A STUDY OF PERCEPTIONS OF E-BANKING SECURITY AND CUSTOMER SATISFACTION ISSUES

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DECLARATION

I hereby declare that this thesis is based on my own independent work, except for quotation and summaries which have been dully acknowledged. I also declare that no part of this work has been submitted for any degree to this or any other university.

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ABSTRACT

An analysis in e-banking security is needed to study the consumer's perception on how safe the e-banking environment in their day to day use. Satisfaction level in the consumers needed to be gathered to see on how does e-banking could be optimized to be better and user-friendly with increased reliability. Cyber-security issues needed to be prioritized as well and needed to be intensively studied in order to provide safe, enhanced and secure online financial services.

Relevance of e-banking increases year on year as more business going online. With increased emergence of online shopping experience demanding a robust and reliable e-banking platform with strong cyber security.

ABSTRAK

Analisis diperlukan untuk mengumpul maklumat mengenai pandangan pengguna terhadap keselamatan perbankan elektronik dalam penggunaan harian. Kepuasan hati pengguna harus diambil tahu untuk memperbaiki dan memberi platform mesra pengguna untuk para pengguna e-perbankan. Masalah keselamatan siber harus diberi keutamaan dan harus dikaji dengan teliti untuk servis kewangan atas talian yang selamat dan meningkatkan tahap keupayaannya.

Kesesuaian semasa perbankan elektronik meningkat setiap tahun kerana dengan peningkatan kemunculan perniagaan-perniagaan yang baru di alam maya dari masa ke semasa. Dengan kemunculan kebolehan membeli-belah di atas talian, menuntut platform e-perbankan yang mantap dan boleh dipercayai dengan keselamatan siber yang kuat.

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CHAPTER 1

INTRODUCTION

1.0 Introduction

Electronic Banking (E-banking) or Internet banking means any user with a personal computer and a browser can get connected to his bank's website to perform any of the virtual banking functions. In internet banking system, the bank has a centralized database that is web-enabled. All the services that the bank has permitted on the internet are displayed in menu. Once the branch offices of bank are interconnected through terrestrial or satellite links, there would be no physical identity for any branch. It would be a borderless entity permitting anytime, anywhere and anyhow banking. (Anon, 2002)

People can now access more information from anywhere at any time due to the advent of the Internet. The Internet is a unique playing field that enables communication, data sharing, and global interaction. The Internet is redefining banking by breaking down conventional boundaries of time and space. The Internet has given rise to new ways to perform a wide range of financial transactions. As a result of these changes, a new age of banking has arisen, called "e-banking."

Electronic banking is one of the truly widespread avatars of E-commerce the world over. In simple words, e-banking implies provision of banking products and services through electronic delivery channels. Various authors define E-Banking differently but the most definition depicting the meaning and features of E-Banking are as follows: "E-Banking is a combination of two, Electronic technology and Banking." "Electronic Banking is a process by which a customer performs banking Transactions electronically without visiting a brick-and-mortar institutions." "E-Banking denotes the provision of banking and related service through Extensive use of information technology without direct recourse to the bank by the customer." (Krishna, et al, 2015)

E-banking refers to a variety of financial transactions that were formerly carried out through the physical exchange of information but are now carried out electronically. Although the

advantages of such advances have been praised, there have also been disadvantages. People have been deterred from participating in the Internet and e-banking revolutions due to concerns about security, fraud, and theft. Furthermore, users could find the prospect of Internet banking unappealing if adequate countermeasures are not in place to prevent malicious acts. (Jake, 2020)

The issue here is that, as technology changes banking processes, insufficient security measures prohibit consumers from reaping the benefits. Furthermore, the security issue is more than just about discouraging participation, it also concerns the unauthorized use and misuse of the Internet for illicit gain and illegal activities. The issue is not limited to a particular group of people, though it may be more prominent in certain age groups, but malicious users may affect anyone. Furthermore, from the standpoint of the institution providing the service, the security issue can be a significant roadblock in selling these online services to consumers. Some banks invest a lot of time and resources into perfecting their online services, and not being able to use them because of Internet vulnerability can be very expensive.

1.1 Background of Study

There have always been people who are hesitant to part with their capital. A fortified bank has long been a secure box concealed under the bed or a sock tucked away under the mattress. This bank, which could be accessed from the comfort of one's own home at any time, gave the account holder peace of mind and a sense of control. Although society has moved away from these values, there are still many who do not trust financial institutions and refuse to use credit cards, for example. Cash is the best way to conduct transactions for these people, since it leaves no space for theft or other illicit and dangerous practices. There has been distrust in banking institutions, in addition to the apprehension of parting with one's capital. Following the great depression and the stock market crash, which paralyzed the country, obliterated many jobs, and left many people penniless, there has been some doubt about entrusting one's life savings to the stranger behind the counter.

Banking institutions have taken substantial steps to ensure that a disaster of this nature does not occur again after these debilitating events. Banks have regained their reputation by forging relationships with their customers and developing a sense of security and trust in them i.e. credibility. It's possible that trust alone won't be enough to bridge the gap between banking and e-banking. When the transaction takes place in front of the individual whose funds are being used, a sense of protection is easier to sell. Furthermore, for older generations, particularly those who are accustomed to physical transactions, the idea of e-banking in a safe setting is more difficult to comprehend. (Prem, 2019)

In addition to the usability problem, e-banking is dependent on a number of other factors. The personal computer is one of the most important components of online banking and money exchange. Older generations are frequently disenfranchised because they do not own computers and did not grow up during the computer and Internet age. Another stumbling block to online banking is social factors like schooling and financial status. An indiscriminate number of people may be unable to use a personal computer due to a lack of expertise. Furthermore, due to the high cost of owning a machine, financial status can be a stumbling block. Not only must the device be bought, but it must also be secured with the requisite software to avoid malicious attacks, viruses, and other illegal activities. (Chai, 2010)

The transition to online banking can be intimidating for an inexperienced person with a shaky understanding of computers. The tangible movement of funds seems archaic in today's banking industry due to transactional activities. Cash is becoming increasingly scarce, while credit cards and debit cards are proliferating. Furthermore, with modern ways to buy and sell goods, cash is no longer the most realistic alternative in many cases. Previously, buying and selling could only be done over the phone, via the mail, or in person. Now, the Internet is a viable alternative. Paying bills, exchanging money, and handling portfolios have all been revolutionized, in addition to the basic transactions of purchasing and selling goods. All activities that previously required the security of a physical exchange can now be completed electronically. Feeling secure enough to perform these financial transactions over the Internet raises a slew of security issues related to the ideas discussed above. The psychological barriers associated with an individual's comfort level with electronic

commerce in relation to age, financial status, and education provide a basis for the security dilemma and may provide a correlation for current attitudes toward e-banking.

The following three basic kinds of internet banking are being employed in the marketplace:

1. Informational - This is the basic level of electronic banking. Typically, the bank has marketing information about the bank's products and services on a stand-alone server. Risk involved in such kind of internet banking is relatively low as informational systems typically have no path between the server and the bank's internal network. This level of internet banking can be provided by the bank or outsourced. While the risk to a bank is relatively low, the server or website may be vulnerable to alteration. Appropriate controls therefore must be in place to prevent unauthorized alterations to the bank's server or website.

2. Communicative - This type of electronic banking system allows some interaction between the bank's systems and the customer. The interaction may be limited to e-mail, account inquiry, loan applications, or static file updates (name and address changes). Because these servers may have a path to the bank's internal networks, the risk is higher with this configuration than with informational systems. Appropriate controls need to be in place to prevent, monitor and alert management of any unauthorized attempt to access the bank's internal networks and computer systems. Virus controls also become much more critical in this environment

3. Transactional - This level of electronic banking allows customers to execute transactions. Since a path typically exists between the server and the bank's or outsourcer's internal network, this is the highest risk architecture and must have the strongest controls. Customer transactions can include accessing accounts, paying bills, transferring funds, etc.

1.2 Problem Statement

The evolution of e-banking and online transactional operation has given the word security a whole new meaning. The identification of common Internet security issues has given rise to a study on e-banking and security, thanks to the development of the Internet and the

revolution of e-banking. The primary goal of this study was to address related e-banking security concerns as well as the bank-customer relationship in terms of Internet security.

1.3 Significance of Study

This research was significant because it determined whether there was a connection between level of experience and comfort with online banking activities and age, education, and salary. The study also analyzed knowledge of online security initiatives and presented the most widely used e-banking options. This research can be used to determine which areas need further clarification from banking institutions in order to familiarize consumers with online products and how to make users feel more at ease when banking online. Also, based on the demographic and socioeconomic correlation, it is possible to determine which category of people should be targeted in order to increase e-banking use and familiarity with online services.

1.4 Purpose of Study

The developments in the area of e-banking and online transactional activity have spawned new meaning for the term security. Through the evolution of the Internet and the revolution of e-banking, the delineation of common Internet security issues has given rise to a study on e-banking and security. The primary purpose of this study was to discuss the relevant e-banking security issues and the relationship between the bank and the customer with regards to Internet security. Furthermore, the study will use a survey to determine which are the most pressing online banking issues, as well as the users' comfort level with each choice, in order to determine whether there is any connection, if any, between demographic characteristics and feelings toward e-banking.

1.5 Research Questions

Is there a connection between user feelings about carrying out financial transactions online and their demographic and/or socioeconomic characteristics, given the related security

issues associated with online banking? A descriptive analysis study will be used to answer this issue.

RQ1: Is there a relationship between the respondents' comfort level with the idea of online banking and their age?

RQ2: Is there any relationship between the respondents' attitude towards Internet banking and the respondents' level of education?

RQ3: Is there a relationship between the respondents' comfort level with the idea of online banking and their annual salary?

1.6 Definition of Terms

A variety of terms are used throughout the explanation and study of online banking and security. In order to create an understanding of the fundamental terms associated with online banking, specific terms have been defined.

Authentication – A method of identifying someone based on "something the user knows, something the user possesses, and something the user is" (FFIEC, 2001, p.2).

Biometrics – "Refers to automatic identification of a person based on his or her physiological or behavioral characteristics" (Jain, Hong, & Pankanti, 2000, p.90)

E-banking – Any transactional banking activity that was once done at or through a banking institution and is now carried out online.

Encryption – Process in which information to be transmitted across the Internet is converted into a secure code, sent, and then translated back into its original format upon reception.

Firewall – "Systems put into place in order to provide a barrier between an organization's internal information and file and external Internet users…" (Blake, 2002).

Virus – Any pathogen that is designed for the specific use of harming a computer's files or hardware. Intended for malicious use.

1.7 Limitations of the Study

For this research the following limitation were present in the collection of data:
The survey assumes that the respondents will have some familiarity with banks and banking transactions and have been exposed to or have knowledge of the existence of e-banking alternatives.

1.8 Customer Perception and Satisfaction with Electronic Banking

The ultimate goal of any organization is generation of profits and that can be achieved with attaining customer perception and satisfaction. A satisfied customer will come back and refer the electronic banking services to other as well, generating more sales and hence more profits. Banks are no different as they also thrive for profits. Customer perception and satisfaction is considered as a necessary condition for customer retention and loyalty and hence helps in realizing economic goals. Banks are now moving its business toward online along with the conventional banking. Internet banking is just the extension of conventional branch banking. Here the services are being provided online that were originally provided in the branches. Thus, customer satisfaction has got great importance in electronic banking as well. High level of satisfaction is demanded by the customer as customer expectation in electronic banking is very high and competition is also high with little differentiation in type of services offered. Hence, banking institutions along with the researchers have realized the importance of customer satisfaction in internet banking.

1.9 Summary

In this chapter, the researcher has discussed about the primary objectives about the introduction research, research background, significance of study for perceptions of E-banking security and customer satisfaction issues. So the researcher will continue on this research for the literature review in Chapter 2.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

Over the last decade, a surge of information technology has swept the globe, transforming people's lives. Information technology has altered the world's operations in a variety of ways, from how people interact with one another to how people balance their check books. Portable computers, e-mail, and the Internet have turned the world into a virtual sandbox that anybody, anywhere, and at any time can access. It's difficult to remember life before the Internet era; processes and acts that we take for granted today were once just a pipe dream for previous generations. Data from universities and libraries thousands of miles away can now be accessed thanks to technical advances. They've made it possible to send a message in a matter of seconds, which would otherwise take days or weeks. Technological advances have allowed a person in Japan to not only interact with someone in the United States, but also to see crystal clear images of them at any given time. Furthermore, they have facilitated the conduct of complex and highly sensitive financial transactions in a matter of minutes from anywhere on the globe.

