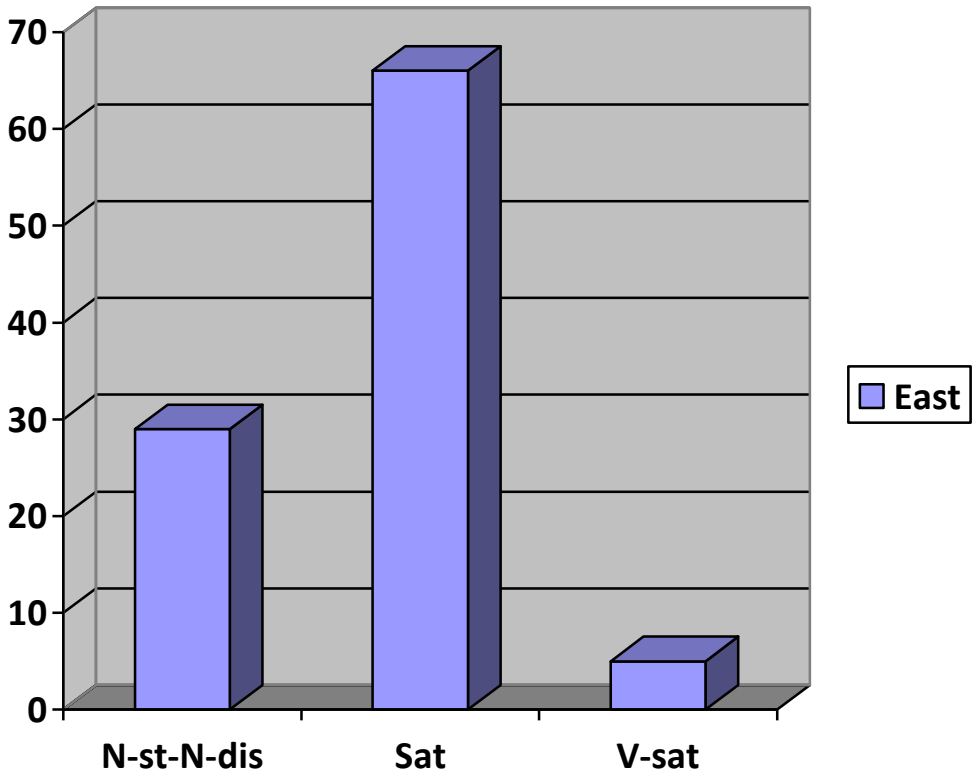
Privacy is considered as very important by 75% and 17% feel that privacy in online banking environment is important.

It reveals that Customers are very much concerned about their privacy. They don't want sharing of their personal information with third parties other than the Internet Bank.

9. Rate your <u>level of satisfaction</u> with reference to <u>security measures</u> taken by your bank to safeguard information and prevent frauds

Table 21: Satisfaction with Security measures

	Frequency
Neither satisfied nor dissatisfied	29
Satisfied	66
Very Satisfied	5
Total	100



Graph 21: Satisfaction with Security measures

The above data shows that:

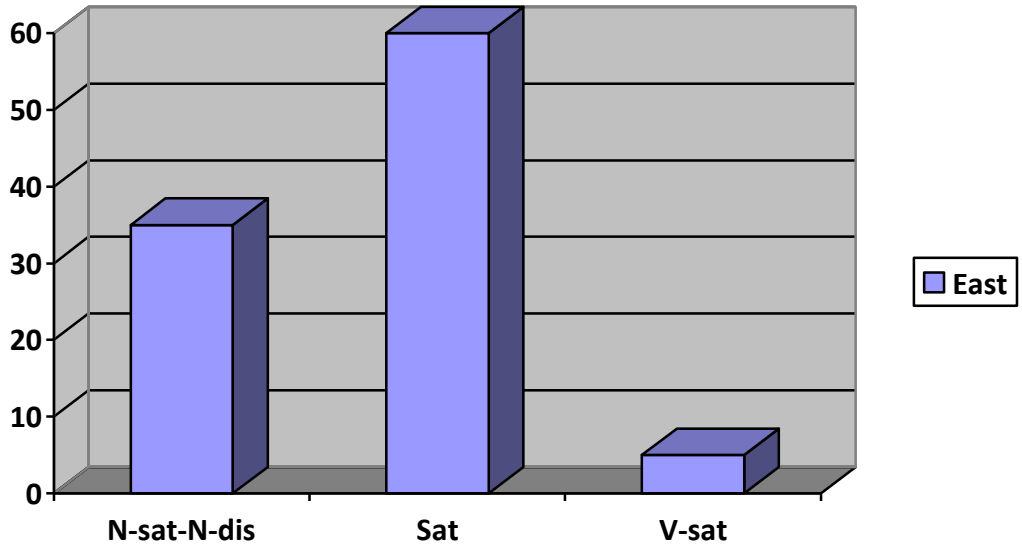
5% of the respondents are very satisfied with the security measures taken by their bank to safeguard information and prevent frauds.66% of the respondents are satisfied

