A Study on Online Banking

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Abstract: Online banking, also known as internet banking, e-banking or virtual banking, is an electronic payment system that enables customers of a bank or other financial institution to conduct a range of financial transactions through the financial institution's website. The online banking system will typically connect to or be part of the core banking system operated by a bank and is in contrast to branch banking which was the traditional way customers accessed banking services. To access a financial institution's online banking facility, a customer with internet access will need to register with the institution for the service, and set up a password and other credentials for customer verification. The credentials for online banking is normally not the same as for telephone or mobile banking. Financial institutions now routinely allocate customers numbers, whether or not customers have indicated an intention to access their online banking facility. Customer numbers are normally not the same as account numbers, because a number of customer accounts can be linked to the one customer number. Technically, the customer number can be linked to any account with the financial institution that the customer controls, though the financial institution may limit the range of accounts that may be accessed to, say, cheque, savings, loan, credit card and similar accounts.

Keywords: Online banking, Mobile banking, Credit card, PIN, ATM

I. INTRODUCTION

Online banking allows customers of a financial institution to conduct financial transactions on a secured website operated by the institution, which can be a retail bank, virtual bank, credit union or building society. Online banking is an umbrella term for the process by which a customer may perform banking transactions electronically. The customer visits the financial institution’s secure website, and enters the online banking facility using the customer number and credentials previously set up. The types of financial transactions which a customer may transact through online banking are determined by the financial institution, but usually includes obtaining account balances, a list of the recent transactions, electronic bill payments and funds transfers between a customer's or another's accounts. Most banks also enable a customer to download copies of bank statements, which can be printed at the customer's premises (some banks charge a fee for mailing hard copies of bank statements). Some banks also enable customers to download transactions directly into the customer's accounting software. The facility may also enable the customer to order a cheque book, statements, report loss of credit cards, stop payment on a cheque, advise change of address and other routine actions.

Today, many banks are internet-only institutions. These “virtual banks” have lower overhead costs than their brick-and-mortar counterparts. In the United States, many online banks are insured by the Federal Deposit Insurance Corporation (FDIC) and can offer the same level of protection for the customers’ funds as traditional banks.

Objectives

The following are the Objectives of the Study:
1. To Study the History of Online banking
2. To Study the Features of Online banking
3. To Study the Various forms of Online banking
4. To Study the Advantages of Online banking
5. To Study the Disadvantages of Online banking
6. To Study the Security token devices of Online banking
7. To Study the Attacks of Online banking
8. To Offer Conclusion

II. HISTORY OF ONLINE BANKING

The History of Online banking includes the following;

• Precursors

The precursor for the modern home loan banking services were the distance banking services over electronic media from the early 1980s. The term ‘online’ became popular in the late 1980s and referred to the use of a terminal, keyboard and TV (or monitor) to access the banking system using a phone line. 'Home banking' can also refer to the use of a numeric keypad to send tones down a phone line with instructions to the bank. Online services started in New York in 1981 when four of the city's major banks (Citibank, Chase Manhattan, Chemical and Manufacturers Hanover) offered home banking services. Using the videotex system. Because of the commercial failure of videotex these banking
services never became popular except in France where the use of videotex (Minitel) was subsidised by the telecom provider and the UK, where the Prestel system was used.

**Internet and Customer reluctance**

When the clicks-and-bricks euphoria hit in the late 1990s, many banks began to view web-based banking as a strategic imperative. The attraction of banks to online banking are fairly obvious: diminished transaction costs, easier integration of services, interactive marketing capabilities, and other benefits that boost customer lists and profit margins. Additionally, online banking services allow institutions to bundle more services into single packages, thereby luring customers and minimizing overhead. A mergers-and-acquisitions wave swept the financial industries in the mid- and late 1990s, greatly expanding banks’ customer bases. Following this, banks looked to the Web as a way of maintaining their customers and building loyalty. A number of different factors are causing bankers to shift more of their business to the virtual realm. While financial institutions took steps to implement e-banking services in the mid-1990s, many consumers were hesitant to conduct monetary transactions over the internet. It took widespread adoption of electronic commerce, based on trailblazing companies such as America Online, Amazon.com and eBay, to make the idea of paying for items online widespread. By 2000, 80% of U.S. banks offered e-banking. Customer use grew slowly. At Bank of America, for example, it took 10 years to acquire 2 million e-banking customers. However, a significant cultural change took place after the Y2K scare ended. In 2001, Bank of America became the first bank to top 3 million online banking customers, more than 20% of its customer base. In comparison, larger national institutions, such as Citigroup claimed 2.2 million online relationships globally, while J.P. Morgan Chase estimated it had more than 750,000 online banking customers. Wells Fargo had 2.5 million online banking customers, including small businesses. Online customers proved more loyal and profitable than regular customers. In October 2001, Bank of America customers executed a record 3.1 million electronic bill payments, totaling more than $1 billion. In 2009, a report by Gartner Group estimated that 47% of United States adults and 30% in the United Kingdom bank online. The early 2000s saw the rise of the branch-less banks as internet only institutions. These internet-based banks incur lower overhead costs than their brick-and-mortar counterparts. In the United States, deposits at most direct banks are FDIC-insured and offer the same level of insurance protection as traditional banks.