The Internet has changed the way people shop and bank, and it has become a common distribution platform for financial products and services. Common banking transactions that once necessitated a trip to the bank are becoming obsolete. At any time of day, on any day of the week, a customer can perform a range of banking and financial transactions from the comfort of their own home. Customers have discovered a number of time and money saving methods due to the availability of e-banking, which is available 24 hours a day, seven days a week. E-banking also has the ability to strengthen a bank's relationship with individual customers as well as business partners. Banks are seeking new and more productive ways to conduct business as e-banking brings financial activities directly into homes and offices with 24/7 availability, enhanced connectivity, and fostered standardization between companies.

2.1 Literature Review

2.1.1 The Internet

The Internet was the work of dozens of pioneering scientists, programmers and engineers who each developed new features and technologies that eventually merged to become the "information superhighway" we know today. Long before the technology existed to actually build the internet, many scientists had already anticipated the existence of worldwide networks of information. Nikola Tesla toyed with the idea of a "world wireless system" in the early 1900s, and visionary thinkers like Paul Otlet and Vannevar Bush conceived of mechanized, searchable storage systems of books and media in the 1930s and 1940s. (Evans, 2019)

Still, the first practical schematics for the internet would not arrive until the early 1960s, when MIT's J.C.R. Licklider popularized the idea of an "Intergalactic Network" of computers. Shortly thereafter, computer scientists developed the concept of "packet switching," a method for effectively transmitting electronic data that would later become one of the major building blocks of the internet. (Evans, 2019)

From its modest origins as a four-computer network to the advanced proliferation of computer technology, the Internet has evolved to cover the entire globe. The first network was put together by the initial military initiative known as ARPANET, or the Advanced Research Projects Agency, in an effort to simplify communication. (World Almanac & Book of Facts, 2001).

On October 29, 1969, ARPAnet delivered its first message: a "node-to-node" communication from one computer to another. (The first computer was located in a research lab at UCLA and the second was at Stanford; each one was the size of a small house.) The message—"LOGIN"—was short and simple, but it crashed the fledgling ARPA network anyway: The Stanford computer only received the note's first two letters. The technology continued to grow in the 1970s after scientists Robert Kahn and Vinton Cerf developed Transmission Control Protocol and Internet Protocol, or TCP/IP, a communications model

that set standards for how data could be transmitted between multiple networks. (Evans, 2019)

ARPANET adopted TCP/IP on January 1, 1983, and from there researchers began to assemble the "network of networks" that became the modern Internet. The online world then took on a more recognizable form in 1990, when computer scientist Tim Berners-Lee invented the World Wide Web. While it's often confused with the internet itself, the web is actually just the most common means of accessing data online in the form of websites and hyperlinks. The web helped popularize the internet among the public, and served as a crucial step in developing the vast trove of information that most of us now access on a daily basis. (Evans, 2019)

Today, the Internet provides unrestricted access to high-quality resources in real time. People are increasingly using the Internet to complete tasks that would only be performed in person. Anything from buying a plane ticket to reading up on the latest breaking news is achieved instantly via the online industry. People connect via e-mail or online chat all over the world, and products and services are accessible to everyone, anywhere. The Internet's advances have totally changed people's lives. "Every year, the online procurement industry is said to double in size" (World Almanac & Book of Facts, 2001).

In order to keep up with technological advances, banks all over the world are offering e-banking as a viable alternative to conventional banking methods in the hopes of attracting new customers. Consumers are becoming more Internet-savvy, and they are constantly demanding services and goods delivered across online platforms. "...Internet banking seems to be a reaction to both the technological shortcomings of previous Home banking systems and the increasing demands of consumers" (Giannakoudi, 1999, p. 205). The change from brick-and-mortar banking to point-and-click banking, on the other hand, is not seamless. "Anyone equipped with common Internet access facilities can participate and exchange data...", according to Giannakoudi, making the transition appear easy. In reality, the transformation is riddled with stumbling blocks that must be overcome. The topic of Internet protection is a big challenge to address.

2.1.2 The Online Services

Despite the security issues surrounding e-banking and the Internet, the advances and advantages of e-banking to both customers and banks are immeasurable. From the viewpoint of the customer, e-banking helps them to pay bills, control accounts, and shop from the comfort of their own homes. Along with conventional services like checking bank accounts, exchanging money, and maintaining a clear record of transactions, the open network of the Internet has made it possible for a range of completely new financial services and products like "digital money" and "electronic checks" to become viable and accessible to consumers all over the world. 205-206) (Giannakoudi, 1999).

The need to send bills on time or wait for a monthly statement to balance a checking account has been eliminated thanks to e-banking. With the rise of online purchases, the amount of paperwork and time spent on these activities has decreased with the click of a button. Many consumers have switched to online banking and bill payments as a more cost-effective alternative to purchasing stamps and mailing bills every month or paying late fees when a bill was not paid until the last day of the payment window. Customers no longer have to be concerned about being out of town when a bill is due because banks now allow them to access their accounts from anywhere in the world and manage their finances. ACH transfers, or automatic clearing house transfers, may also be used to debit or credit an account. This option has also lowered the expense of the service for the banks that provide it; “an online transaction costs the bank much less than a face-to-face contact with a bank's teller” (World Almanac & Book of Facts, 2001). Banks have been able to focus their attention on enhancing other areas of their organizations with fewer paperwork to handle each month and the money saved. Banks are able to provide a wider range of services and have global access to these services as a result of this streamlining and standardization of options. They are able to extend their market presence into many different parts of the world, enabling them to attract a greater number of potential customers. “Consistent portrayal of a bank on the Internet...allows even small banks to extend their businesses geographically,” writes Giannakoudi (1999). (p.206).They can also expand their business relationships outside of banking and form global alliances that lead to electronic solutions in banking and beyond.

While financial institutions took steps to implement e-banking services in the mid-1990s, many consumers were hesitant to conduct monetary transactions over the web. 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 percent 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 percent 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 percent of U.S. adults and 30 percent in the United Kingdom bank online. (Batchelor, 2017)

E-banking offers consumers and organizations many benefits, including 24/7 access to accounts and services. As financial institutions continue to develop online banking, customers are using more services, such as bill payment across industries, money transfer and mobile e-banking using cell phones and hand-held devices. While a number of industry and governmental forces are combining to fight Internet fraud, financial institutions continue to invest heavily in online services. The benefits are too great to turn back, despite worries about security. Active online banking users not only show greater loyalty to their bank, but they almost always carry higher balances. In an age where even the largest financial institutions are willing to fight for every single customer, these benefits are huge. (Batchelor, 2017)

2.1.3 The E-banking Revolution, Security and Safety

With regard to e-banking, security concerns are found fairly important, when it comes to collection and management of personal and financial confidential data and service quality is

often considered in terms of transaction security. Service quality is termed directly in form of safe and correct transfer of funds and payment confirmation and indirectly in form of risk involved in transaction. (Ziqi, et al, 2002) Quality of website, Security statement and technical security are very crucial and relevant factors in order to enhance intention to use internet banking and to address security concerns. However, in some of the cases, people may consider cost and benefits to make trade-off between ease of access/ usability and security concerns. (Hyun, et al, 2013) Security and privacy risk may be defined as a potential loss in event of a fraud or e-banking user security is compromised by a hacker. Phishing is a comparatively new style of committing cyber-crime. In this, phishers tries to illegally acquire personal confidential information related to bank accounts, such as user credentials and credit or debit card particulars, by showing them as a reliable entity or organization in an e-mail or electronic message. (Nicola, 2005) In phishing attack, end user receives an e-mail (referred as spoof email), usually representing a trustworthy entity, which then takes user to an equally fraud website representing same entity. This website is used to gather confidential personal and financial information of user (Payam, et al, 2014) Fraud and Hacking result into a financial loss for the user and its privacy is compromised. Due to these incidents, customers tend to believe if they use e-banking, then they may be compromising their privacy and revealing their identity to many other unintended persons, who may misuse the same. (Dale, et al, 2006)

There are five types of risks which can be considered as negative factors or resistance in adoption of e-banking, these are security risk, financial risk, social risk, time risk and performance risk. E-banking adoption is adversely impacted mainly by Security risk. This seems to be most concerning factor for adoption of e-banking. This implies the fact that customers or end users are mostly concerned about their personal data theft and loss due to fraud. So, implementing various encryption methods and robust authentication mechanism should be a priority area for service providers to ensure fast adoption to e-banking. Second main adverse impact on the adoption of e-banking is caused by financial risk (Ming-Chi, 2009)

Efforts to improve e-banking's availability and accessibility go hand in hand with security concerns. Consumers can access online baking, online bill pay, portfolio management, stock

trading, and online shopping through banks and other financial institutions. While these conveniences are readily accessible, they are extremely responsive. Banks have reorganized their organizations to incorporate Information Technology Departments as an integral part of their operations in order to ensure the safety of their customers. These IT departments have taken steps such as designing authentication processes for both the host and the remote client, encrypting data sent and received with the development of 128-bit encryption, internal network protection and regulation, and firewall implementation, to name a few. These firewalls were placed in place by banks to defend themselves from viruses and other malicious software. Many banks have now employed trained network managers as part of their IT departments to ensure the safety of both consumers and institutions that use and log into the bank's network. Biometrics and electronic fingerprinting will be used in the future to ensure compliance with these security measures. Banks are often advised to concentrate on internal security by considering situations involving disgruntled staff or internal hackers. (World Almanac & Book of Facts, 2001).

The consumer is also responsible for their own safety and security. The key focus of consumer protection is the creation of customer identification numbers, passwords, and other types of customer identification that enable customers to log into a bank's website and perform safe transactions. One of the most serious issues that customers face is password security. Outside parties with malicious intent are discouraged from hacking computers by using passwords that are difficult to guess. Many banks now demand case-sensitive passwords with a minimum number of characters and a mix of numbers and letters. Customers are often encouraged to change their password on a regular basis, and in some cases, are expected to do so. Consumers may also take advantage of the same security measures that banks use. Customers are advised to "download antivirus software... Keep it up to date, and try to stay informed about new viruses that can necessitate special attention... Consider purchasing a ‘firewall software to guard…against attacks by hackers” to shield yourself. (World Almanac & Book of Facts, 2001).

2.1.4 Crimes and Countermeasure Strategies

Cybercrime such as identity theft, credit card fraud, and virus attacks can be avoided with password protection and a basic understanding of computers. Operating a device that has access to personal or sensitive financial data should be performed in a clean, safe environment. When a customer logs in from a public or shared device to visit websites that require password protection, problems occur. If a user does not log out entirely, all confidential data is readily available to the next user. By simply pressing the browser's "back" key, anyone attempting to use this public computer may gain full access to the previous user's bank account, e-mail account, financial portfolio, or credit cards. On a personal computer, instances of this public or shared access may not be as frequent, but this should not give users of home computers a false sense of security. Furthermore, while firewalls and antivirus programs are significant, they should not be the only security tool in your arsenal. Consumers and financial institutions need to know who is on the other end of a conversation that might contain classified information. Authentication protocols should be used to determine identity. As more institutions outsource some of their Internet needs and transactions go through these vendors first, the threat of malicious third parties are becoming more prevalent.

Wireless Internet access, in addition to computer Internet access, is creating a new avenue for financial transactions. A misplaced mobile phone may hold the key to a company's financial portfolio or asset schedule. Furthermore, with the buying power of the Internet, a lost or stolen credit card may be a defrauder's dream come true, resulting in exorbitant bills and identity theft. Money laundering and the proliferation of illegal businesses and wealth are two final concerns. The Internet, in its entirety, exists outside of the regulatory system. In the virtual world, many of the laws that govern the real world do not apply or are impossible to implement. Illegitimate businesses excel in the virtual marketplace because they can take advantage of naive consumers.

