CHAPTER 2

THEORETICAL FOUNDATION

2.1. Electronic Banking

The origin of banking dated since ancient times, even before the Christian era [19]. There have been evidences showing signs of banking activities back at the time of Ancient Mesopotamia and Egypt. Further proofs were found in Ancient Greece in which Greek temples were used to perform financial transactions [20]. It was then modernized during the medieval era where banks were located mostly in rich Italian cities. Banks keep evolving throughout the course of history, experiencing deregulations, an ever-increasing globalization, cost issues, and other influencing factors; until at some point, during the search of ways to implement a new and innovative technology for banking services, electronic banking was born.

The concept began when the first ATM machine was implemented in 1970s, its popularity increases since then and eventually became a mainstream when e-banking was popularized by late 1980s which eventually led to other electronic transactions like SMS banking, phone banking, and internet banking [21,22]. E-banking enables customers to perform financial transactions and check other banking information without any direct physical interaction with the bank itself. It is a generic term used to describe the delivery of banking services and products through various electronic channels. Being a multichannel system, the concept and scope of e-banking is still expanding and evolving. Nowadays, it is considered to be a necessity for most banks

across the globe. In European countries for example, back in 1997, more than half of their banks have already planned to perform services over the internet within one year; even more through the course of three years [23]. For North America, it has been predicted that by now, 90% of its biggest financial institutions has already implemented transaction services using the internet as a medium [24]. The service undergoes an increase in popularity mostly due to the sharp increase in internet development and its users across the years [25]. E-banking offers a broad array of services mainly differentiated into two groups, transactional and non-transactional. Transactional include services such as bill payment, fund transfers, investment purchase or sale, and loan transactions. Whereas non-transactional for instance are web chat with other online bankers, viewing statements and bank services online and other administrative services.

2.1.1. Benefits of e-banking

With the development of e-banking, not only the customers will be benefitted, but also the banks themselves as well as the country's general economy [26,27].

- **Benefits for the customers**

  The customers are divided into two groups, corporate customers and private customers. Corporate customers perceives e-banking as a plus in the banks versatility, enabling them to gain access anytime, anywhere, without any physical interactions with the bank [28]. Moreover, it gives them greater management over their cash and account, and improves the corporation's business process. As for the private customers, they choose e-banking for the reduced banking products and services costs it offers, its accessibility and availability (one can perform transaction from home or from ATMs around the

country), its reliability and speed allowing customers to do a last-minute transfer, and to analyze their funds before making any actual transaction for a better planning [29]. Therefore, by looking at the benefits, Internet Banking is substantially convenient for the customers.

- **Benefits for the banks**

  A bank may improve its brand image thus improving its place in the market due to the technological implementation of e-banking. Cost is also one of the benefits, there have been a studies indicating that e-banking services actually gives a lower cost compared to its physical counterpart [30,31]. Other benefits come in the form of automation for most repetitive banking tasks, giving more efficiency over time and control in the bank's activities. Better documentations of bank's records and transactions can also be reached. Networking usage (such as the internet) also helps the bank to reach customers from far away, further than any branch network can reach.

- **Benefits for the country's general economy**

  E-banking will automatically improve the country's development as it is benefitting its people and the banks itself. Reducing illegal threats such as money laundering, theft, or frauds, e-banking boosts the country's prosperity, productivity, and growth by increasing the efficiency of businesses and economical condition of the country. Taking the Finland market as an example, the usage of information and communication technology increased its output by 0.4% from early 1990s until late of the same year [32]. Not to mention that e-

banking encourages paperless activities, cutting paper usage along the way thus less wastage, less environmental issue, and more green environment.

