

Information technology in the banking sector: Review of mobile banking

Nadire Cavus *, Department of Computer Information Systems, Near East University, Nicosia 98010, Cyprus.

Dambudzo Netsai Christina Chingoka, Department of Computer Information Systems, Near East University, Nicosia 98010, Cyprus.

Suggested Citation:

Cavus, N. & Chingoka, D., N., C. (2015). Information technology in the banking sector: Review of mobile banking. *Global Journal of Information Technology*. 5(2), 62-70.

doi: <http://dx.doi.org/10.18844/gjit.v5i2.196>

Received 14 June, 2014; revised 12 July, 2015; accepted 17 August, 2015.

Selection and peer review under responsibility of Prof. Dr. Adem Karahoca, Bahcesehir University, Turkey
© 2015 SciencePark Research, Organization & Counseling. All rights reserved.

Abstract

This paper is written to state the advantages and disadvantages, the different models to test the effects of individual's intention to adopt mobile banking, the different technologies that are being implemented currently by banks and what the future holds for mobile banking. Information Technology (IT) has evolved over time and has changed the way business is conducted. The way people conduct business has been made easier and more efficient. IT has opened many doors for new technologies that are used within business and for individual use; the Banking sector is of no exception. Mobile banking is the fastest growing channel of banking as a result few people are walking into bank branches nowadays. Banks now need to remain relevant by catering to the needs and expectations of the customers and to the technology advancements. By providing better services and products customers are able to utilise. The role of IT in the banking sector can be divided into two categories: Communication and connectivity, and individual and business transactions. IT enables for sophisticated products to be developed with better frameworks, execution of dependable strategies and help with communication so to connect with people from different countries, businesses across the globe, geographical distance and diverse markets.

Keywords: mobile banking, information technology, it, mobile banking adoption, mobile banking application, mobile payment

*ADDRESS FOR CORRESPONDENCE: **Nadire Cavus**, Department of Computer Information Systems, Near East University, Nicosia 98010, Cyprus. E-mail address: atalba3@hotmail.com

1. Introduction

The banking sector includes a lot of key players, including retail and commercial banks, mobile (telecommunication) network operators, and financial institutions [17]. Information Technology (IT) has changed how business is conducted, how individuals live, work and think [9, 2]. There is stiff competition amongst banks and has also paved way for many new and exciting banking products and services being offered nowadays for customers with so many banks to choose from [13, 1]. The banking sector has paved way for the use of IT in different ways namely the personal computer (PC), personal digital devices (PDAs), tablets, smartphones, automatic teller machines (ATM) and standalone machines with in the banks [9]. All the above technologies named assist the customer and employees to access bank account information they need at the present time.

Mobile Banking has been in use since the 90's [18], Banking information technologies used by the banks include, mobile banking applications, contactless payments, SMS banking, USSD, ATM, debit and credit card, mobile money, telephone banking, wireless Point of Sale (POS) to name but a few.

Mobile Banking is defined best as one of the latest technologies that customers use on the go. Mobile Banking is also a service that is offered to customers by retail and commercial firms, money lenders and service providers for transacting by using a handheld device such as smartphone, tablet, cellular phone and personal organisers [18]. It is utilising the mobile device to do the following: access the bank account, balance inquiry, bill payments, deposits and transfers [16]. The account is accessed using an Internet connection (which can either be Wi-Fi, mobile data or fibre optic cable) [23] or by mobile network by sending an SMS or calling. An individual does not have to physically go into the branch to make transactions now a days. The account information can be accessed from virtually anywhere in the world and transactions achieved as well. Mobile banking in a large sense is part and parcel of E-commerce [15].

Information Technology which will be referred to as IT within the rest of the document refers to the application of computers (which include hardware, software, networking and the internet) and communication apparatus to ensure the facts obtained can be used by individuals and businesses [19]. Many companies now have IT departments which are setup to manage the computers, networks, and other technical areas of their businesses. There have been vast changes and additions to IT used worldwide [2].

2. Information Technology in the Banking Sector

Banks and financial institutions are now offering many services that benefit their potential and current customers in many ways. The management have now seen that with the technology they have to keep up with the times in order to keep the customers happy and interested in their products [9, 14]. IT has also brought about stiff competition wars within the industry. IT also aids the employees of the bank as well as the banks and financial institutions themselves. Operations are now automated making life simpler and easier.