There are four key tools that regulators need to focus on to address the new challenges posed by the arrival of e-banking: (Saleh & Andrea, 2002)

Adaptation: In light of how rapidly technology is changing and what the changes mean for banking activities, keeping regulations up to date has been, and continues to be, a far-

reaching, time-consuming, and complex task. In May 2001, the Bank for International Settlements issued its "Risk Management Principles for Electronic Banking," which discusses how to extend, adapt, and tailor the existing risk-management framework to the electronic banking setting. For example, it recommends that a bank's board of directors and senior management review and approve the key aspects of the security control process, which should include measures to authenticate the identity and authorization of customers, promote nonrepudiation of transactions, protect data integrity, and ensure segregation of duties within e-banking systems, databases, and applications. Regulators and supervisors must also ensure that their staffs have the relevant technological expertise to assess potential changes in risks, which may require significant investment in training and in hardware and software. (Saleh & Andrea, 2002)

Legalization: New methods for conducting transactions, new instruments, and new service providers will require legal definition, recognition, and permission. For example, it will be essential to define an electronic signature and give it the same legal status as the handwritten signature. Existing legal definitions and permissions—such as the legal definition of a bank and the concept of a national border—will also need to be rethought. (Saleh & Andrea, 2002)

Harmonization: International harmonization of electronic banking regulation must be a top priority. This means intensifying cross-border cooperation between supervisors and coordinating laws and regulatory practices internationally and domestically across different regulatory agencies. The problem of jurisdiction that arises from "borderless" transactions is, as of this writing, in limbo. For now, each country must decide who has jurisdiction over electronic banking involving its citizens. The task of international harmonization and cooperation can be viewed as the most daunting in addressing the challenges of electronic banking. (Saleh & Andrea, 2002)

Integration: This is the process of including information technology issues and their accompanying operational risks in bank supervisors' safety and soundness evaluations. In addition to the issues of privacy and security, for example, bank examiners will want to know how well the bank's management has elaborated its business plan for electronic banking. A special challenge for regulators will be supervising the functions that are outsourced to third-party vendors. (Saleh & Andrea, 2002)

CHAPTER 3

RESEARCH METHODOLOGY

3.0 Introduction

The overall goal of this study was to discuss related e-banking security issues as well as the bank-customer relationship in terms of Internet security. A correlation study was conducted by means of a survey to determine whether technological advances in banking and security issues are influential in a user's decision to engage in online banking. The purpose of the survey was to look into the relationship between demographic features and feelings about e-banking, as well as to highlight the most pressing online banking problems and the user's level of comfort with each choice. The goal of the study was to see if there was a link between certain demographic characteristics and a user's willingness to engage in online banking and their feelings about online services. Generalizations and forecasts about the future proliferation of online banking services and products were possible thanks to the aggregation and analysis of data. The main goal of this chapter is to emphasize the research framework, which includes the research design, data collection method, and data analysis methods.

3.1 Research Design

3.1.1 Population and Sample

A purposive sample was used in this study. The population was not limited by factors such as location because the survey was conducted over the Internet. Customers and employees from local banking institutions, as well as students and professionals from Selangor, Malaysia, were included in the poll. The sample of respondents used in the correlation analysis was selected at random from the total number of people who responded to the survey and was representative of the overall population. Each participant was assigned a number, and the sample was generated using a random number generator. The sample group was formed when the number produced corresponded to a respondent.

3.1.2 Instrumentation

The survey was the primary tool used in this study, and it was written by the researcher and approved by the thesis program's chair. The survey's questions were closed-ended, with predetermined responses from which respondents could choose. These answers were chosen because they were easier to standardize, analyse statistically, and were more consistent over the course of the survey and data extrapolation. The survey consisted of four types of questions that elicited four different types of answers. When asked about race or gender, the responses were categorical. Ordinal answers referred to questions in which the respondent was asked to rate options. The individual was asked to rate their level of comfort or ease of use with respect to certain online services in these questions. Choices involving numbers were referred to as numerical responses. The survey's final set of questions included a series of demographic and/or socioeconomic questions that were used in the data's correlation analysis. These were demographic questions about the person being polled, such as age, race or ethnicity, education, and gender. Typically, these questions are useful for establishing a link between the independent variables and the other dependent variables that the survey was designed to determine.

3.2 Pilot Study

In order to screen out problems in the instructions or design of a questionnaire, a trial run with a group of 20 randomly volunteered individuals were administered. The questionnaire was found to have easy understanding and unambiguous statements.

3.3 Procedure of Data Collection

A structure questionnaire was used to collect necessary data, which served as primary data to answer the research questions and objective regarding perceptions of e-banking security and customer satisfaction issues. The survey consists of 24 questions and each question contain different part of the study. In view of time constraints and difficulty to access

respondents in Selangor the researcher used google forms to setup questions related to the study thereafter used google automated analytics tool to analyze the outcome of the survey which was made available online.

3.4 Data Analysis

Data collected through google survey method thereafter results administered using google automated analytics tool. The entered data was checked for errors.

3.5 Ethical Consideration

The data collected kept anonymously while respondents participated in the survey did not feel any coercion at no point prior to the survey. Informed consent stated that an individual must give their explicit consent to participate in the study which was written in the form of disclosure to create trust between the researcher and the participants.

3.6 Conclusion

Based on the pilot study which was participated by 20 randomly volunteered respondents, the researcher managed to obtained precise information to understand and evaluate the opinions on perceptions of e-banking security and customer satisfaction issues.

CHAPTER 4

DATA ANALYSIS AND DISCUSSION OF FINDINGS

4.1 Data Analysis

The present chapter discusses about overall outcome of the survey responses which was obtained from google automated analytics tool. The responses administered to observe whether is there a relationship between the respondents' comfort level with the idea of online banking and their age? Besides, the responses were analysed to find whether is there any relationship between the respondents' attitude towards Internet banking and the respondents' level of education? Finally, the researcher examined to discover whether is there a relationship between the respondents' comfort level with the idea of online banking and their annual salary? All the data collected from final random 80 respondents whom answered the survey voluntarily were carefully inspected by the researcher and findings of the study has been discussed accordingly.

The illustrations shown below discusses overall outcome of the survey which is divided into two section under demographic analysis and attitude of customer towards e-banking analysis.

4.1.1 Demographic Analysis

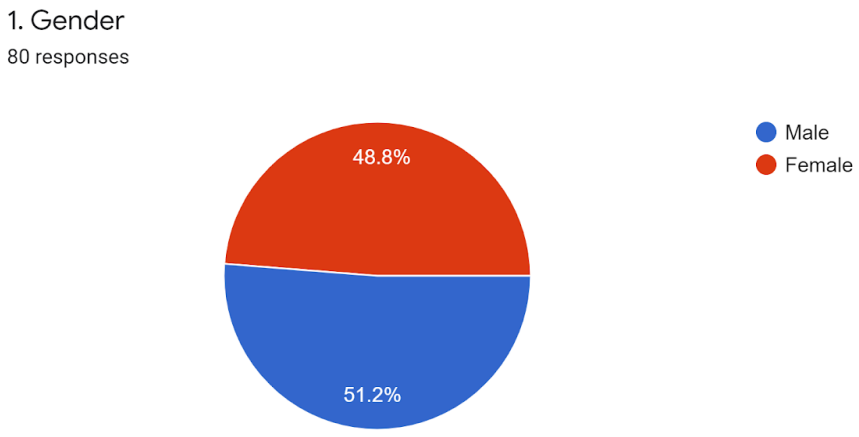

Chart 1: Gender

51.2 % male respondents and 48.8% female respondents participated in the survey.

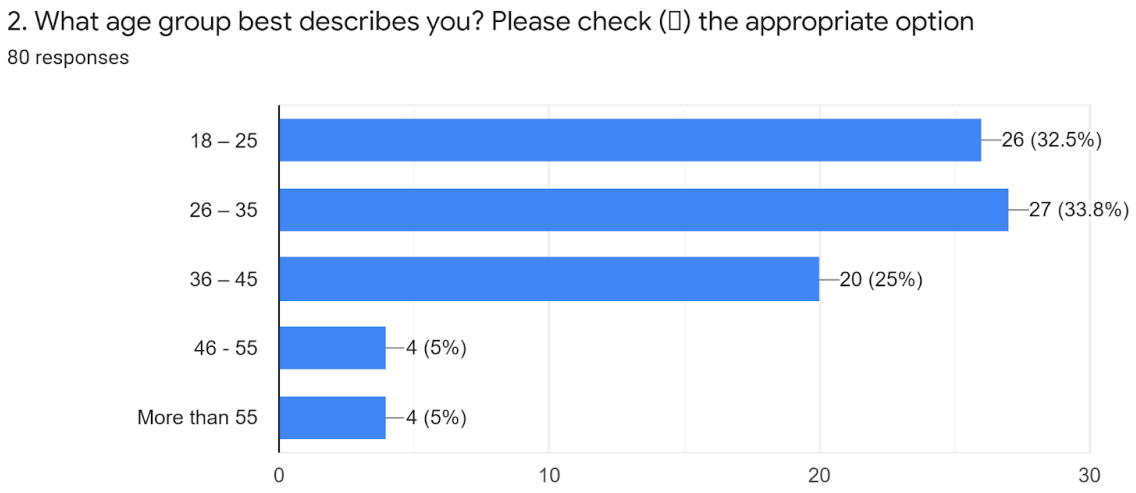

Chart 2: Age

Almost every spectrum of the age group participated in the survey.

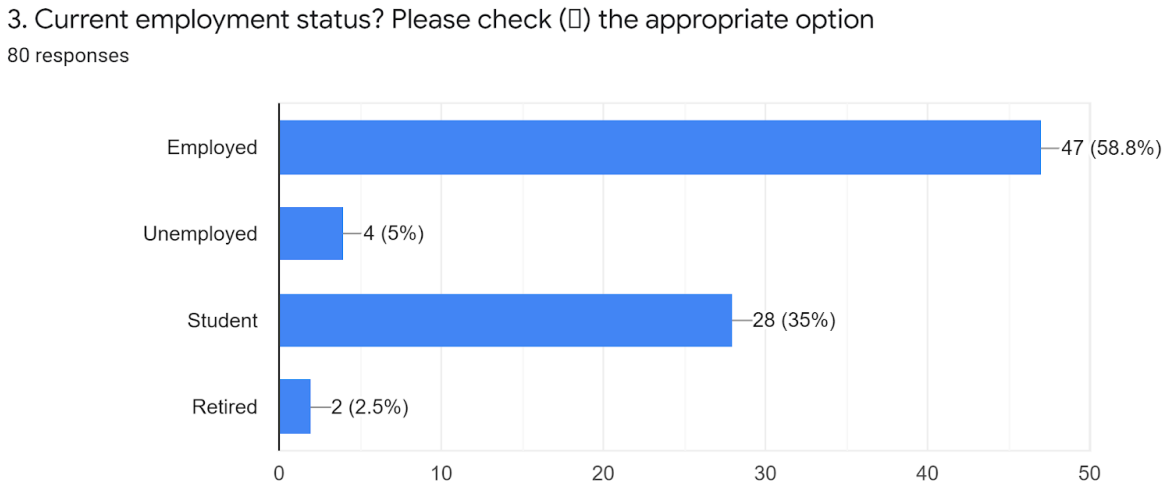

Chart 3: Employment Status

Highest number of respondents participated are all employed which marks up to 58.8% of overall respondents. Followed by students, 35%.

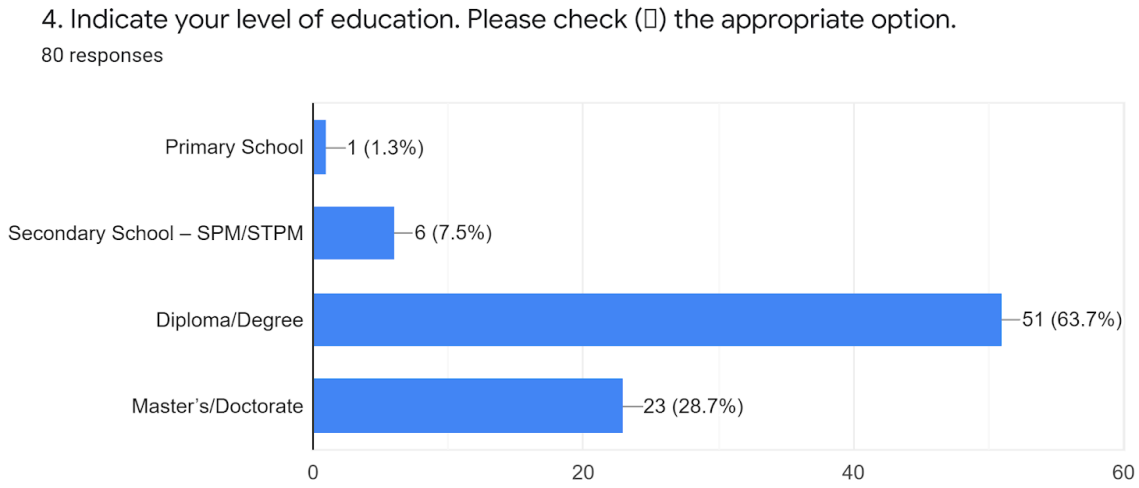

Chart 4: Education Level

Majority of participants contributed to the survey are from Diploma/Degree category which shown as 63.7% followed by respondents from Master's/Doctorate level which is 28.7% of overall participants.