with the security measures taken by their bank to safeguard information and prevent frauds.

10. Rate your over all level of satisfaction with the services offered by your internet bank

Table 22: Overall level of satisfaction

	Frequency
Neither satisfied nor dissatisfied	35
Satisfied	60
Very Satisfied	5
Total	100



Graph 22: Overall level of satisfaction

The above data shows that:

5% of the respondents are very satisfied with the services offered by their internet bank.60% of the respondents are satisfied with the services offered by their internet bank.

SUMMARY OF FINDINGS

This study is designed to understand Internet users' perspectives on Internet banking, their experiences with Internet banking, and their expectations on Internet banking services. Some of the major Findings are as follows;

- Younger generations are more likely to adopt internet banking than older generations.
- People with higher education (university or above) are more likely to adopt Internet banking than those with less education.
- High-income group is more likely to adopt internet banking than low-income group.
- Frequent visitors to banks' websites are more likely to adopt internet banking.
- Men arse more likely to adopt internet banking than women.
- 58.3% of the male respondents shop online using their online bank account.
- 45% of the respondents stated that they use their internet bank account once a week.
- 60% of the respondents felt that they opened the internet bank account because they had a traditional bank account with the same bank.
- 55% of those with Internet bank accounts claim to have purchased some product over the Worldwide Web.
- 85%of those with an Internet bank account said convenience of the services were "very important" or "important" in their decision to open their account.
- 65% of the respondents with an Internet bank account said they access their account from office.
- 75% of the respondents feel that Security is very important in a bank's website.
- 66% of the respondents said that they are happy with the security measures taken by the bank to safeguard information and prevent frauds.
- 65% of the respondents said that they are happy with the services offered by their Internet Bank.
- 75% of the respondents stated that Privacy is one of the very important contents of a bank's website.

- 85.7% of the female respondents stated that they opened an online account because they had a traditional bank account with the same bank; where as 50% of the male respondents stated the same reason.

SUGGESTIONS

- Banks should maintain secrecy and confidentiality of customer's account and take adequate risk control measures against hacking and technology failures.
- Banks should ensure that proper security infrastructure is in place like the use of at least 128-bit SSL for securing browser to web server communications and, in addition, encryption of sensitive data like passwords in transit within the enterprise itself.
- Banks should use latest versions of software or upgrade existing software which gives better security & control to remove bugs and loopholes.
- Banks should concentrate on providing more technical support to its customers.
- Banks should design the websites in a more user friendly format to make the customers comfortable with the technology.
- Banks should ensure that a proper system of back up of data is in place, to prevent loss of data.
- Banks should be more responsive to customers' queries.
- Banks should create awareness among non-users of internet banking, and motivate them to use online banking to reduce rush at bank branches.

CONCLUSION

Banks are finding that a comprehensive online banking strategy is essential for success in the increasingly competitive financial services market. Due to technology advances and rapid growth of the internet, an online banking solution can be designed today that is more effective and less costly than the traditional branch banking. Banks have traditionally been in the forefront of harnessing technology to improve their products, services and efficiency. They have, over a long time, been using electronic and telecommunication networks for delivering a wide range of value added products and services.

By the study conducted on "Customer's experience with Internet Banking" we can conclude that in all respects the customers are satisfied with their internet bank. Major concerns of customers include security and privacy because of the growing number of online frauds, cheating cases and hacking. Even though the Banks in India providing Internet banking facility are giving 128 bit encryption security there are cases of frauds reported in India. So banks should be committed to provide adequate safety to the customers and prevent frauds. Banks should maintain secrecy and confidentiality of customer's account and take adequate risk control measures against hacking and technology failures. Banks should use latest versions of software or upgrade existing software which gives better security & control to remove bugs and loopholes.

