

Security Risk Assessment and Prevention Methods of E-Banking, (A Case Study of Senegal)

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Abstract

The new information technologies have become an important factor in the financial services sector and with the advent of electronic technologies, electronic banking has become an important element in almost every business. The banking sector is one of the most significant developments in this area. The e-banking has become popular because of its convenience and flexibility, and also transaction related benefits like speed, efficiency, accessibility, etc. In recent years many Senegalese banks have started to offer internet banking services to their customers. Electronic banking systems provide them with easy access to banking services. However, the electronic banking systems have associated information security threats and risks. Electronic banking, security threats and risks that impact both the banks and the banking customers. The purpose of our research is to study the potential risks of e-banking in Senegal, evaluate the risks, and then put forward prevention plans. Based on detailed literature review, a research model was developed. A qualitative research approach was used to get better understanding of these issues. The empirical data were collected from the residents of Senegal by using questionnaires. Data analyses were done in accordance with the research questions and research model. Finally, the results from respondent data and conclusion were drawn by answering the research questions.

Keywords: Electronic Banking, Security, Risks, Senegal, safety.

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1.0 Introduction

Since the second half of the 20th century, the world has been networked through the Internet. The latter has been behind the proliferation of commercial transactions, the spread of broadband and interactive networks, and has changed the relationships between the various economic agents. The advent of the Internet has led to a change in Information and Communication Technologies (ICT). The Internet has also transformed the entire transactions including financial and banking markets. The banking sector, like many industries, has used information and communication technologies (ICT) to value-added services and convenience. Around the 1990s, electronic banking (e-banking) emerged as a means of replacing a few traditional banking branches. The e-banking system has facilitated interaction between customers and banks with the aim of facilitating many services for bank customers. A service that allows customers to bank over the Internet without having to travel to the bank, thus allowing the bank to develop its services, improve its competitive image and meet customers' expectations.

Internet banking has benefited both banks and customers. The banks are benefited because the internet has allowed banks to diminish their operational costs in terms of decreasing physical facilities involving human resources, paperwork, and supporting staff. The customers are benefited because e-banking has given them fast access to various financial activities, such as money transfer, payment for utility bills, checking account management. These services can be developed for the benefit of the customer and the bank, the customer can access the banking service and anytime, anywhere and easily converted. Banks are using internet banking services to reach more customers and provide them with quality services that are customized to their preference and thereby gain competitive advantages[1].

Africa is a continent conducive to the development of e-banking because the majority of the population does not have access to banks especially in rural areas. The Senegalese banking sector has undergone many changes in recent years with the arrival of new players from the Middle East and Europe. As such, Senegalese banks must now overhaul their information system in order to accelerate their developments. They are also required to ensure a level of safety and quality in the services provided to address client concerns.

However, despite the benefits the bank offers its customers through online services, online banking has also raised many security issues. Obtaining safe and secure environment of computer technology is the most important concern for all financial service organizations. Security of online banking transactions is one of the most important challenges to the banking sector [2]. This study investigates the security risk assessment and prevention methods of e-banking in Senegal. Every day, billions of transactions in financial data are made online, skilled hackers manipulate banks' online information systems and online banking cybercrime occurs every day. Threats can come from inside or outside the system, which threatens customer information and transactions, where bank administrators must ensure that banks have the appropriate practices in place to ensure the confidentiality of

customer data, as well as the integrity of the e-banking system and the transactions performed.

1.2 Motivation for the Study.

The objective of this is to study the security risk assessment and prevention method of e-Banking in Senegal. The study seeks to analyze the potential dangers threatening the security of e-banking services through a comprehensive investigation of the relevant literature, to identify the tools and methods that can ensure the consumers' protection in e-banking, to present the results of a pilot study regarding the Senegalese consumer perception on the protection and security related to e-banking services.