**First online banking services in the United States:**

Online banking was first introduced in the early 1980s in New York, United States. Four major banks — Citibank, Chase Bank, Chemical Bank and Manufacturers Hanover — offered home banking services. Chemical introduced its Pronto services for individuals and small businesses in 1983, which enabled individual and small-business clients to maintain electronic checkbook registers, see account balances, and transfer funds between checking and savings accounts. Pronto failed to attract enough customers to break even and was abandoned in 1989. Other banks had a similar experience need since its inception in the United States, online banking has been federally governed by the Electronic Funds Transfer Act of 1978.

**First online banking in the United Kingdom:**

Almost simultaneously with the United States, online banking arrived in the United Kingdom. The UK’s first home online banking services known as Homelink were set up by Bank of Scotland for customers of the Nottingham Building Society (NBS) in 1983. The system used was based on the UK’s Prestel viewlink system and used a computer, such as the BBC Micro, or keyboard (Tandata Td1400) connected to the telephone system and television set. The system allowed on-line viewing of statements, bank transfers and bill payments. In order to make bank transfers and bill payments, a written instruction giving details of the intended recipient had to be sent to the NBS who set the details up on the Homelink system. Typical recipients were gas, electricity and telephone companies and accounts with other banks. Details of payments to be made were input into the NBS system by the account holder via Prestel. A cheque was then sent by NBS to the payee and an advice giving details of the payment was sent to the account holder. BACS was later used to transfer the payment directly. Stanford Federal Credit Union was the first financial institution to offer online internet banking services to all of its members in October 1994.

**First online banking in France:**

After a test period with 2500 users starting in 1980, online banking services were launched in 1984, using Minitel terminals that were distributed freely to the population by the government. Eventually, 6.5 millions Minitels were installed in households in 1990. Online banking was one of the most popular services. Online banking services later migrated to Internet.
Banks and the World Wide Web
Around 1994, banks saw the rising popularity of the internet as an opportunity to advertise their services. Initially, they used the internet as another brochure, without interaction with the customer. Early sites featured pictures of the bank's officers or buildings, and provided customers with maps of branches and ATM locations, phone numbers to call for further information and simple listings of products.

Interactive banking on the Web
In 1995, Wells Fargo was the first U.S. bank to add account services to its website, with other banks quickly following suit. That same year, Presidential became the first U.S. bank to open bank accounts over the internet. According to research by Online Banking Report, at the end of 1999 less than 0.4% of households in the U.S. were using online banking. At the beginning of 2004, some 33 million U.S. households (31%) were using some form of online banking. Five years later, 47% of Americans used online banking, according to a survey by Gartner Group. Meanwhile, in the UK online banking grew from 63% to 70% of internet users between 2011 and 2012.

Features of Online Banking
The following are the Features of Online banking:
- balance and transaction history search
- transaction history export
- eStatements and Statement Preferences
- order new statements
- Mobile banking
- transfers
- pay bills with BPAY®
- receive bills online with BPAY View®
- Pay Anyone payments
- Multi Payments
- Foreign currency calculator
- International and RTGS payments
- Open or apply for selected accounts
- Daily Limits Packages for BPAY, Pay Anyone and Multi Payments
- SMS banking services
- extra online security with the BOQ Security Token

Business features of online banking: The following are the Business features of online banking:
- If you have a business, find out how Internet Banking can assist you:
- payments file upload
- direct debit payments and payment templates
- related account access
- multi user transaction authorisation and privilege delegation

Various Forms of Online Banking
The following are the various forms of Online banking:
- Internet Banking
  Internet Banking helps you manage many banking transactions online via your PC.
- Automated Teller Machines (ATM)
  An automated teller machine or automatic teller machine (ATM) is an electronic computerized telecommunications device that allows a financial institution's customers to directly use a secure method of communication to access their bank accounts, order or make cash withdrawals (or cash advances using a credit card) and check their account balances without the need for a human bank teller.
- Tele Banking
  By dialing the given Telebanking number through a landline or a mobile from anywhere, the customer can access his account and by following the user-friendly menu, entire banking can be done through Interactive Voice Response (IVR) system.
- Smart Card
  A smart card usually contains an embedded 8-bit microprocessor (a kind of computer chip). The microprocessor is under a contact pad on one side of the card. Think of the microprocessor as replacing the usual magnetic stripe present on a credit card or debit card. The microprocessor on the smart card is there for security. The host computer and card reader actually "talk" to the microprocessor. The
microprocessor enforces access to the data on the card. The chips in these cards are capable of many kinds of transactions.