2.1.2. Types of E-banking

E-banking mainly uses a system called EFTS which stands for Electronic Fund Transfer Systems. It is a paperless transfer of funds through systems comprising Automated Clearing Houses, Automated Teller Machines, Mobile Banking, Telephone Banking, and Internet Banking [33]. There are several types of e-banking worldwide; some of them are even called differently from country to country such as the Automated Clearing House which is called as SistimKliringElektronik (SKE) in Indonesia. Some of the main types of e-banking are as follow:

2.1.2.1. Automated Clearing House (ACH)

ACH is a clearing system found in the US made to reduce paper money usage for large or small routine payments, such as checks or bill payments. It consists of a computerized facility where payments are processed and directed to online institutions or data processors. Rules and regulations for it are made by the National Automated Clearing House Association (NACHA) and the Federal Reserve (Fed). In this system, five elements exist to make a proper clearing activity; Receiver, Originator, Originating Depository Financial Institution (ODFI), Receiving Depository Financial Institution (RDFI), and the ACH Operator. The Receiver (employee) is the one who authorizes the Originator (employer) since the latter cannot start the transaction process without first getting an authorization first. ODFI serves as a mediator between the originator and the

ACH Operator whereas it is RDFI for the Receiver's side. ACH can be used for both Debit and Credit transactions (Figure 1 and Figure 2).

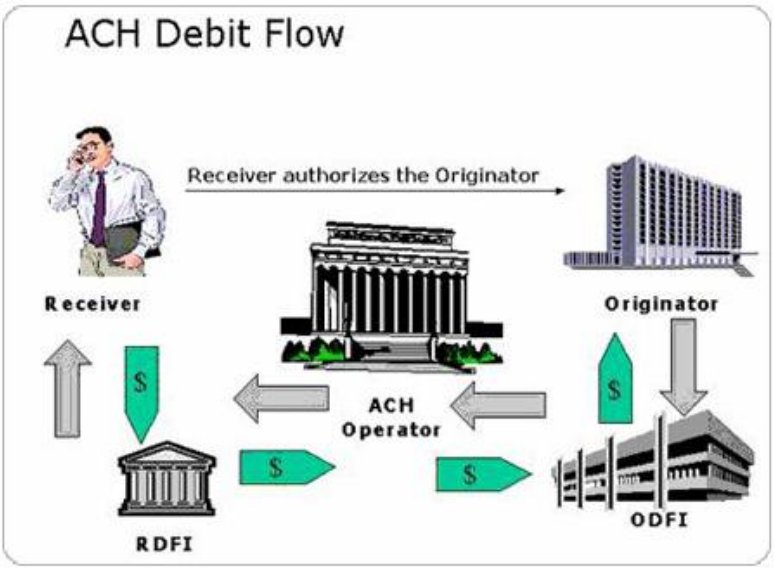

Figure 1 ACH Transaction Process: Debit Flow [34]

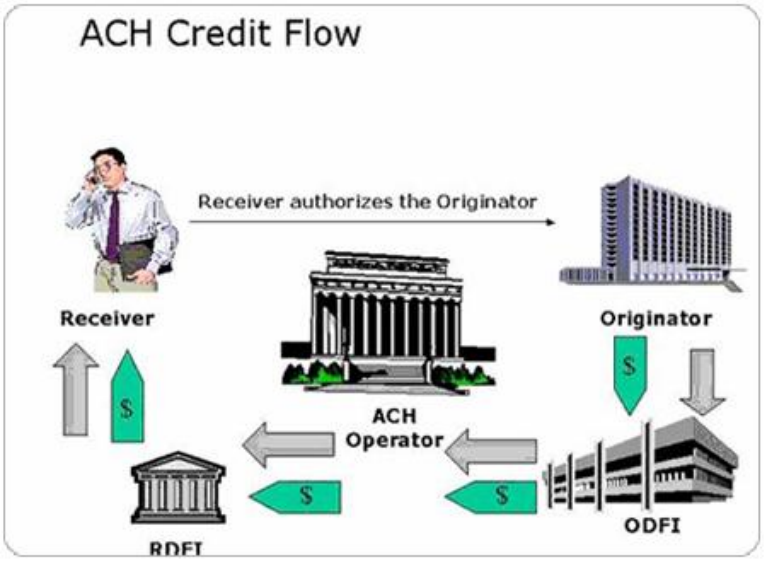

Figure 2 ACH Transaction Process: Credit Flow [34]