2.0 Literature Review

2.1 Internet Banking

Internet banking is defined as the acquisition of banking services via the internet. It provides a vast range of potential advantages because of the attainable and user friendly application of technology. It handles banking transactions on the internet via websites [2] Clients have direct access to the bank's information system from anywhere they have access to the internet. Internet banking provides various online services, such as balance enquiries, ordering checks, instructions for various services (such as balance transfer, opening accounts, perusing account balances), making payments [4], paying bills, transferring cash, saving and investing money [5], printing statements [6], and other information related to accounts. Internet banking has numerous benefits, such as faster marketing because of the easier access to customers, simpler launching of new services, a wider propagation of information [8], competitive advantages, attracting and retaining clients, higher revenues, fewer costs [9], a higher potential to economize time [11] a high capacity of innovation, improved communications, and higher customer satisfaction and loyalty [12]. This channel enables consumers to have most of their banking needs met with a minimum of human intermediation [13]. In general, internet banking enables banks to form and maintain an effective relationship with their clients and to lessen operating costs and fixed costs [14]. Therefore, according to [15][16], and [17], all the above-mentioned benefits of internet banking can help banks achieve a greater market share.

2.2 Developing Countries and Internet banking

Although it is claimed that banks should improve their services [18] to increase market share, there is little research on the relationship between the different channels of presenting innovative banking services and a bank's market share. The current literature on bank marketing considers innovative banking services agents of bank growth, but it neglects the effect of developing various channels of innovative services on a bank's market share. In addition, most of the studies of innovative banking services were performed in developed countries.[19] asserted, however, that developing countries may radically differ from developed countries when exerting and exploiting innovation. It is useful to study the relationship between the development of e-banking channels and bank market share in developing countries like Iran. Based on the above discussion, we theorized that the development of e-banking channels, including Automated Teller Machines (hereafter ATM), Point-of-Sales (hereafter POS), internet banking, telephone banking (TB), and mobile banking [20]; [21]; [22]; [23], positively influences banks' market share. This research contributes to bank marketing literature and practice in two ways. First, this research helps develop a better understanding of whether innovative banking services can influence marketing concepts like market share by combining [24], [21][20], and [23] e-banking channels. Second, by revealing the direct impact of each e-banking platform on market share, this article will enable bank managers and authorities to make their market grow by means of improving their innovative service channels.

2.3 The Role of the Network Structure

In the theoretical literature on contagion and banking crises [23] have suggested that the pattern of linkages in the inter-bank market is critical for financial fragility. In particular they contrast two kinds of inter-bank market structures, which are called complete and incomplete. A complete structure refers to a network topology of the inter-bank market where all banks are connected with each other by claims or liabilities. An incomplete structure is one in which banks are only partially connected. [24] Study an example of an incomplete structure where banks hold inter-bank deposits among each other. In a liquidity insurance framework they analyze 25 the risk allocation and fragility properties of a banking system with four banks which face different liquidity shocks but can enter risk sharing agreements to achieve improved allocations of liquidity contrary to a situation without an inter-bank market. The authors show that the fact whether the inter-bank market structure is complete or incomplete is decisive whether an aggregate liquidity shock leads to contagion and financial crises or not. They conclude that a complete structure is more robust than an incomplete structure. A complete structure leads to a better distribution of the risk of an aggregate liquidity shock and does therefore not create a necessity of costly liquidation of long term assets. An incomplete structure may however lead to large effects of an aggregate liquidity shock because banks can only turn on their neighboring region for liquidity and may enforce premature liquidation with a knock

on effect to other regions.