- **Debit Card**
  Debit cards are also known as check cards. Debit cards look like credit cards or ATM (automated teller machine) cards, but operate like cash or a personal check. Debit cards are different from credit cards. While a credit card is a way to “pay later,” a debit card is a way to “pay now.” When you use a debit card, your money is quickly deducted from your checking or savings account.

- **E-Cheque**
  An e-Cheque is the electronic version or representation of paper cheque.

### Benefits of Online Banking

More and more financial institutions are offering online banking to their customers, with some banks being completely online. With so many different options available, anyone can do most of their banking online. Both businesses and individuals can benefit from changing their accounts to the online variety. Convenience are touted as one of the major advantages of banking online, but it isn’t the only one. There are many reasons to bank online, from saving you money to being more environmental in your way of life. For some reasons to consider banking online here are nine benefits to carrying out your banking activities online rather than within an actual bank.

- **Convenience** – By banking online, you can carry out your banking activities whenever you want. Online banking is a 24 hour service, so you are no longer tied to the branch’s hours. On top of that, you don’t have to take the time to travel to the branch and wait in the inevitable lines, thus giving you more time to do what you want.

- **Mobility** – Online banking can be done from anywhere, as long as you have an Internet connection. Even if you are away for business or a vacation, you can still take care of your banking needs. Some banks, such as Bank of America, have even created mobile applications that make banking easier for those with a Smartphone like the Apple iPhone or iTouch or a Blackberry. With this added mobility, you’ll no longer have to worry about missing a payment or any other time sensitive banking activity.

- **No Fees** – Because an online bank doesn’t have to worry about funding an actual bank location with all of those additional costs, fees can be reduced and are often non-existent. Those checking and savings accounts that are offered by completely online banks usually have no fees at all. Depending on the type of account you currently have, you could be saving anything from $60 a year and up.

- **Higher Interest Rates** – Again, due to a lack of costs associated with running an online bank, higher interest rates are often offered for their accounts. For higher interest rates, you would usually need to bank with a completely online account.

- **Online Statements** – Most online banks try to be as paper-free as possible. Most statements and correspondence is done online, reducing the amount of paper used and sent out to you. This again will help reduce the costs of the online bank. As an added bonus, this makes online banking a great environmental choice. Be warned, some banks do charge if you do want a paper copy of something.

- **Direct Deposit** – With any incoming money, such as your salary, you can arrange for it to be directly deposited into your bank account by the company sending the money. This is actually a double benefit, as you don’t have to take the time to deposit the check, plus the money goes into your account faster allowing you to earn interest that much quicker.

- **Automatic Bill Paying** – With automatic bill paying, you can automate paying your monthly bills. Of course, you need to set this up, but it will be worth it in the long run. First, with your bills being paid automatically, you shouldn’t ever miss a payment. Plus, by not having to worry about the time taken to mail in your payment, you can keep your money in your account for a bit longer, earning you a little bit more interest – and you save on postage too. Finally, you can actually do away with using checks and you also save on paper used, making this a much greener way of banking also.

- **Real Time Account Information** – Because you can access your accounts anytime, you can get up to date, real time information on the money in your accounts. This will allow you to better manage your money and gain the most from different accounts, interest rates and services provided by the bank.

- **Transfers** – Transfers between accounts with the same financial institution online can be done almost instantaneously. Not only is there no hold on the money being moved around, you can do it whenever you like and from wherever. You also save time on travelling to the local branch. Even transferring to other financial institutions is easier, and safer as you don’t have to carry the money around with you. You can even now e-mail money to and from other people with INTERAC e-mail money transfers.

### Disadvantages of Online Banking

Online banking may have several disadvantages for small businesses;

The modern age of the computer and the Internet provides additional ways to conduct everyday transactions, including banking. If you operate a small business, online banking offers advantages like accessing...
funds 24 hours a day or saving time by making fewer trips to the bank. At the same time, online banking presents potential disadvantages. They are;

- **Security**
  While banks typically offer secure web pages to conduct your business transactions, this does not guarantee complete safety. All websites, even secure ones, may be susceptible to Internet criminals who try to hack into your account and gain access to your business’s private financial information. This can lead to fraudulent use of your business’s identity and potentially cost you thousands of dollars.

- **Site Disruption**
  A technical glitch could cause the bank’s website to go offline for a period of time, possibly resulting in problems for you and your business. For example, you may need immediate funds after normal banking hours to make a payment or emergency business purchase. Routine site maintenance also occurs, although this normally takes place during off-peak hours.