2.1.2.2. Automated Teller Machine (ATM)

Available across the majorly populated parts of the world, ATM has borne many different names; it is often called as Automated Banking Machine in the US, Automatic Transaction Machine, Cashpoint in the United Kingdom, Money Machine, Bank Machine, Cash Machine, Hole-in-the-Wall, Autoteller or Cashline (Scotland), MAC Machine (Philadelphia), Bankomat (Some countries in Europe and Russia), Multibanco (Portugal), Minibank (Norway), and All Time Money (India). Whatever is its name, it is a remote computer terminal that allows consumers to withdraw, transfer, or deposit cash and other transactional activities as well as bank information viewing using a magnetically encoded bank card [35]. Some of today's more advanced ATM machine has the ability of cashing checks; even more, certain banks in the US have enabled their ATMs to access all of the bank's services available in the internet, hence consolidating Internet Banking with an ATM. A basic ATM process diagram can be found in Figure 3.

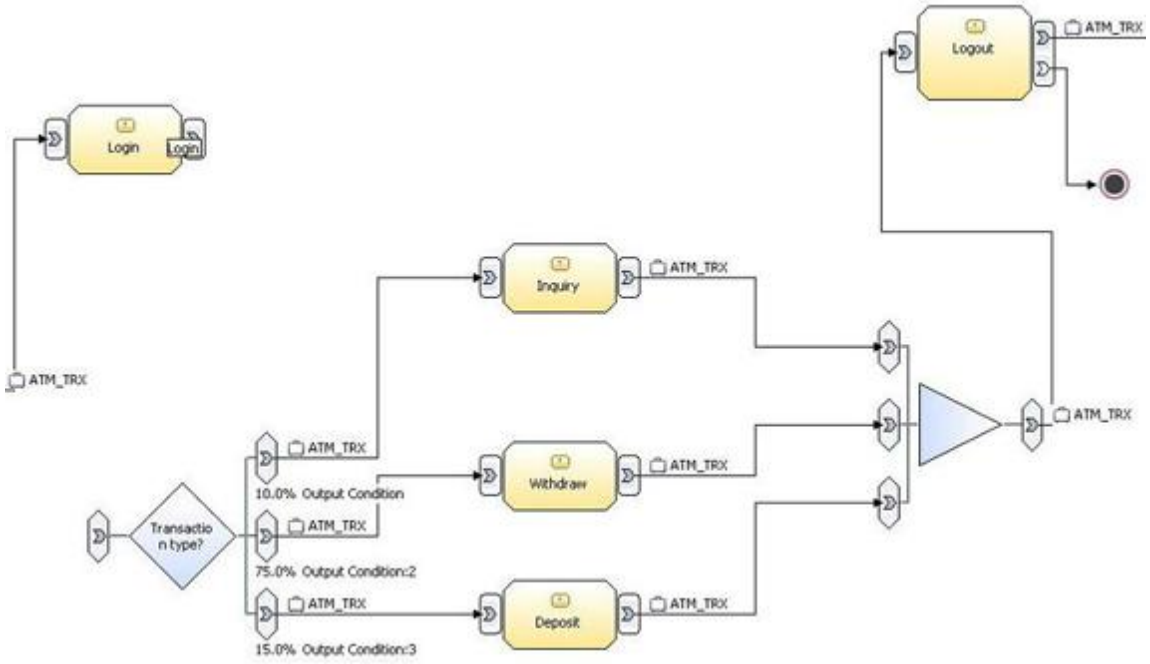

Figure 3Basic ATM Business Process [36]

2.1.2.3. Mobile banking or SMS Banking

Known also as m-banking, it is the term used for any banking activities such as balance check, account transactions, payment, etc. that are done using a mobile device such as hand phones or Personal Digital Assistant (PDA). It was first deployed in Europe in 1999 by using SMS services, hence the name of SMS banking. It still persist until this day, with the advances in handhelds technology, Mobile Web is now also used to obtain banking services using Wireless Application Protocol (WAP) technology. The advantage of this type of banking is that it is truly mobile, unlike ATM or even branch banking that makes the customer in need to go to a certain spot to perform a banking activity. SMS Banking usually uses a “push and pull” messages to obtain two types of banking services; transaction based and enquiry based [37]. Push occurs when the bank sends notifications to its customers via SMS of events occurring to their bank account, this information are limited to enquiry based services such as bill payment alerts or minimum balance alerts. As for pull, it happens when the customers themselves inquires their bank for information about their account by which then the bank will reply by displaying information the customers asked for. Pull message has full access, both enquiry based and transaction based, where the customer is allowed to do payment and other kind of transactions via SMS.