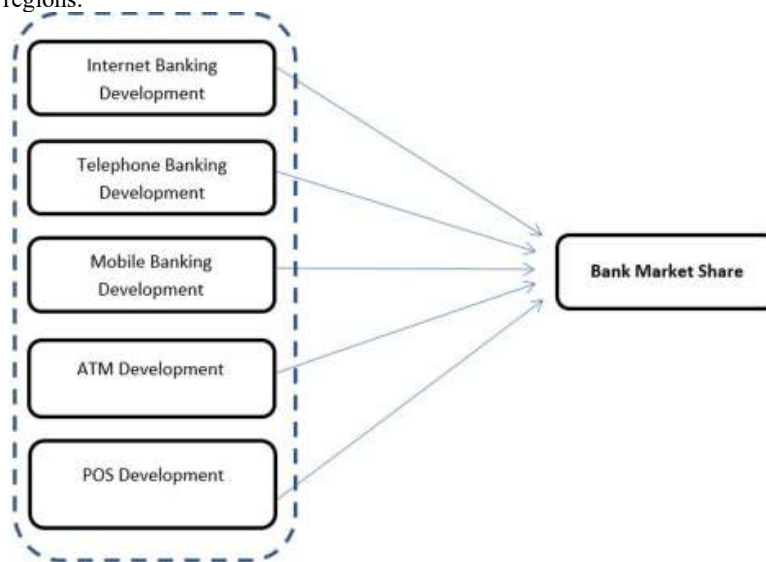


Figure 1. Banking Models

2.4 Challenges of Banking

Implementation of security and data protection mechanisms was a major challenge found in Senegal banks, [25]
Accessibility challenges: Limited to educated people, limited to people with electronic devices. Limited to urban areas, multiple holding of cards in urban and semi-urban areas show low rural penetration. According to [25] the relatively low Internet usage, the non-familiarity with technologically advanced devices were seen as major problems.

Fewer machines: causing queue, poor accessibility and inconvenient Limited availability of Point of Sale terminals and poor transaction culture in POS.

Mobile internet penetration remains weak in rural areas: For settling transactions digitally, internet connection is needed. Interiorly, there is poor connectivity in rural areas. In addition to this, a lower literacy level in poor and rural parts of the country, make it problematic to push the use of e-banking on a wider scale, [26] Higher service charges: higher transaction charges, Most card and cash users fear that they will be charged more if they use cards. Further, non-users of credit cards are not aware of the benefits of credit cards as reported by [27].

Technical challenges: Poor personnel, takes time to be helped when an error occurs, cards problem especially master cards. Information challenges: there is a delay in information causing incomplete transaction. A study in Ethiopia by [28] found that e-banking was not well known to bank customers and many banks were too late to move with technological advancement. Another major threat faced by the banking industry was their non-technical staff and improper training sessions. Mostly the bank sector preferred to appoint those people who belong to banking education or commerce and business education for execution of banking activities, [29].

3.0 Methodology

3.1 Research Design

In this study, the survey was conducted online, by selecting samples of Senegalese residents, using a survey method, with or without electronic bank and bank accounts. A questionnaire was created to collect information on the target audience and to make visible the possible correlation between age, sex, knowledge of computer systems, knowledge of electronic applications and trust in online banking. The qualitative meta-synthesis was applied as a suitable approach and essential stage towards enlarging the research and setting the basis for analyzing the contributions of this paper [27]. This step makes it easy to identify boundaries of the conceptual content of the field and contribute to theory advances [29]. In line with the qualitative research tradition, a qualitative meta-synthesis is an analytical approach that is widely used in study to integrate different findings from diverse studies on the same subject of inquiry from different contexts.

3.2 Population, Sample and Data Collection

In this study, we outlined how the development of e-banking platforms may affect increasing banks' market share, and addressed this issue by analyzing data collected from 176 experts at 5 different banks. The units of analysis in this study were the Senegal Bank branches. Based on rankings published by the Central Bank of the Senegal ledger, Senegal banks are the most innovation-driven bank in the Senegal banking industry, and therefore it was the best

environment for performing this research.

On the emerging trends of financial inclusion in connection with mobile banking, the research found that several attempts have been made by the government to improve financial inclusion in the country through a number of public-sector led credit schemes such:

1. Central Bank of West African States
2. Bank of Africa Sénégal
3. International Commercial Bank
4. Banque Régionale de Solidarité
5. Banque de l'Habitat du Sénégal
6. Ecobank Sénégal

3.3 Strategic Risk E-Banking

On strategic risk E-banking is relatively new and, as a result, there can be a lack of understanding among senior management about its potential and implications. People with technological, but not banking, skills can end up driving the initiatives. E-initiatives can spring up in an incoherent and piecemeal manner in firms. They can be expensive and can fail to recoup their cost. Furthermore, they are often positioned as loss leaders (to capture market share), but may not attract the types of customers that banks want or expect and may have unexpected implications on existing business lines. Banks should respond to these risks by having a clear strategy driven from the top and should ensure that this strategy takes account of the effects of e-banking, wherever relevant. Such a strategy should be clearly disseminated across the business, and supported by a clear business plan with an effective means of monitoring performance against it. Poor e-banking planning and investment decisions can increase a financial institution's strategic risk. Early adopters of new e-banking services can establish themselves as innovators who anticipate the needs of their customers, but may do so by incurring higher costs and increased complexity in their operations.