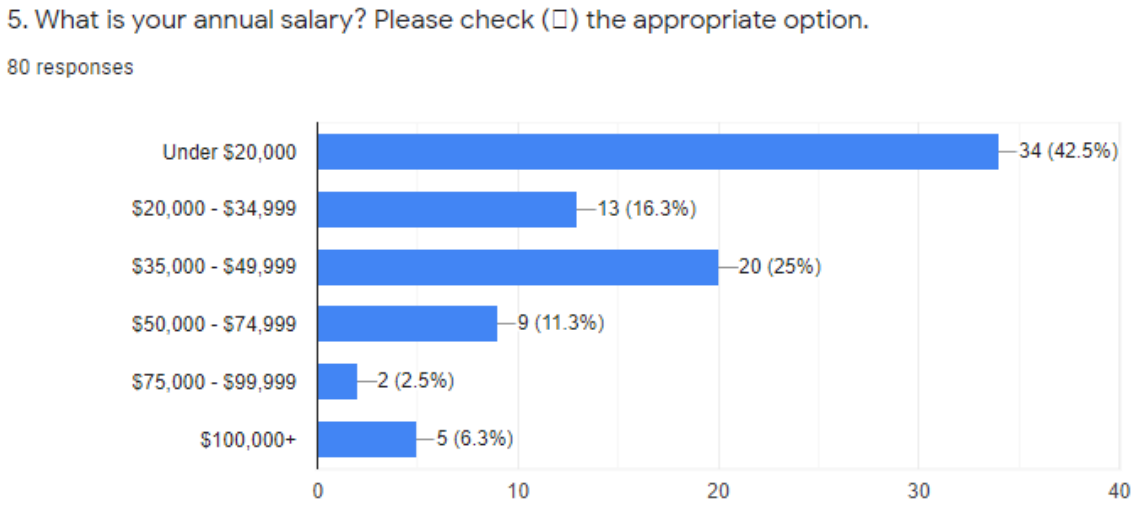

Chart 5: Annual Salary

Based on the chart above, most respondents participated in the survey fall under income group ranging under $20,000 which is 42.5% as compared to overall participants.

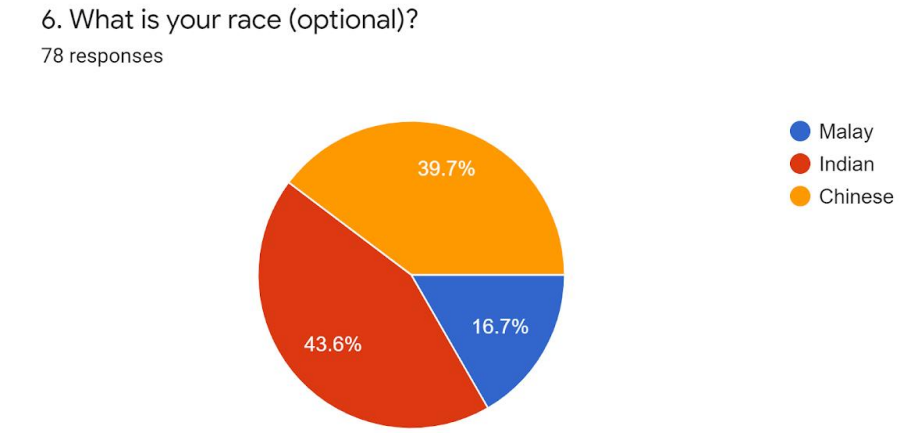

Chart 6: Race

Majority responded to the survey are from Indian ethnic group which is 43.6%.

4.1.2 Attitudes of Customers towards e-Banking

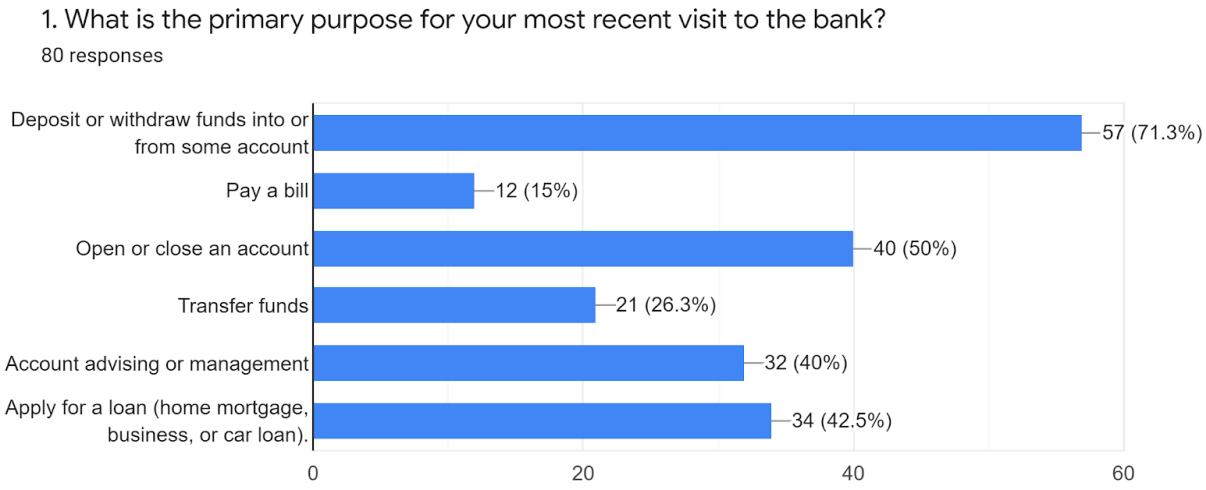

Chart 7: Primary Visit Purpose

Majority of respondents visits the bank for the purpose of deposit or withdraw funds.

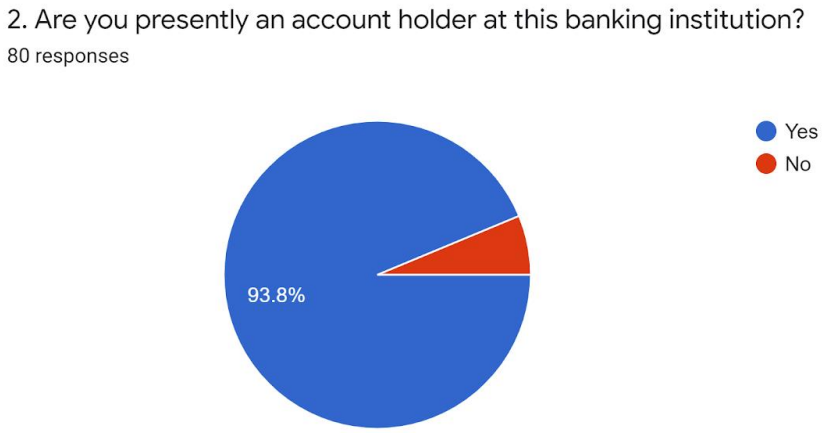

Chart 8: Declaration of account with banking institution

Majority of the respondents held account with banking institution

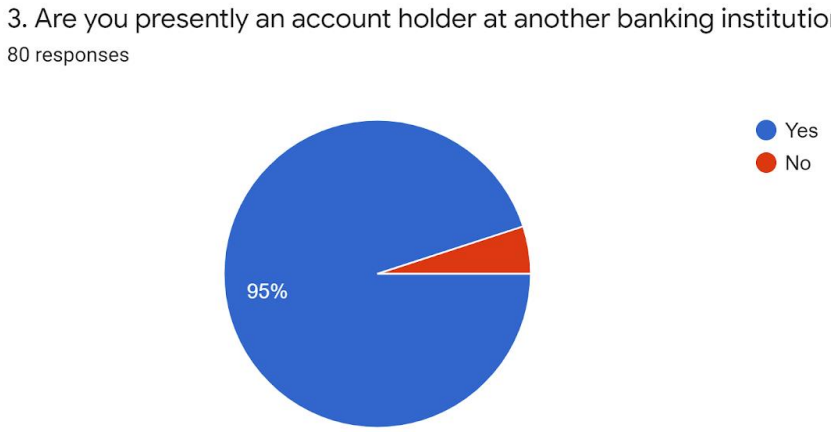

Chart 9: Declaration of account held with other banking institution

Majority of the participants held account with more than one banking institution.

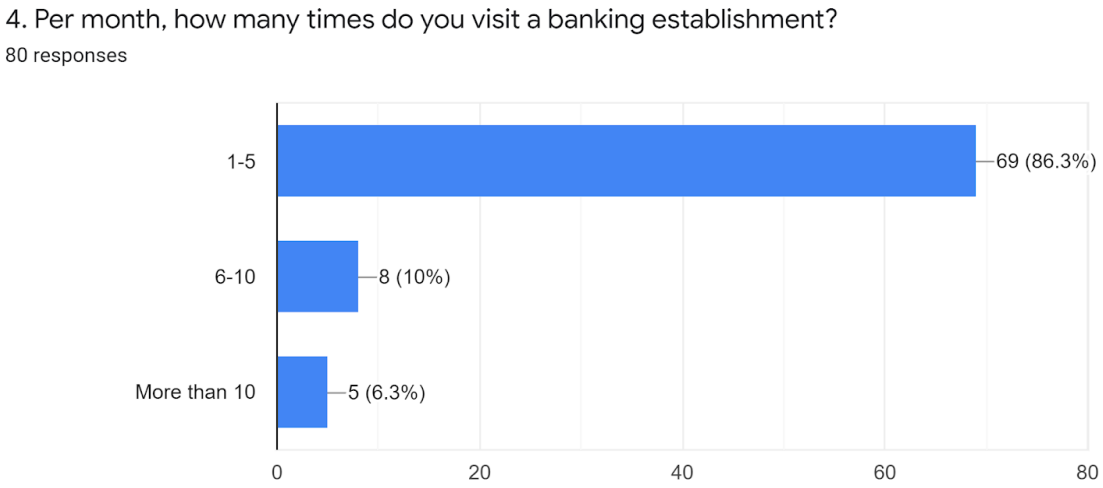

Chart 10: Frequency of visit to the bank

Majority of the participants visits the bank at least 1 to 5 times in a month.

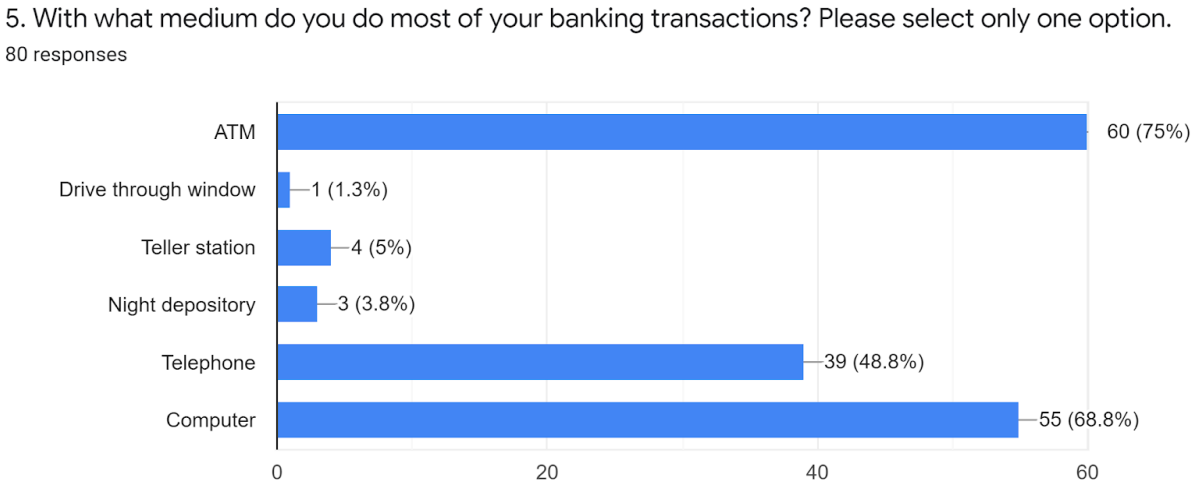

Chart 11: Medium of banking transactions

Most of the respondents' uses ATM machine and computer as a medium to perform banking transactions.