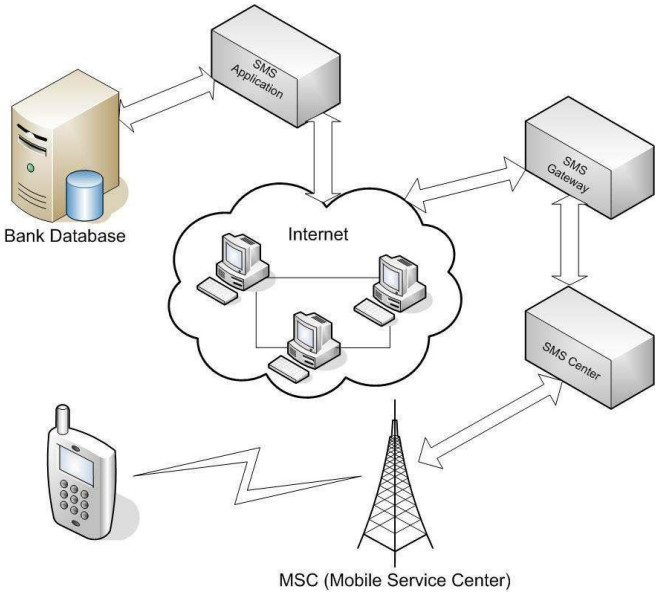

Figure 4 SMS Network Architecture [37]

2.1.2.4. Telephone Banking

Also called as phone banking, it offers services quite similar to ATMs', except the obvious fact that it uses the telephone as a medium. The automated system usually uses phone keypad response or voice recognition for customer identification and the rest of its operation. The caller also has the option to speak with a live representative of the bank in case something needs to be cleared out, although the downside is that this is not available 24/7.

2.1.2.5. Internet Banking

As its name denotes, Internet Banking uses the Internet as the main base for any banking activity that occurs. It allows the customers to access their bank account along with other general information of the bank by using a personal computer or any other intelligent

device [38], so instead of customers going to the bank in person, they can use the bank's website from home to gain services almost as if they went to the bank directly. It is very versatile considering the widespread rate of Internet since the 21st century, all that a customer needs to acquire almost all of the services offered in the real bank, is a computer connected to the internet. This form of E-Banking enables customers to do the activities offered in other form of E-Banking, such as Cash Management, Wire Transfers, ACH transactions, Bill presentment or payment, balance inquiry, funds transfers, etc.; basically it is an all-in-one banking tool which can be accessed from home!

Banks develop Internet Banking for the reason that there are several factors such as competitive cost, customer service, and demographic considerations that affect their position in the continuous competition to attract more customers. Their marketing strategy is to expand their market as wide as possible, with a delivery channel that costs as low as possible, hence the solution is the Internet. Implementing a technologically advanced service such as this also contributes to the bank's brand image; e.g. customers will be happy that they are be able to do banking transactions and other informational inquiries from their PC at home. Basically, there are three types of Internet Banking services commonly employed by banks.

- **Informational:** It is considered to be one-sided (the bank's), includes promotion, advertisements, or any other information regarding the bank's products or services. These are stored in a stand-alone server, separated from the bank internal database where financial records are located for security reasons.
- **Communicative:** This is where an actual interaction between the bank and its customers takes place. It enables the customers to inquire their account information, edit it, receive electronic mails, etc. Unlike the informational type,

this one requires additional security since communication occurs directly with the bank's internal server.

- **Transactional:** This type poses even greater security risks. It is where the customers do financial transactions such as bills payment, funds transfers, etc. so a breach in security may cause a great harm both to the bank and to the customer involved.

Due to the considerable amount of hostility the internet offers in regards to technology such as this, even though single password authentication are usually viewed as enough for most e-commerce enabled website, it is not enough for Internet Banking activity. There are two different types of security in internet banking; the first is using PIN/TAN system and the other one is signature based system.