3.4 Safety to be consider in e-banking

- Review the link provided to ensure it leads to a valid website.
- Act quickly if you suspect fraud.
- Use a strong password and Change your PIN / password often.
- Do not visit suspicious sites.
- Be alert for scam e-mails and Open e-mails only when you know the sender.
- Make sure your home computer has the most current anti-virus software.
- Monitor your transactions.

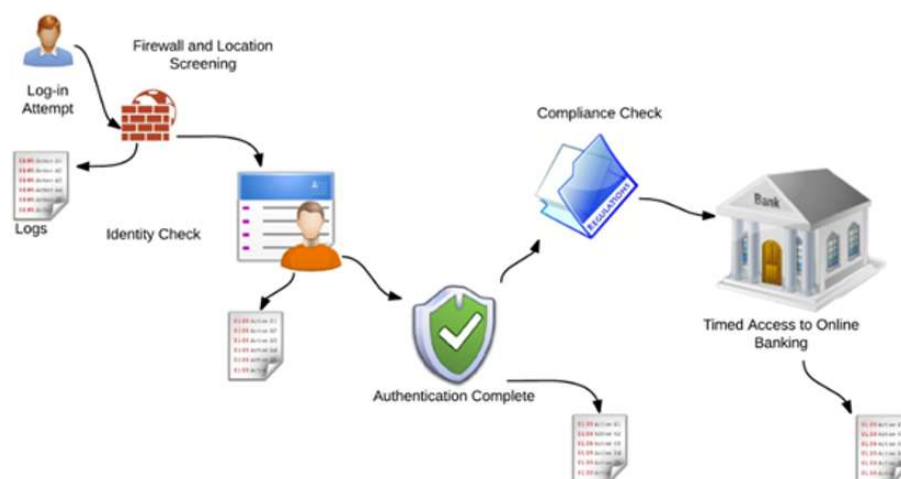


Fig 1: Secure E-banking Flow Diagram

First, credit and debit cards were originally conceived as a replacement of cash for physical payment operations. There have been numerous attempts to reduce the security risks of online payments so far. Unfortunately, many attempts have been more reactive than proactive, as they do not take into account the root of the problem [24]. Therefore, some might offer a base for using credit/debit cards as unique physical and remote tools for all our payment needs (not only e-banking but also e-banking), however, our security practices in this regard are not mature enough to handle these transaction

4.0 Analysis

4.2 Analysis Challenges of using E-Banking Services

The study sought to investigate the challenges faced by customers when using e-banking services in Senegal. Respondents were required to provide their opinions on the challenges they face when using e-banking services and their results were as follows

Table 1: Issues Associated with E-Banking Services (N=176)

Challenge	Frequency	Percent	N
Network problem challenge	71	56.3	126
Security challenge	36	28.8	125
Accessibility challenge	19	15.1	126
Power breakdown challenge	7	5.6	125
Service charges challenge	8	6.4	125
Technical challenge	27	21.4	126
Information challenge	10	7.9	126
Limited withdraw amount	10	8.0	125
Out of service challenge	25	19.1	131

Field data (2021)

This sub-section shows the relationship between e-banking services and security. The variables considered by the researcher were reliability, transfer time, security, availability, easy to use, awareness, accessibility, time factors and the level of satisfaction of customers using e-banking services. Network failure especially in night time, breakdown of ATM machines and server breakdown are the main challenges seen by bank customers. This is caused by poor network infrastructure of many banks. Electronic banking is challenged by cybercrimes, as one can maneuver the whole aspect from a distance and become unrecognized acts of theft in which one creates an email in the name of the financial Institution and deliver it to customer, would cause a serious challenge by giving out information which are used to draw money from a person's account. E-banking services is not helpful in some cases as it is limited to a certain withdraw amount per day hence customers fail to meet their needs.