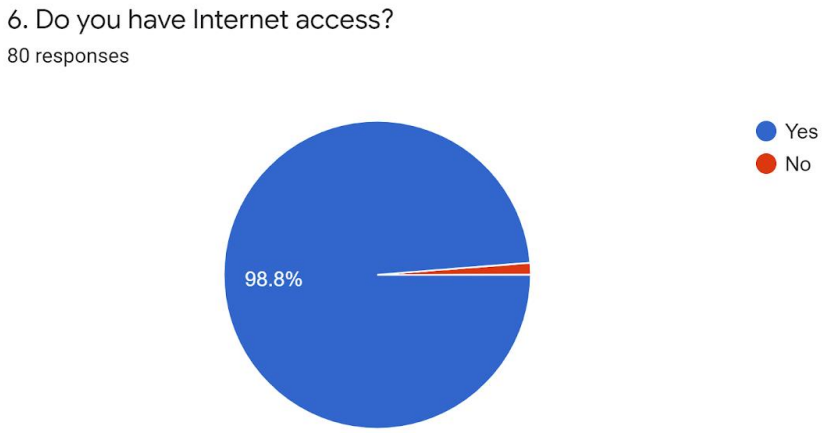

Chart 12: Internet access declaration

Almost all the respondents has internet access.

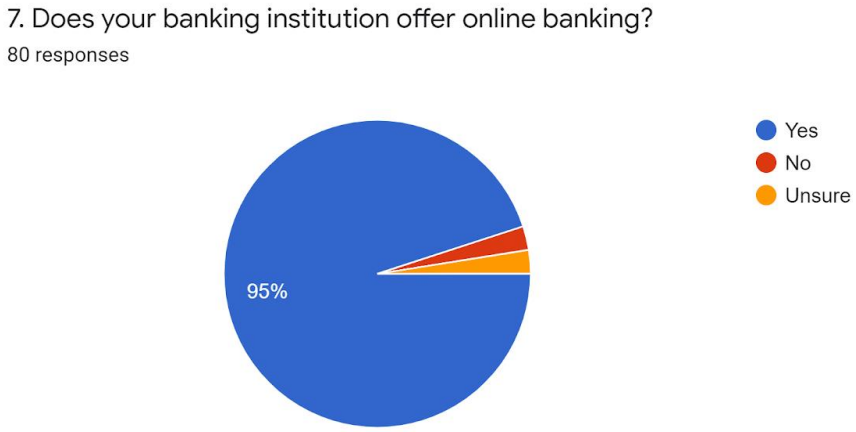

Chart 13: E-Banking Availability

Almost all the banking institution offers online banking.

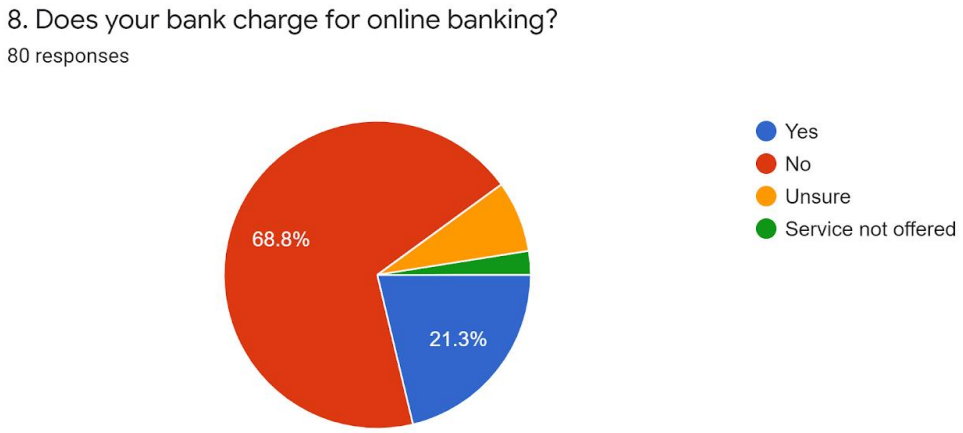

Chart 14: Online Banking Charges

Majority of the respondents' banks does not charge online banking fee.

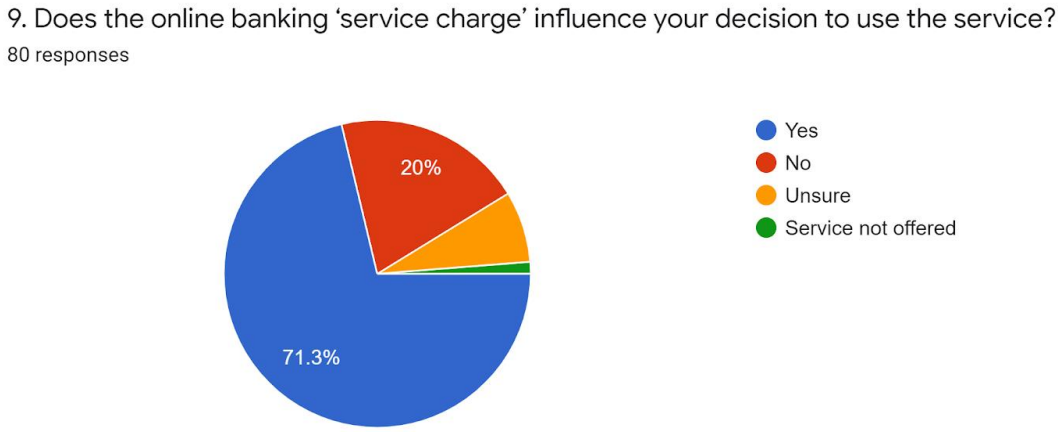

Chart 15: Influential on online banking service charge

Majority of the respondents' attitude shows that imposing online banking "service charge" will influence their decision to use e-banking facility.

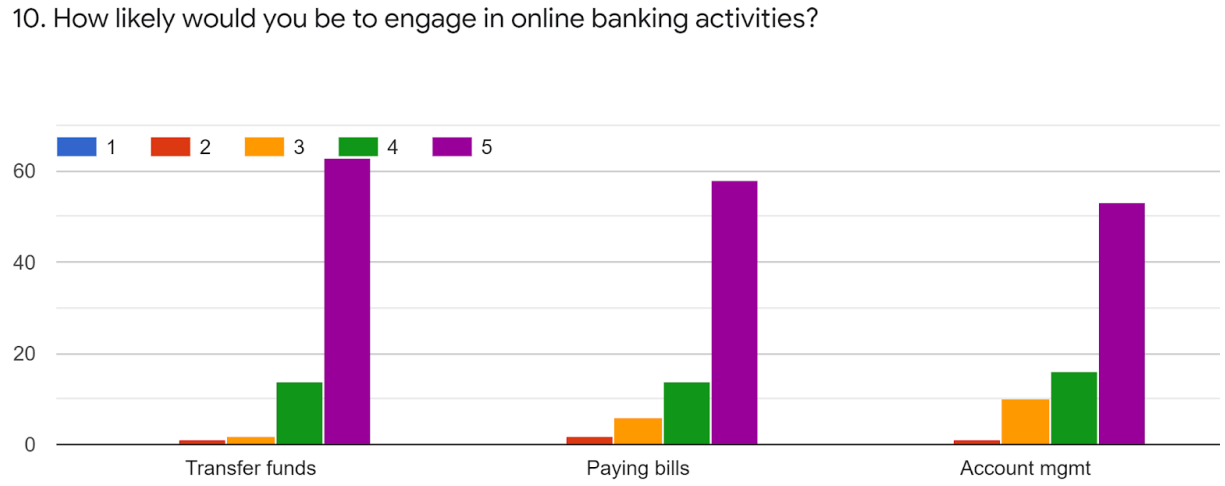

Chart 16: Engaging Attitude towards e-banking

Majority of the respondents feels very positive to engage in online banking activities.

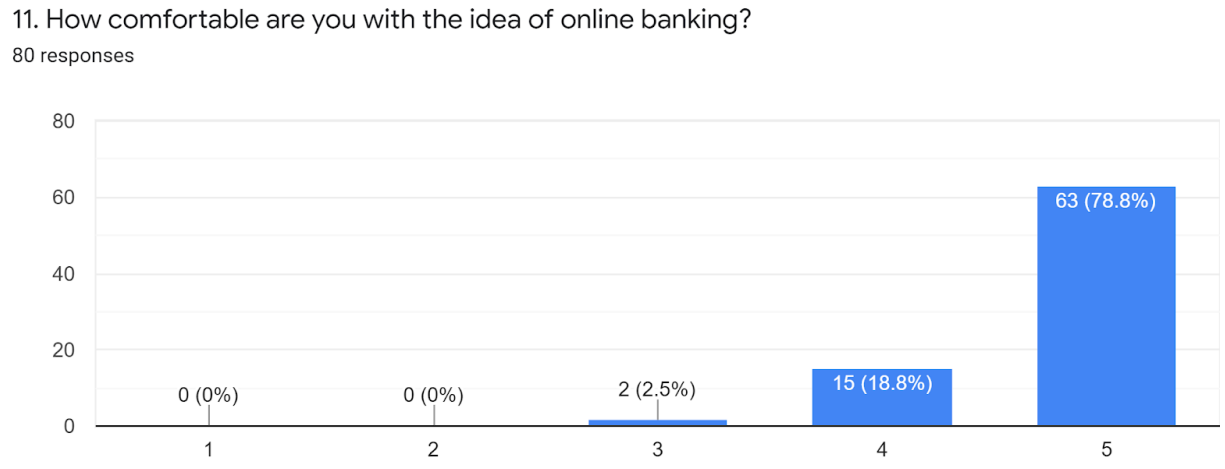

Chart 17: Comfort Level towards e-Banking

Most of the respondents comfort level shown to be postive towards idea of e-Banking.

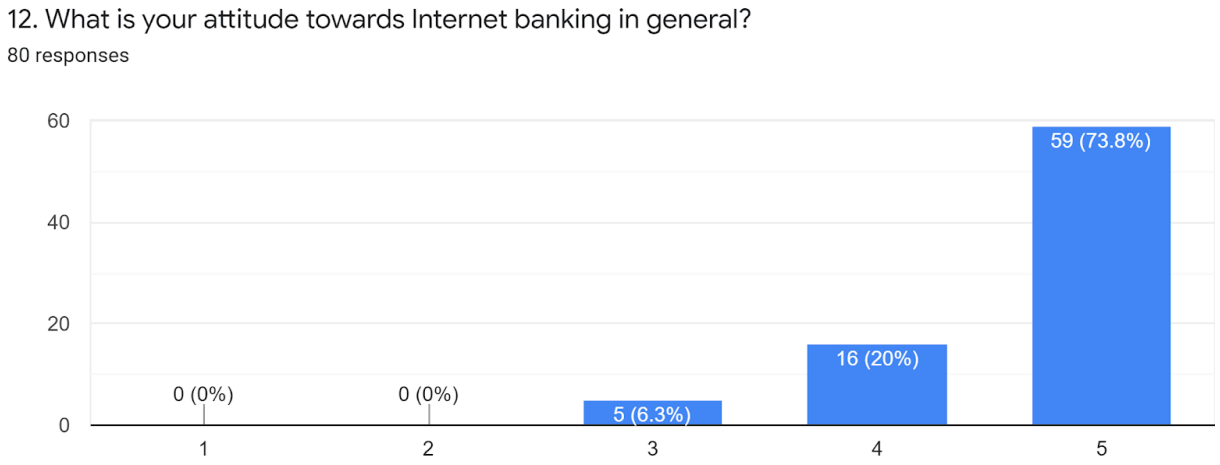

Chart 18: General Attitude towards e-Banking

Almost 73.8% of the respondents' general attitude towards e-banking illustrated to be positive.