In a PIN/TAN system, PIN, which stands for Personal Identification Number, represents the customer's password used to log into his or her account. Whereas a Transaction Authentication Number, or abbreviated as TAN, is used for the validity of a transaction. TAN is treated specially, it is a one-time time password; meaning that it is only valid for one login session or transaction. TAN are usually sent by the bank to the customer involved via postal letter or by using security tokens which is a small piece of hardware that generate TAN for the user, an example of this would be BCA's KeyBCA. The other type of security, the signature based, occurs when the internet banking services employs signatures for all the transactions and encrypt them digitally where it can be stored in smart cards or any memory medium afterwards. Most banks use 128-bit Secure Socket Layer (SSL) for its online services nowadays, including PermataBank, where every single piece of information is encrypted using 128-bit key only known to the sender and the receiver [39].

2.1.3. The Internet and Internet Banking in Indonesia

The history of Internet in Indonesia goes back to more than a decade ago, in the 1990s [40]; at that time, it was better known as *paguyuban network*. From 1992 to 1994, M. Samik-Ibrahim, Suryono Adisoemarta, Muhammad Ihsan, Robby Soebiakto, Putu, Firman Siregar, Adi Indrayanto, Onno W. Purbo were important figures in the country's achievement in networking and internet implementation. Paguyuban Network or often also called as PaguyubanNet was essentially a radio community using TCP/IP packet radio as a communication tool to connect to a network. Packet radio is a way of transmitting digital data in a form of packet switching technology via radio or other wireless communication link. It first started as a casual radio club in Institut Teknologi Bandung (ITB), with no TCP/IP capability yet at that time; Robby seized that idea to implement one. Eventually, it was adapted by several other institutions such as Universitas Indonesia (UI), Badan Pengkajian dan Penerapan Teknologi (BPPT), Lembaga Penerbangan dan Antariksa Nasional (LAPAN), along with ITB itself, creating the foundation of PaguyubanNet. Robby then convinced his fellow friend PaguyubanNet who was studying in Canada, Onno, to study more into the world of TCP/IP. He believed that the key to inter-computer communication lies in it. Continual development in TCP/IP packet radio was made, until in 1995 when ITB successfully obtained a line from PT. Telekomunikasi Indonesia (TELKOM), allowing them to have a 14.4 kbps of connection speed compared to their radio packet's 1200 bps. A year later, in September 1996, because of the fact that ITB played part in the Asia Internet Interconnection Initiatives (AI3), they gained a bandwidth access of 1.5 Mbps to Japan, with an addition of 2 Mbps from the part of TelkomNet and Indonesia Internet Exchange (IIX). The latter being a unification of several Indonesia's Internet Service Providers (ISP) such as CBN,

3G-Net, Indosat M2, and Telkomnet Instant among others. Today, Internet has spread across the country, with more users than ever and still climbing.

ICT development rate is essential for banking, especially e-banking [41]. Indonesia experienced an explosive outburst in Information and Communication Technology (ICT) development in the last 20 years; with an estimation of zero internet users back in 1990, around 1.5 million in 2005, and up to more than 30 million users today [3,42,43].

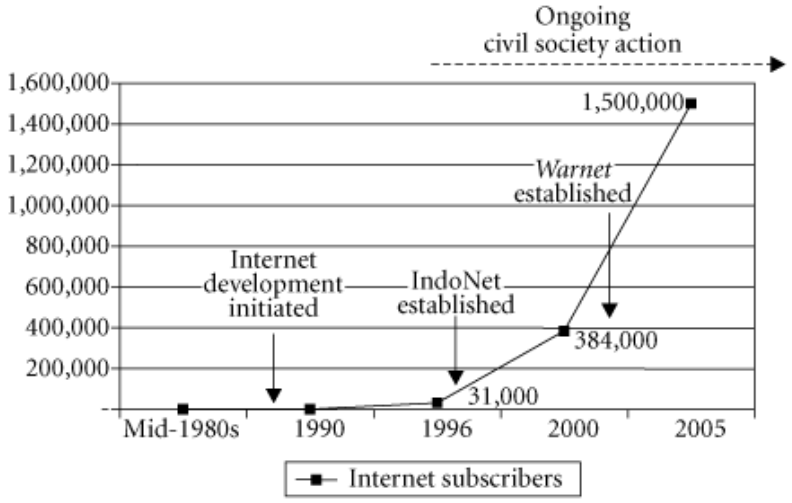

Figure 5 Internet Developments in Indonesia [42]