SThere is a large potential for internet banking in India. Only about 1% of Internet users did banking online in 1998. This increased to 16.7% in March 2000. The growth potential is, therefore, immense. Internet usage is expected to grow with cheaper bandwidth cost. The Department of Telecommunications (DoT) is moving fast to make available additional bandwidth, with the result that Internet access will become much faster in the future. Today state owned BSNL is offering Broad band internet at Rs 250/- per month. This is expected to give a fillip to Internet banking in India. The online population has increased from just 500,000 in 1998 to 5 million in 2000. By 2015, the online population is expected to reach 70 million. Keeping in view all tdevelopments, Internet banking is likely to grow at a rapid pace and most banks will enter into this area soon.

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ANNEXURE

Questionnaire

Dear Sir/Madam,

I am a student of Al-Ameen institute of management studies. Bangalore, conducting a study on *"Customer's experience with INTERNET BANKING"* .The responses would be a part of my dissertation study. I would be grateful if you could please answer the following questionnaire. I assure you that all information would be kept confidential and used for academic purposes only.

Thank you.

Personal Details:

Name: **Gender:** ☐ Male ☐ Female

Age: ☐ <25 ☐ 25-35 ☐ 35-45 ☐ >45 **Occupation:**

Education: ☐ Schooling ☐ UG ☐ PG ☐ above PG

Income (p.a). ☐ < 2 Lakhs ☐ 2-4 Lakhs ☐ 4-6Lakhs ☐ Above 6 Lakhs

1. Since how many years are you using the Internet? _____

2. How often do you use your internet bank account?
   ☐ Daily ☐ Twice a week ☐ weekly ☐ Monthly ☐ Rarely

3. Rate the following factors of **service quality** in terms of your level of satisfaction with reference to internet banking.(Tick one)
   (1-Very dissatisfied 2- dissatisfied 3-Neither dissatisfied nor satisfied 4-Satisfied 5-Very Satisfied)

a)Reliability	1	2	3	4	5
b)Responsiveness	1	2	3	4	5
c)Personalization	1	2	3	4	5
d)Tech support	1	2	3	4	5
e)Efficiency	1	2	3	4	5

4. What is the **single most reason** that made you to choose this particular bank as your internet bank

☐ I have a traditional bank account with the same bank

☐ Brand name of the bank

☐ Excellent service offered by the bank☐ Others (Specify) _____

5. Have you ever done online shopping using your internet bank account

☐ Yes ☐ No

6. From where do you access the internet most, to use your internet bank account

☐ Home ☐ Office☐ Cyber café☐ College/School

7. Rate the following services in terms of their **level of utility** (Services you use most) which your internet bank offers. (1-Not at all useful 2- Not useful 3-Neither useful nor not useful 4-useful 5-Very useful)

a) Seeking Products info	1	2	3	4	5
c)Download banking transaction list	1	2	3	4	5
d)Check balances online	1	2	3	4	5
e)Inter account transfers	1	2	3	4	5
f)Online bill payment	1	2	3	4	5

8. Rate the following factors in terms of their importance with reference to a bank's website contents (Rating:1-5)

(1-Very unimportant 2- unimportant 3-Neither important nor unimportant 4-Important

5-Very important)

a)Ease of Use	1	2	3	4	5
b)Application downloads	1	2	3	4	5
c)Easy navigation	1	2	3	4	5
d)Security(Encryption like 128 bit)	1	2	3	4	5
e)Privacy	1	2	3	4	5

9. Rate your **level of satisfaction** with reference to **security measures** taken by your bank to safeguard information and prevent frauds.(Rating 1-5):_____

   (1-Very dissatisfied 2- dissatisfied 3-Neither dissatisfied nor satisfied 4-Satisfied 5-Very Satisfied)

10. Rate your **over all** level of **satisfaction** with the services offered by your internet bank

    (Rating 1-5):_____

Thank you for sparing your valuable time

GLOSSARY:

Authentication - the process of proving the claimed identity of an individual user, machine, software component or any other entity.