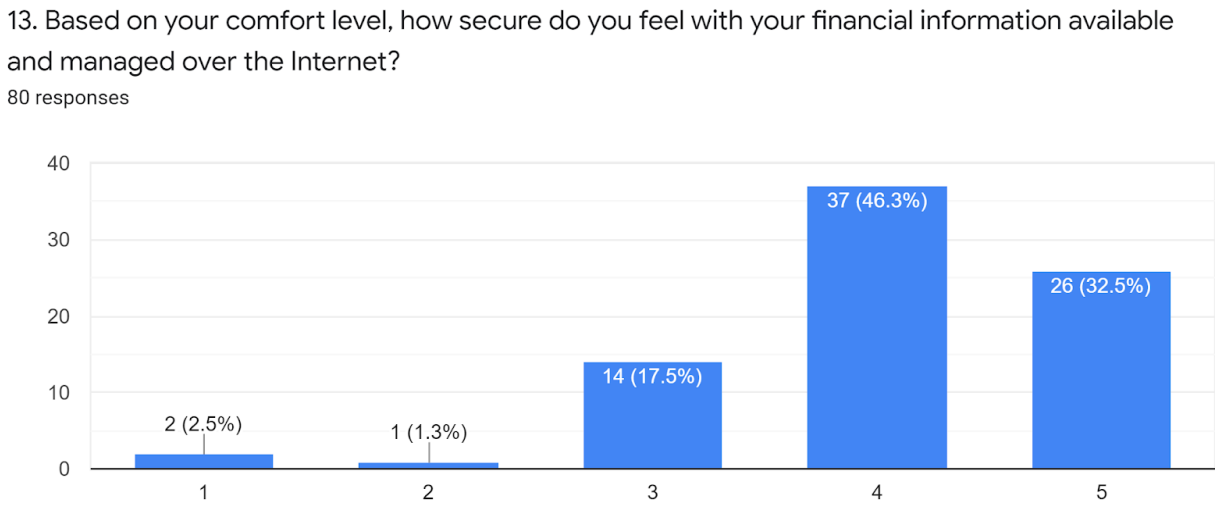

Chart 19: Security Level towards Financial Information

Most of the respondents comfort level fall under category "somewhat likely" and followed by "very likely" when it comes to security concern on financial information that made available and managed over the internet.

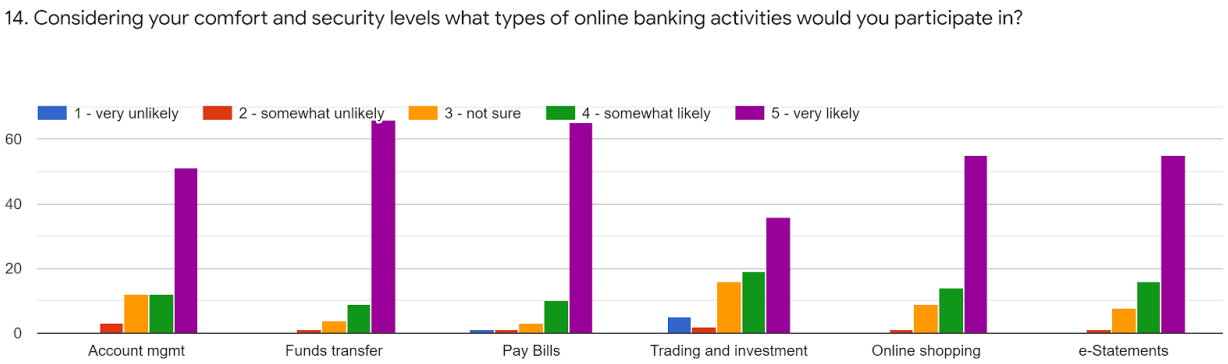

Chart 20: Preferred e-banking activities

Based on the chart almost all the respondents' comfort level and security level fall under "very likely" when it comes to types of e-banking activities that they would get involved with.

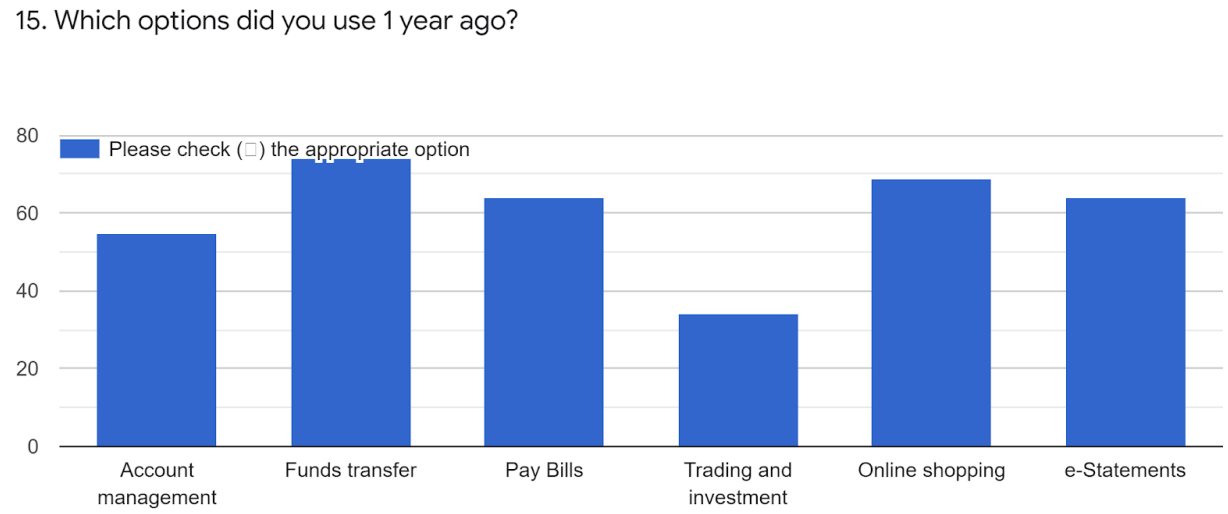

Chart 21: Preferred e-banking activities 1 year ago

Illustration above shows almost all the e-banking activities widely used even a year ago by respondents.

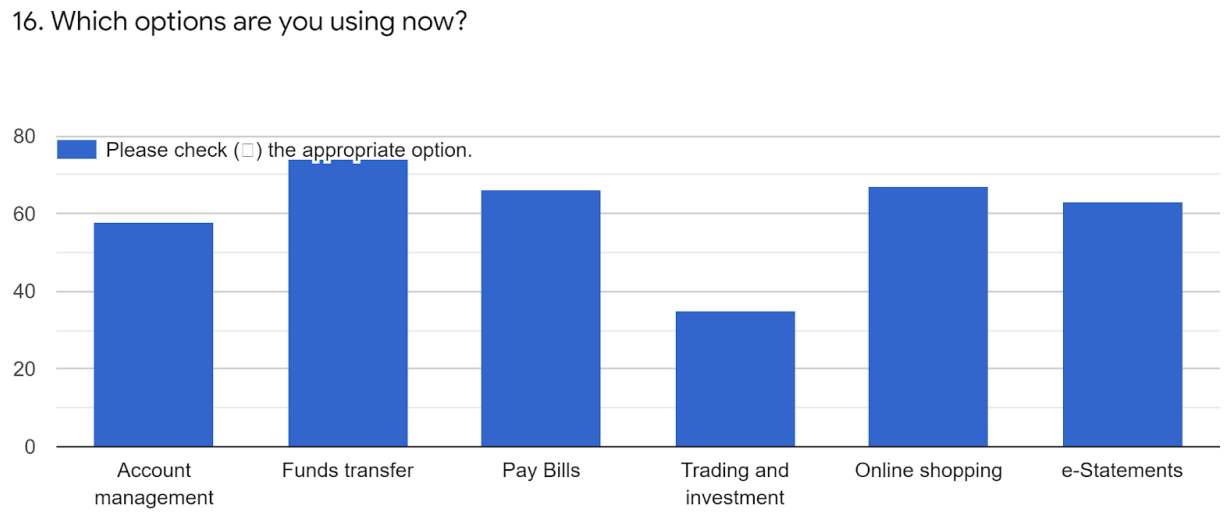

Chart 22: Preferred current e-banking activities

Majority of the respondents seen to be using all the e-banking activities which as listed above even at the current moment.

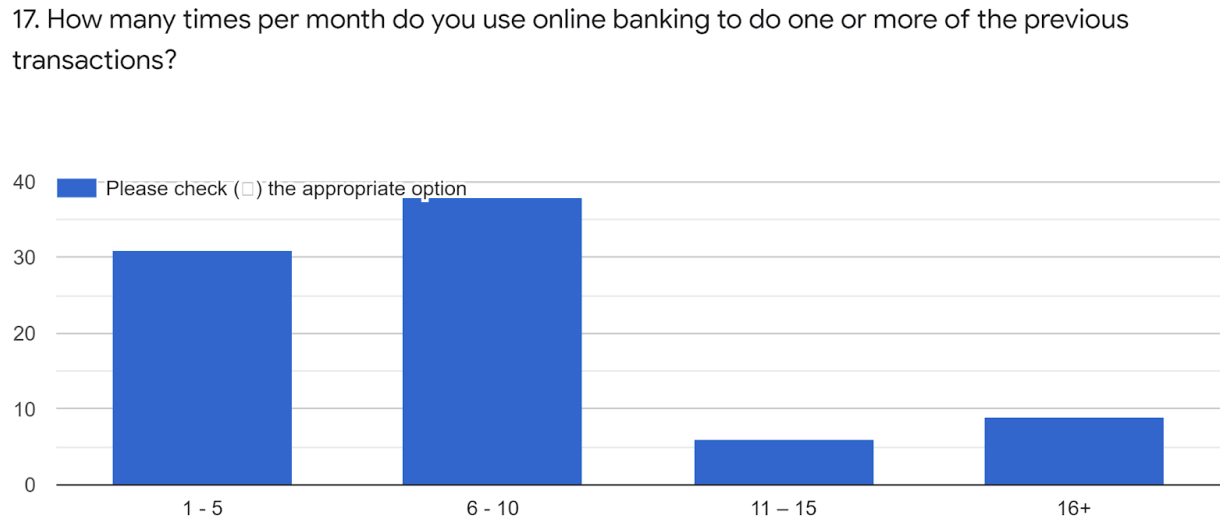

Chart 23: Frequency of e-banking activities usage

Majority of the respondents, mostly uses e-banking services at least 6 - 10 times in a month.

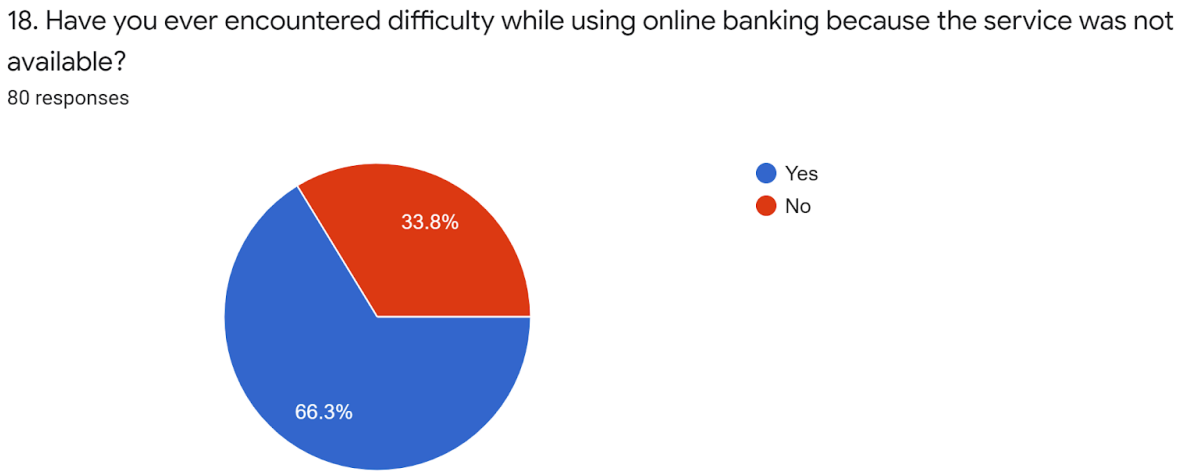

Chart 24: Service interruption experience

Most of the respondents encountered service interruption while using e-banking facility.