With an ICT development at such rate, e-banking in Indonesia was slowly introduced by some banks back around late 20th and early 21st century [6]. Chronologically, the banks who started to implement e-banking services are Bank International Indonesia (1998), Bank Niaga (2000), Bank Bukopin (2001), Bank Central Asia (2001), Bank Mandiri (2003), Bank PermataNet (2005), Bank Permata e-Business (2006), Bank Negara Indonesia (2007), Bank Lippo, and Bank Danamon (2008). Its penetration towards Indonesia's population was low. As an example, people back then generally uses phone banking, SMS banking or Internet Banking solely for information gain, not for

transactional activity [44]. The main causes behind this were because customers were not yet accustomed to this kind of technology yet. Banks needed more time and promotional efforts to make them get used to it. Another issue concerning the lack of progress on Internet Banking is security, its law issues, and the fact that the Indonesian central bank (Bank Indonesia) does not hold responsibility towards other banks in this matter, meaning that each bank is responsible for oneself [45,46,47,48,49,50]. A previous study regarding Internet Banking was done using TAM [17]. It concluded that the perceived usefulness of Internet Banking was affected by the length it takes for individuals to adopt such technology, usage frequency, and the volume of transaction needed to be made; although these three variables do not have any impact on the perceived ease of use.

Events such as the klickBCA incident only deteriorated public trust towards online banking activities. In that event, a hacker named Steven Haryanto, instead of going through BCA's layers of securities, bought several domains with names closely resembling to the authentic klickBCA. Customers, who committed a typo (i.e. mistyping) when writing the website name, would likely go to Steven's site instead, decorated to make it look exactly like the real one. Believing it was the real site, they would then enter their Bank IDs and passwords to proceed; Steven hit the jackpot. His scheme is mostly known today as *Phishing*. Fortunately, he admitted he did not do anything to the accounts he obtained and wrote a letter of apology to the public and BCA about the incident [51]. Today, most banks have implemented technologies such as Secure Socket Layer (SSL) 128 bit and Secure HTTP (HTTPS) in their websites, making it very hard to crack and hack. The most popular banks in the country also implemented other safety measures to prevent harm of being hijacked for their

customers. For example, the use of random code generator (BCA's keyBCA and Mandiri's Token), auto-log out feature, and e-mail or SMS notification for the user when a transaction occurs as part of their security measures, layers of Firewall (ISP>Web Server>Data Server>Host), and daily transaction limit.

As a side note, big banks such as Mandiri, BCA, Citibank, or HSBC have various electronic services to offer their customers including auto-debit, internet banking, phone banking, SMS banking among many others. As time slowly progresses, e-banking usage keeps on increasing; an indication of the raise in Indonesian people's acceptance towards e-banking technology is seen in the increase of the country's non-cash transactions across the years; with 48, 46, and 20 banks owning its own ATM Card, Debit Card, and Credit Card respectively [52].

2.2. The Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT is a theory used to research people's intention and behavior towards the usage of Information System [53]. It originated from [12] stating that four key constructs are considered to be a direct influence on use behavior; those are Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions. Additional four elements (Gender, Age, Experience, and Voluntariness of Use) are used to moderate the four key constructs previously mentioned. This theory is in effect a consolidation of eight other theories of the same nature; Theory of Reasoned Action, Technology Acceptance Model, Motivational Model, Theory of Planned Behavior, a combined theory of planned behavior/technology acceptance model, model of PC utilization, Innovation Diffusion Theory, and Social Cognitive Theory. There have been many studies on technology acceptance using this theory as base although those in

developing countries are still quite rare. The creation of hypothesis is based on the four main constructs along with four other moderating variables that affect the relation between the main constructs and usage of Internet Banking.