- **Site Navigation**
  If you are new to online banking, it may take some time to get used to it, taking valuable time out of your work day. Online banking offers a large number of transactions, so frustration may occur while you’re learning to navigate the site. Banks also update web pages to add new features, requiring additional learning and possibly the need to change account numbers or passwords. If you need help, you might encounter a lengthy wait when using the bank’s telephone customer service line.

- **User Apprehension**
  Some business owners may not feel comfortable with the idea of placing vital financial information into an online account, or may be apprehensive about using the Internet. If you’re a long-time small business owner who is used to doing banking in person or even by telephone, this hurdle might be difficult to surmount.

- **Accessibility**
  If your business is located in a rural or remote area, your Internet options could be limited. Depending on your type of business, this can make conducting transactions difficult. For example, if you operate a home-based business and you have access to a high-speed cable connection, you may have to use a slower dial-up service. As a result, your business banking may take more time, or you might even experience times where you can’t get online.

**Five Security Devices for Online Banking**

Security of a customer's financial information is very important, without which online banking could not operate. Similarly the reputational risks to the banks themselves are important. Financial institutions have set up various security processes to reduce the risk of unauthorized online access to a customer's records, but there is no consistency to the various approaches adopted.

- The use of a secure website has been almost universally embraced. Though single password authentication is still in use, it is not considered secure enough for online banking in some countries. Basically there are two different security methods in use for online banking:
  - The PIN/TAN system where the PIN represents a password, used for the login and TANs representing one-time passwords to authenticate transactions. TANs can be distributed in different ways, the most popular one is to send a list of TANs to the online banking user by postal letter. Another way of using TANs is to generate them by need using a security token. These token generated TANs depend on the time and a unique secret, stored in the security token (two-factor authentication or 2FA).
  - More advanced TAN generators (chipTAN) also include the transaction data into the TAN generation process after displaying it on their own screen to allow the user to discover man-in-the-middle attacks carried out by Trojans trying to secretly manipulate the transaction data in the background of the PC.
  - Another way to provide TANs to an online banking user is to send the TAN of the current bank transaction to the user’s (GSM) mobile phone via SMS. The SMS text usually quotes the transaction amount and details, the TAN is only valid for a short period of time. Especially in Germany, Austria and the Netherlands many banks have adopted this “SMS TAN” service. Usually online banking with PIN/TAN is done via a web browser using SSL secured connections, so that there is no additional encryption needed.
  - Signature based online banking where all transactions are signed and encrypted digitally. The Keys for the signature generation and encryption can be stored on smartcards or any memory medium, depending on the concrete implementation (see, e.g., the Spanish ID card DNI electrónico.)
Attacks on Online Banking

Attacks on online banking used today are based on deceiving the user to steal login data and valid TANs. Two well-known examples for those attacks are phishing and pharming. Cross-site scripting and keylogger/Trojan horses can also be used to steal login information.

- A method to attack signature-based online banking methods is to manipulate the used software in a way that correct transactions are shown on the screen and faked transactions are signed in the background.
- A 2008 U.S. Federal Deposit Insurance Corporation Technology Incident Report, compiled from suspicious activity reports banks file quarterly, lists 536 cases of computer intrusion, with an average loss per incident of $30,000. That adds up to a nearly $16-million loss in the second quarter of 2007. Computer intrusions increased by 150 percent between the first quarter of 2007 and the second. In 80 percent of the cases, the source of the intrusion is unknown but it occurred during online banking, the report states.
- Another kind of attack is the so-called man-in-the-browser attack, a variation of the man-in-the-middle attack where a Trojan horse permits a remote attacker to secretly modify the destination account number and also the amount in the web browser.

III. CONCLUSION

From all of this, we have learnt that information technology has empowered customers and businesses with information needed to make better investment decisions. At the same time, technology is allowing banks to offer new products, operate more efficiently, raise productivity, expand geographically and compete globally. A more efficient, productive banking industry is providing services of greater quality and value. E-banking has become a necessary survival weapon and is fundamentally changing the banking industry worldwide. Today, the click of the mouse offers customers banking services at a much lower cost and also empowers them with unprecedented freedom in choosing vendors for their financial service needs. No country today has a choice whether to implement E-banking or not given the global and competitive nature of the economy. The invasion of banking by technology has created an information age and commoditization of banking services. Banks have come to realize that survival in the new e-economy depends on delivering some or all of their banking services on the Internet while continuing to support their traditional infrastructure. The rise of E-banking is redefining business relationships and the most successful banks will be those that can truly strengthen their relationship with their customers. Without any doubt, the international scope of E-banking provides new growth perspectives and Internet business is a catalyst for new technologies and new business processes. With rapid advances in telecommunication systems and digital technology, E-banking has become a strategic weapon for banks to remain profitable. It has been transformed beyond what anyone could have foreseen 25 years ago.

IV. REFERENCES

[8] DNI electrónico de España/Spanish ID-card