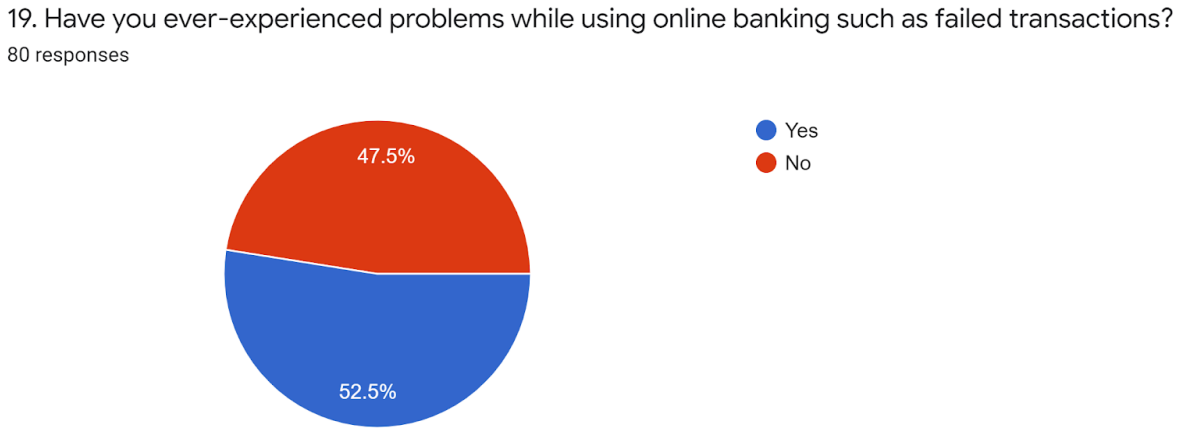

Chart 25: Failed transactions experience

Almost half of the respondents experienced problems such as failed transactions while using e-banking facility.

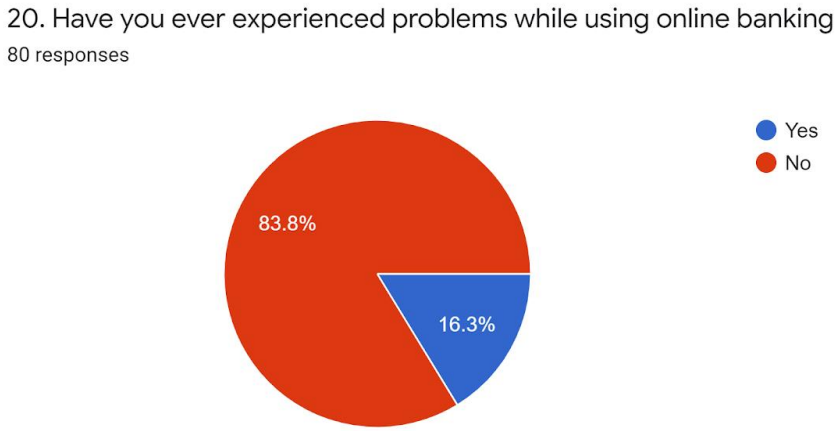

Chart 26: Fraud experience

Large number of respondents have not experienced fraud related to e-banking. 83% of respondents seemed to be well aware of risks in e-banking and majority never fell into the trap of online fraudsters. With many banks issuing fraud alerts and educating the masses on the risks involved when bringing their personal finance to online.

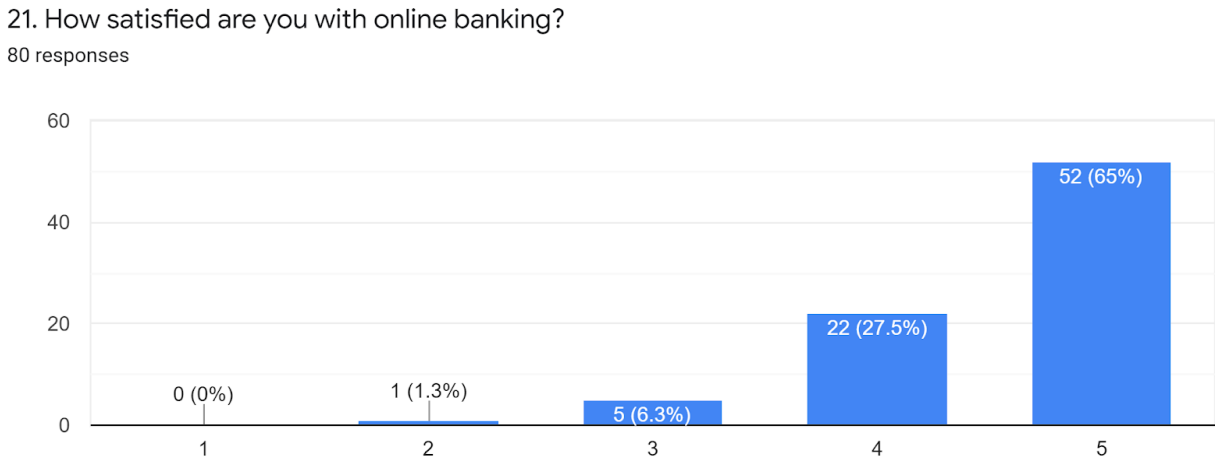

Chart 27: E-banking satisfaction level

Huge number of respondents' satisfaction level can be measured as "very satisfied" and "somewhat satisfied" with e-banking. Almost 65% of the respondents' perception towards e-banking is quite positive in nature.

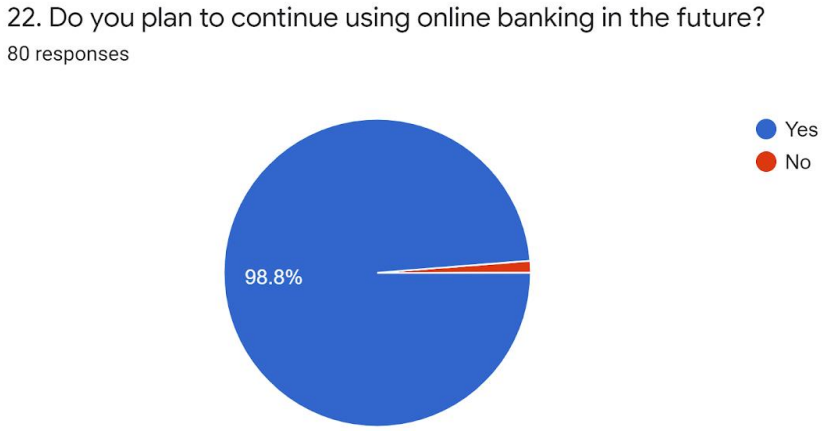

Chart 28: Declaration on e-banking usage in future

98.8% of respondents plan to continue using the e-banking facility in the future as illustrated above.

23. There have been new technological developments to make online banking more secure. With which you are familiar?

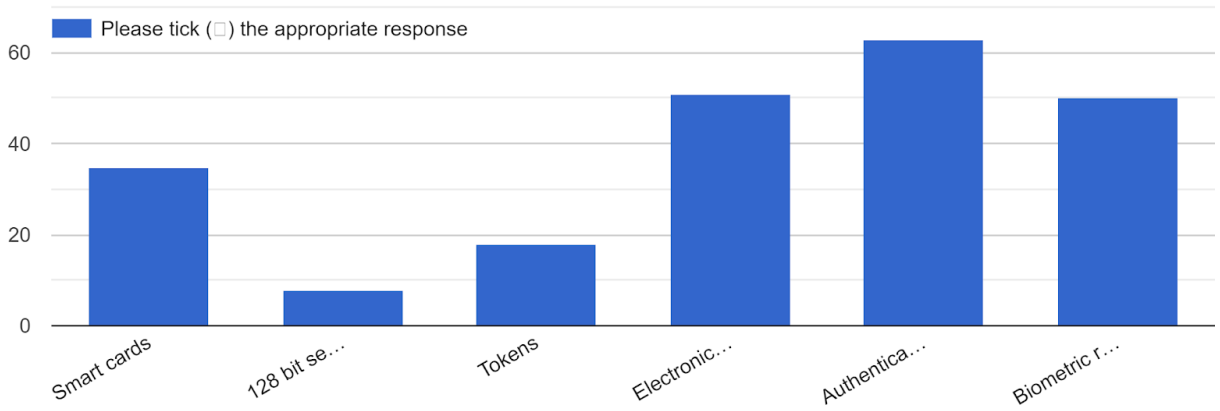

Chart 29: Technological enhancement awareness towards secure e-banking

The respondents seems to be aware of almost all the technological enhancement which been designed towards more secure e-banking.

24. In past or recent experiences, have you used any of the security measures?

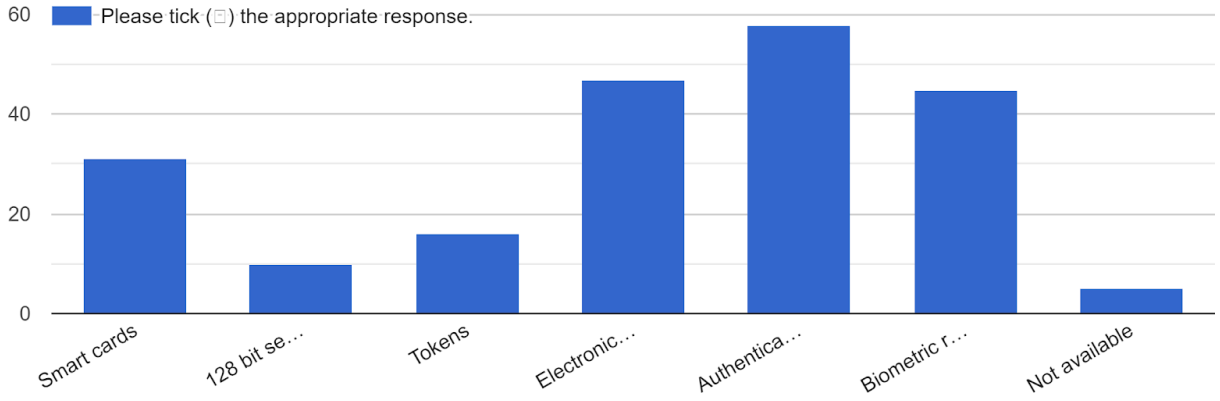

Chart 30: Security measures usage declaration

Respondents seems to be experienced towards type of security measures that have been introduced by banking institutions to access to e-banking with many are aware about authentication codes and passwords method which commonly used security method by most of the banks in Malaysia.

4.2 Discussion of Findings

The researcher did comprehensive findings after taking into consideration of data analysis which were obtained after examining the results of the survey questions which was made available online.

Based on the data analysis, overall findings seems to have no relationship between the respondents' comfort level with the idea of online banking and their age. Besides, the outcome of the findings shows that there is no relationship found between the respondents' attitude towards Internet banking and the respondents' level of education. Finally, the researcher also discovered that there is no significant relationship between the respondents' comfort level with the idea of online banking and their annual salary.

The outcome of the survey shows that more and more people are getting familarised with e-banking as a mode of performing banking activities due to convenience and wide Internet access availability. As time passes by, people are getting more comfortable towards idea of e-banking since banking institutions had given the best possible secured e-banking facility thus far with adaption of new technological developments which made e-banking more user friendly and secure.

Although there are insignificant people are not using e-banking to perform their banking activities, the researcher can foresee that, eventually almost all the banking customers will adapt to the usage of e-banking if the banking institutions continuously invest to enhance the e-banking facility with high level of security adoption in their e-banking facility align with latest prevention of malicious attack. With this, we can see as the Internet era evolving, people's attitude towards e-banking tend to also change accordingly since Internet have made people's life more easy and comfortable. People can now safe more time and energy by completing their banking activities at their fingertips without frequent visit to the banks. Hence, people can spend their energy for other productive use.