2.2.1. Performance Expectancy (PE)

It is the degree to which an individual believes that the system will help him/her to attain gains in job performance. In other words, it is a measure of how much an individual believes that he or she will succeed in using the technology (in this case, it is Internet Banking) to achieve a goal. Being a result of consolidation from various theories, each of the key constructs themselves are based from various similar factors found in other theories. For PE, Venkatesh obtained it from five factors used by different authors; Perceived Usefulness [54], Extrinsic Motivation [55], Job-Fit [56], Relative Advantages [57], and Outcome Expectations [58]. Various other research on human psychology made by several authors have also indicated that age and gender play a role in PE, saying that young individuals are exceptionally sensitive when it comes to tasks; their motivation to perform an act is determined by their expectancy towards such act or to obtain any extrinsic reward [59,60,61]. The same theory applies when the subject is male. Therefore, two hypotheses can be extracted from here.

H0a: PE, moderated by Age, does not affect the Usage of Internet Banking.

H1a: PE, moderated by Age, affects the Usage of Internet Banking.

H0b: PE, moderated by Gender, does not affect the Usage of Internet Banking.

H1b: PE, moderated by Gender, affects the Usage of Internet Banking.

2.2.2. Effort Expectancy (EE)

The degree of ease associated to the use of the system. To put it simply, it is the level of complexity on using a new technology perceived by the individuals. It is the resultant from three other factors in earlier studies of similar nature; Perceived Ease of Use [54], Complexity [56], and Ease of Use [57]. In this key construct, age and gender is also a factor, with experience now playing part as well. Many studies have considered that gender affects one's psychology towards the perception of science or technology use, implicating that women have lower self-esteem compared to men when it comes to technology practices, hence the poor rate of women's technological skills [62,63]. As far as age is involved, it is harder for humans to learn something new as they get older [64,65,66]. As for experience, it is self-explanatory when it comes to EE, those who have used a system before will find it easier the next time they use it. To sum it up, three hypotheses can be assumed.

H0c: EE, moderated by Age, does not affect the Usage of Internet Banking.

H1c: EE, moderated by Age, affects the Usage of Internet Banking.

H0d: EE, moderated by Gender, does not affect the Usage of Internet Banking.

H1d: EE, moderated by Gender, affects the Usage of Internet Banking.

H0e: EE, moderated by Experience, does not affect the Usage of Internet Banking.

H1e: EE, moderated by Experience, affects the Usage of Internet Banking.

2.2.3. Social Influence (SI)

SI is the degree to which an individual perceives that important others believe that he or she should use the system. In other words, it is a measure of how much a person's social

environment is contributing towards the use of new technology. Based on three theories, Subjective Norm [67], Social Factors [56], and Image [57]; Venkatesh explains that there are various aspects to look in this construct. For voluntariness of use, there are two types of social cause igniting an individual interest to a system; mandatory and voluntary. Mandatory means that the individual starts using a technology not completely out of his own will, but either to obey or to please others around him or her; hence categorizing it to be a compliance mechanism. The other one, voluntary, occurs when the individual, on his or her own free will, decides to interact with the system in order to gain value for him or herself (i.e. status gains). It is also stated that women are more sensitive to social influence compared to men, hence mostly are in a mandatory status when using a system [68,69]. Age is also a factor; young individuals are usually more susceptible to what others say in term of the introduction of a new system [70]. As far as experience is concerned, SI diminishes if the subject has used the system before. This key construct is the only one that has all of the four moderating factors affecting it, resulting in four hypotheses.

H0f: SI, moderated by Age, does not affect the Usage of Internet Banking.

H1f: SI, moderated by Age, affects the Usage of Internet Banking.

H0g: EE, moderated by Gender, does not affect the Usage of Internet Banking.

H1g: SI, moderated by Gender, affects the Usage of Internet Banking.

H0h: SI, moderated by Experience, does not affect the Usage of Internet Banking.

H1h: SI, moderated by Experience, affects the Usage of Internet Banking.

H0i: SI, moderated by Voluntariness of Use, does not affect the Usage of Internet Banking.

H1i: SI, moderated by Voluntariness of Use, affects the Usage of Internet Banking.