Authorization - the process of determining what types of activities are permitted. Usually, authorization is in the context of authentication: once you have authenticated a user, they may be authorized different types of access or activity.

Bandwidth - the transmission capacity of a computer channel or communications line

Biometrics - a method of verifying an individual's identity by analyzing a unique physical attribute.

Browser - a computer program that enables the user to retrieve information that has been made publicly available on the Internet; also permits multimedia (graphics) applications on the World Wide Web.

Code - computer programs, written in machine language (object code) or programming language (source code).

Cracker - a computer operator who breaks through a system's security. This can be legitimate activity, such as to test system security measures.

Cryptography - the principles, means, and methods for rendering information unintelligible and for restoring encrypted information to intelligible form (i.e., scrambling a message).

Data Integrity - the property that data meet with a priority expectation of quality.

Dial-up - the ability of a remote user to access a system by using private or common carrier telephone lines.

Digital - referring to communications processors, techniques, and equipment where information is encoded as a binary "1" or "0".

Digital Certification - a process to authenticate (or certify) a party's digital signature; carried out by trusted third parties

Digital Signatures - a mathematical encryption technique that associates a specific person with a given computer file and indicates that the file has not been altered since that person signed it; should not be confused with making an electronic representation of a written signature.

Download - to transmit a file or program from a central computer to a smaller computer or a remote site.

Electronic Cash - the digital equivalent of dollars and cents (also referred to as digital cash).

Electronic Data Interchange (EDI) - the transfer of information between organizations in machine-readable form.

Electronic Document - the digital or computer equivalent of paper documents.

Electronic Money - monetary value measured in currency units stored in electronic form on an electronic device in the consumer's possession. This electronic value can be purchased and held on the device until reduced through purchase or transfer.

Encryption (Cryptography) - the process of scrambling data by a device or encoding principle (mathematical algorithms) so that the data cannot be read without the proper codes for unscrambling the data.

Firewall - a system or combination of hardware and software solutions that enforces a boundary between two or more networks.

Gateway - a computer that performs protocol conversion between different types of networks or applications.

Hacker - a computer operator who breaks into a computer without authorization, either for malicious reasons or just to prove it can be done.

Home Banking - banking services that allow a customer to interact with a financial institution from a remote location by using a telephone, television set, terminal, personal computer, or other device to access a telecommunication system which links to the institution's computer center.

Home Page - a screen of information made available to users through the Internet or a private intranet; it is the "main page" that users are expected to read first in order to access the other pages that comprise the web site.

Hypertext Transfer Protocol (HTTP) - a standard method of publishing information as hypertext in HTML format on the Internet.

. **Key** - A secret value or code used in an encrypting algorithm known by one or both of the communicating parties.

Password - a unique word or string of characters that a programmer, computer operator, or user must supply to satisfy security requirements before gaining access to the system or data.

Password Cracker - a software program designed to conduct an automated brute force attack on the password security controls of an information system by "guessing" user passwords.

Password Sniffer - a software program that is illicitly inserted somewhere on a network to capture user passwords as they pass through the system.

Phishing- Phishing means sending an e-mail that falsely claims to be from a particular enterprise (like a bank) and asking for sensitive financial information.

Protocols - a standardized set of rules that define how computers communicate with each other.

Public Key Cryptography - type of cryptography in which the encryption process is publicly available and unprotected, but in which a part of the decryption key is protected so that only a party with knowledge of both parts of the decryption process can decrypt the cipher text.

Repudiation - the denial by one of the parties to a transaction of participation in all or part of that transaction or of the content of the communication.

Secure Socket Layer (SSL) - a protocol for providing data security during transmission using data encryption, server authentication, and message integrity.

Server - a computer that provides services to another computer (the client).

Spoofing - an attempt to gain access to a system by posing as an authorized user.

Tamper-proof - the proven capacity of devices to resist all attacks.

Topology - the arrangement of nodes usually forming a star, ring, tree, or bus pattern.

Transmission Control Protocol/Internet Protocol (TCP/IP) - a standard format for transmitting data in packets from one computer to another, on the Internet and within other networks. TCP deals with the construction of the data packets while IP routes them from machine to machine.

World Wide Web (web, www) - a sub network of the Internet through which information is exchanged via text, graphics, audio, and video.