CHAPTER 5 - CONCLUSION, RECOMMENDATIONS AND SUGGESTIONS FOR FURTHER STUDIES

5.1 Conclusion

At present Malaysian banks are investing huge amount in the infrastructure to host Internet banking activities. Aligned with that, the adoption rate of e-banking services is currently seems to drive trending interest in Malaysian citizen as compared to other developing countries. Various research studies showed that apart from other factors, concern for securities and privacy are the most important factor influencing the adoption of internet banking. The present study also found that except ATM, the level of concern for security and privacy regarding use of e-banking services is somewhat to be high. Besides, internet banking service charges also might affect the usage of e-banking among customers if the banking institution impose the service fee for subscribing to e-banking facility. In this context, the findings of the study have implications for banking industry in two ways. Firstly, the comparison of security and privacy features will help the banking institution to make their online portal more secure by incorporating the security features which other banks are using. Secondly, the study will be helpful to the banking institution to understand the behavior of internet banking users and non-internet banking users and banking activities that they would like to participate in. It will help banking institution to understand the security and privacy aspect of various e-banking services where customers have high level of concern. It will assist the banking institution to retain the existing bank customer and to convert the potential users to actual e-banking users.

5.2 Recommendations and Suggestions for further studies

The researcher strongly recommends further investigation on improving information/cyber security for e-banking services to improve public perception on safety of internet banking. More education for the masses needed to emphasize importance and ways to avoid or minimize cyber security threats while engaging in e-banking on the user's side. Marketing professionals in the online banking sector need to focus on demonstrating and explaining the security of online banks to overcome this challenge.

Banks should prominently highlight the convenience of using internet banking by making customers aware of benefits of using internet banking. Bankers should make the customers aware of their internet banking needs. So that customers identify the need of using internet banking. Secondly, bank should educate the customers about how to use internet banking. Banks can send security recommendations to their customers via emails, text messages, in-

app notifications, or putting text on web portals. When the customer is educated, they'll avoid cyber-attacks such as phishing attacks. (Jermaine, 2020)
Multi-factor authentication in e-banking point to a need for strengthening the customer login process. Giving access to the bank account with a single password will only compromise digital banking cyber security. (Jermaine, 2020)

Multi-factor authentication will make the account access more secure by sending OTP to a mobile number or requiring fingerprint authentication for easy access. Unlike two-factor authentication, a combination of username and password, multi-factor authentication is a much safer method for the customer login. (Jermaine, 2020)

Multi-factor authentication requires additional layers for authentication, such as fingerprint scanning, which isn't easy to bypass. Although implementing multi-layer authentication is quite expensive, the efforts are justified for digital banking. My suggestion for banking mobile app development is that the user shouldn't be required to input a username and password every time that they open the app from the same mobile device. (Jermaine, 2020)

It is safe to assume that the customer using mobile banking or paying via cards has direct access to their smartphone or email account in most cases. Banking institutions can leverage this assumption to send real-time alerts to the customer by notifying them of their account activity. (Jermaine, 2020)

Some mobile banking apps allow customers to personalize their notifications, by enabling the app to trigger alerts for more than the specified amount. Real-time alerts will enable customers to identify immediately if anyone has wrongfully used their money or altered their account details. (Jermaine, 2020)

To summarize, with all the security features and public awareness, e-banking can be seen to have wide access all over the world. Besides, indeed customer's perception towards e-banking will overall be significantly positive in the near future.

REFERENCES

Anonymous. 2002. Available at < http://www.worldjute.com/ebank.html > Viewed 23/4/2021

Krishna Reddy & Sudhir Reddy. 2015. Available at < http://www.iosrjournals.org/iosr-jbm/papers/Vol17-issue12/Version-2/D0171222027.pdf > Viewed 23/4/2021

Jake Frankenfield. 2020. Available at < https://www.investopedia.com/terms/o/onlinebanking.asp > Viewed 23/04/2021

Prem Khatri. 2019. Available at < https://www.theglobaltreasurer.com/2019/09/25/the-importance-of-cyber-security-in-banking/ > Viewed 23/4/2021

Chai Lee Goi. 2010. Available at < https://www.icommercecentral.com/open-access/factors-influence-development-of-ebanking-in-malaysia-1-21.php?aid=38579 > Viewed 23/4/2021

Federal Financial Institutions Examination Council. (2001, July). Authentication in an electronic banking environment. Washington, DC.

Jain, A., Hong, L. & Pankanti, S. (2000). Biometric identification [Electronic Version]. Association for Computing Machinery, Communications of the ACM, 43(2), 90-98. Retrieved April 23, 2021, from ProQuest database.

Blake, S. (2002, July 8). Network security: Real threats, real risks and the real solutions. In Information Technology Security. Available at < http://www.bankersonline.com/vendor_giri/bindview/bindwiew_its.html> Viewed 23/04/2021

World Almanac Education Group Inc. (2001). Internet Basics [Electronic Version]. World Almanac & Book of Facts, 566-569. Retrieved May 11, 2021, from EBSCO HOST database.

Evans Andrews. 2019. Available at < https://www.history.com/news/who-invented-the-internet > Viewed 24/05/2021

Giannakoudi, S. (1999). Internet banking: The digital voyage of banking and money in cyberspace [Electronic Version]. Information & communications Technology Law, 8(3), 205-244. Retrieved May 11, 2021, from EBSCO HOST database.

Bob Batchelor (2017). The History of E-Banking. Available at < https://bizfluent.com/about-5476081-use-computers-banks.html > Viewed 24/05/2021

Z. Liao and M. T. Cheung, "Internet-based e-banking and consumer attitudes: An empirical study," Information and Management, vol. 39(4), pp. 283-295, 2002.

H. S. Yoon, L. M. B. Steege," Development of a quantitative model of the impact of customers' personality and perceptions on Internet banking use," Computers in Human Behavior, vol. 29, pp. 1133-1141, 2013.

N. Reavley, "Securing online banking," Card Technology Today, vol. 17(10), pp.12–13, 2005.

P. Hanafizadeh, B. W. Keating and H. R. Khedmatgozar, "A systematic review of Internet banking adoption," Telematics and Informatics, vol. 31, pp.492-510, 2014.

D. Littler, D. Melanthiou, "Consumer perceptions of risk and uncertainty and the implications for behaviour towards innovative retail services: the case of Internet banking," Journal of Retailing and Consumer Services, vol. 13, pp.431-443, 2006.

Ming –Chi Lee, "Factors influencing the Adoption of Internet Banking: An Integration of TAM and TPB with Perceived Risk and Perceived Benefit," Electronic Commerce Research and Applications, vol. 8, pp. 130-141, 2009.

Saleh M. Nsouli and Andrea Schaechter (2002). Challenges of the "E-Banking Revolution". Available at < https://www.imf.org/external/pubs/ft/fandd/2002/09/nsouli.htm >Viewed 24/05/2021

J. Trotman (2020). How To Overcome Security Issues In Digital Banking For 2021. Available at < https://www.nimbleappgenie.com/blogs/how-to-overcome-security-issues-in-digital-banking-for-2021/ > Viewed 11/07/2021

APPENDICES

Questionnaires

Demographic information – The following questions for research purposes only.

1. Gender: Male ____ Female ____

2. What age group best describes you? Please check (□) the appropriate option.

   - 18 – 25 □
   - 26 – 35 □
   - 36 – 45 □
   - 46 – 55 □
   - 56 – 65 □
   - 66 – 75 □
   - 76 – 85 □

3. Current employment status? Please check (□) the appropriate option.

   - Employed □
   - Unemployed □
   - Student □
   - Retired □

4. Indicate your level of education. Please check (□) the appropriate option.

   - Primary School □
   - Secondary School – SPM/STPM □
   - Diploma/Degree □
   - Master's/Doctorate □

5. What is your annual salary? Please check (□) the appropriate option.

   - Under $20,000 □
   - $20,000 - $34,999 □
   - $35,000 - $49,999 □
   - $50,000 - $74,999 □
   - $75,000 - $99,999 □
   - $100,000+ □

6. What is your race (optional)?

- Malay □
- Chinese □
- Indian □
- Others □

Attitudes of Consumers Towards E-banking Online

Please indicate the appropriate response.

1. What is the primary purpose for your most recent visit to the bank?

- Deposit or withdraw funds into or from some account □
- Pay a bill □
- Open or close an account □
- Transfer funds □
- Cash a check □
- Account advising or management □
- Apply for a loan (home mortgage, business, or car loan). □

2. Are you presently an account holder at this banking institution?

Yes □ No □

3. Are you presently an account holder at another banking institution?

Yes □ No □

4. Per month, how many times do you visit a banking establishment?

- 1-5 □
- 6-10 □
- 11-15 □
- 16+ □

5. With what medium do you do most of your banking transactions? Please select only one option.

- ATM □
- Drive through window □
- Teller station □
- Night depository □
- Telephone □
- Computer □

6. Do you have Internet access?

Yes □ No □

7. Does your banking institution offer online banking?

Yes □ No □ Unsure □

8. Does your bank charge for online banking?

Yes □ No □ Unsure □ Service not offered □

9. Does the online banking 'service charge' influence your decision to use the service?

Yes □ No □ Unsure □ Service not offered □

10. How likely would you be to engage in online banking activities?

Please rate on a scale of 1-5:

1 - very unlikely
2 - somewhat unlikely
3 - not sure
4 - somewhat likely
5 - very likely

- Transferring funds 1 2 3 4 5

- Paying bills 1 2 3 4 5

- Account management 1 2 3 4 5

11. How comfortable are you with the idea of online banking?

Please rate on a scale of 1-5:

1 - very uncomfortable,
2 - somewhat uncomfortable,
3 - not sure,
4 - somewhat comfortable,
5 - very comfortable).

12. What is your attitude towards Internet banking in general? 1 2 3 4 5

Please rate on scale from 1-5:

1 - very negative
2 - somewhat negative
3 - not sure
4 - somewhat positive
5 - very positive

13. Based on your comfort level, how secure do you feel with your financial information available and managed over the Internet? 1 2 3 4 5

Please rate on a scale of 1-5:

1 - very insecure
2 - somewhat insecure
3 - not sure
4 -somewhat secure
5 - very secure

14. Considering your comfort and security levels what types of online banking activities would you participate in? 1 2 3 4 5

Please rate on a scale of 1-5:

1 - very unlikely
2 - somewhat unlikely
3 - not sure
4 - somewhat likely
5 - very likely

- Account management 1 2 3 4 5
- Funds transfer 1 2 3 4 5
- Bill pay (e.g. e-checks and electronic debit). 1 2 3 4 5
- Trading and investment activities, portfolio management 1 2 3 4 5
- Online shopping and purchasing 1 2 3 4 5
- Electronic statements 1 2 3 4 5

15. Which options did you use 1 year ago? Please check (□) the appropriate option.

- Account management □
- Funds transfer □
- Bill pay (e.g. e-checks and electronic debit). □
- Trading and investment activities, portfolio management □
- Online shopping and purchasing □
- Electronic statements □

16. Which options are you using now? Please check (□) the appropriate option.

- Account management □
- Funds transfer □
- Bill pay (e.g. e-checks and electronic debit). □
- Trading and investment activities, portfolio management □
- Online shopping and purchasing □
- Electronic statements □

17. How many times per month do you use online banking to do one or more of the previous transactions? Please check (□) the appropriate option.

- 1 - 5 □
- 6 - 10 □
- 11 – 15 □
- 16+ □

18. Have you ever encountered difficulty while using online banking because the service was not available?

Yes □ No □

19. Have you ever-experienced problems while using online banking such as failed transactions?

Yes □ No □

20. Have you ever experienced problems while using online banking such as fraud?

Yes □ No □

21. How satisfied are you with online banking?

Please rate from 1 - 5:

1- very unsatisfied
2 - somewhat unsatisfied
3 - not sure
4 - somewhat satisfied
5 - very satisfied

22. Do you plan to continue using online banking in the future? 1 2 3 4 5

Yes □ No □

23. There have been new technological developments to make online banking more secure. With which you are familiar? Please place a check (🕘) next to the appropriate response.

- Smart cards 🕘
- 128 bit security encryption 🕘
- Tokens 🕘
- Electronic fingerprint ability 🕘
- Authentication through access codes and passwords 🕘
- Biometric recognition systems 🕘

24. In past or recent experiences, have you used any of the security measures? Please place a check (🕘) next to the appropriate response.

- Smart cards 🕘
- 128 bit security encryption 🕘
- Tokens 🕘
- Electronic fingerprint ability 🕘
- Authentication through access codes and passwords 🕘
- Biometric recognition systems 🕘

- Not available 🕓