2.2.4. Facilitating Conditions (FC)

FC refers to the individual believability towards the existence of a reliable technical and organizational infrastructure to support the new technology. It is a measure of the individual's perception towards the compatibility of the technology with the environment where he or she lives invite has been theorized that age plays a role in an individual's sensitivity towards FC [71]; saying that older individuals prefer to seek assistance whenever he or she encounters difficulties while interacting with a system. The subject's familiarity with the system is also considered, since he or she will know where and how to seek for a proper guidance [72].

H0j: FC, moderated by Age, does not affect the Usage of Internet Banking.

H1j: FC, moderated by Age, affects the Usage of Internet Banking.

H0k: FC, moderated by Experience, does not affect the Usage of Internet Banking.

H1k: FC, moderated by Experience, affects the Usage of Internet Banking.

2.2.5. UTAUT Summary and Hypothesis Formulation

Therefore, if we make a model schema based on the four major components and the four moderators, the result will be like it is shown in Figure 6. Questions found in the survey are derived from these elements; refer to Appendix B to see the formulation.

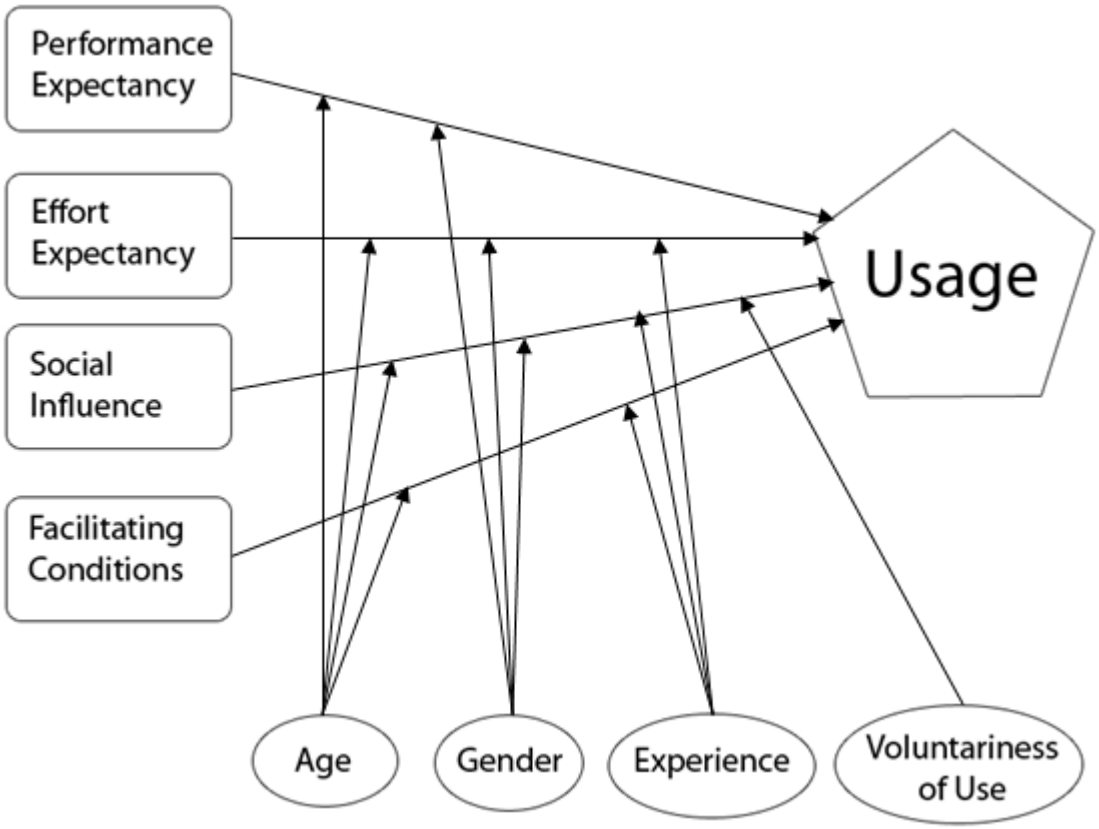

Figure 6 UTAUT Schema