4.2 Security solutions for e-banking Issues

Adequately protecting credit card information is not only essential to guarantee secure e-banking, but it also offers the possibility of extending the uses and services of cards, especially for e-banking purposes.

1. *Accept the risk*

The first solution that we can think of is, doing nothing and simply accepting the risks. That is a solution that many are seriously considering, given the cost of implementing other, more complex solutions. For example, American Express decided to do this. They simply offer fraud protection for their customers, so that none of them will have to pay anything if they become victims of fraud. For an institution with very low fraud rates involving credit/debit cards, this reactive plan may be the way to go, however, this will only work if the low fraud rates stay constant.

2. *Secure Channels*

This solution is to be more of a patch than a real attempt to stop credit/card fraud considering the current implementations with SSL/TLS and on-line shopping and banking. There is nothing wrong with SSL and all secure channel solutions; they work well but are simply not enough of a security solution to limit credit/card fraud [29]. Consequently, people should avoid telling customers that e-banking/e-banking sites that transactions are 100% secure just because those sites happen to have a digital certificate and use some kind of secure channel technology such as SSL or TLS, to secure the connection. While having these secure connections will not protect a user from all fraud, having these secure connections are much better than having nothing.

3. *Additional Codes and Secrets*

Another solution is to add some kind of secret to the use of the card. Security under this scheme rests then on the secrecy of that additional piece of information, be it a pin, a password or whatever you would like to call it. Both Visa and MasterCard have implemented security solutions that work in this way, called Verified by Visa., In this case, the customer may register a password with their card issuer, and they are asked for it during online-purchases. That way, the customer is identified with the customary information (e.g. name, address) and then authenticated with the password.

4. *Random or Changing Information*

This is also a popular solution implemented by several banks, mainly for controlling access to e-banking systems. On the e-banking side of the coin, there are already solutions similar to our randomly serialized Cheques suggested at the beginning of this article, and this is how they work. It offers customers a secure method to complete online payments, and it does not require online stores to get involved or make additional investments.

4.4 Finding from Managers

From a managerial point of view, our findings regarding the applicability of SDL and the importance of mobile banking can be of special interest to managers and mobile app designers. Our results highlight that platform is essential to boost financial inclusion towards banking services and financial products. From the platform perspective, in fact, consumers are dynamically engaged in the value co-creation process, which relies on experience, personalization and relationship. For instance, managers have to create more chances to co-create platform with the client because the financial institution needs to propose appropriate customized services and customer care that produce better experiences and set the basis for long term relationships with the customers. Moreover, this paper states that financial inclusion is a complex phenomenon and the solutions to reduce financial exclusion are economic, technical and social and have to be used in a mixed set up by public authorities and financial institutions. From this perspective, this paper suggests that policy makers play an important role in creating online communities for consumers that use mobile banking. They could foster financial inclusion practices in virtual places, guiding users and acting as a reference point, or simply answer questions and solve doubts that consumers may have regarding using the financial products. In fact, policy makers should act as a “filter” between banks and users.

5. Conclusion

Internet banking has some inherent risks due to its nature. Legal system is still not very well defined across the globe, internet is prone to hackers and hence fraudulent risks are always there. The factor that technology is designed, driven and controlled by outside non-bank people is a constant threat. The rapid pace of change of information technology presents the banks with the risk of system obsolescence and hence huge costs. In spite of the hardware and software technologies like firewalls, encryption and authentication there is risk perception in transactions particularly of high value. The legal position regarding information technology actions and crimes is still not very sound. Again there is a feeling that the laws around the globe are neither complete nor in perfect harmony as they should be as internet is a global medium. There is a risk of non-bank organization emerging as banks through internet and start offering more lucrative facilities or virtual banks may come up without having any physical presence.

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