Telecommunication Mobile Operators, Internet Service Providers (ISPs), computer hardware manufacturers, software developers, mobile device manufactures and the operating software manufactures have all assisted in the giving the banking sector the much needed boost. Mobile devices meet the following criteria, having light operating software (mobile phones, smartphones, tablets and Personal Digital Assistant (PDA)) and being portable [5]:

2.1. Benefits in banking

The general advantages IT brings are as follows and listed in the literature by Railienõa [16] and Dangolania [11] and Ahmadirezaeia (2011):

- **Globalisation:** Information Technology has brought the world closer and allowed for information to be shared easily, quickly and effectively. Allowing for transactions to be performed regardless of where an individual or business are located. Information Technology has broken down geographical boundaries making the global village so small.
- **Communication:** Information Technology has made communication easier, quicker, cheaper and more efficient. People are now able to communicate with each other from anywhere around the world. For example through video conferencing, email, texting, instant messaging, social networking, radio on the go, television on the go, voice calls and VoIP.
- **Cost Effectiveness and Operational Excellence:** Automation of processes for individuals and businesses means our daily lives have been transformed. Our daily lives have been made so much easier and economically effective. Cost effectiveness gives rise to profits realised and better pay for employees. Making daily lives easier and less strenuous working conditions. Transactions are achieved in the less amount of time compared to the days before automation. Fewer errors are made by the use of IT.
- **Bridging the Cultural Gap:** People from different nationalities and cultures are able to communicate amongst themselves and this allows for exchange of views and opinions which could better their lives, increase awareness and decrease prejudice.
- **Longer Working Hours:** Business hours are extended from the normal Monday to Friday and 8-5 working days. The business is virtually open 24 hours and 7 days a week. This applies to all businesses around the globe. The extended hours allows for business transactions to be conducted from anywhere and anytime of day. People are now allowed to purchase anytime and anywhere.
- **Creation of New and Exciting Jobs in the Field of IT:** Creation of new and interesting jobs within the Information Technology field. For example, would have computer programmers, system administrators, system analysts, technical specialists of hardware and software, web development, computer engineering and network administration.
- **Business Intelligence:** IT in banking gives competitive lead amongst other rivals. Crucial and essential information obtained will be used in making strategic business decisions. Information attained from competitors, individuals, business environment, internal operations and business partners.

2.2. Problems of IT in banking

Mobile banking customers are at great risk of receiving fake SMS messages and scams from hackers and scammers. The loss of a person's mobile device often means that the customer's information can be accessed unlawfully. Gaining access to customer's mobile banking PIN and sensitive information. In order to have better experience with mobile banking customers need to have access to more Modern mobile devices such as Smartphone, PDA's and tablets. From the literature attained on Mobile Banking Adoption there are several key problems that were stated in the research. There are various problems customers face when using mobile banking. The problems being:

- **Security and Risk:** Mobile customers are susceptible to scammers. A customer receives a fraudulent email or SMS from a sender posing as a bank or financial institution. Requesting for the customer to send their bank account details. If and when a mobile device is stolen the customer is at great risk. Most customers automatically set their devices to save their personal information leaving the customers vulnerable to scammers. As consistent with Chitungo and Munongo [6] customers of mobile banking are uncertain with issues such as loss and theft by hacking thus discouraging the customers to adopt mobile banking.

- **Compatibility:** Banks offer the mobile banking services to all customers, some customers are limited to the number of services offered as they do not have compatible devices, consistent with research conducted by Al-Jabri and Sohail [3]. Thus the customer is limited to several services only with the constraint of the type of mobile they have. Mobile applications designed can also be exclusively available to certain mobile phone brands [5].
- **Cost:** The cost of mobile banking occur if the customer does not have a compatible device, though if the customer does have a compatible device they may still incur data and text messaging costs. Extra costs for mobile banking service, for software [6].
- **Scalability and Reliability:** The banks need to ensure that mobile banking systems are working for customers to access the service from anywhere and anytime. There can be loss of customer confidence if mobile banking services are not met continuously, found to be consistent with Luo et al. [15] and Gu et al. [9].
- **Application Distribution:** Customers would expect that the mobile application would be updated, upgraded and downloads being available. On the other hand, there are numerous issues to ensure that the upgrade, update and downloads are implemented successfully [5].

2.3. Information Technologies and Applications used in Banking Sector

The technologies listed below are currently in use in the banking industry around the world. The technologies are still being utilised. The future will see more technologies being introduced and used in the developing and developed world. With the advancement of technology, will also assist in the infrastructure advancements. Here is a list of some old and new technologies used in banking today.

- **Automated Teller Machine (ATM):** The ATM is a technology in use world over. The ATM assists in customers being able to cash out money at any time when they need cash, thus replacing the human teller [2]. A unique PIN number is used to identify the customer which is provided by the bank, the customer is to change this number to their own preferred number for security reasons. To use this service the customer has to have a bank account, debit or credit and PIN number. Money can be withdrawn from anywhere in the world. If withdrawn from another country or ATM a service charge will be issued for each transaction. The following are facilities available to the customer at the ATM; check their account balance, withdraw cash, mini statement print out, PIN change, money transfer with linked bank accounts, pre-paid mobile top-up and credit card payment.
- **Mobile Banking:** Mobile Banking Application is the latest of technologies used in the banking sector that is offered to the customers. A customer has to have a smart phone, tablet or Personal Digital Device (PDA). An application is developed which has to be compatible with Windows, Android, iOS and other mobile phone operating software. The Mobile application is downloaded straight to the mobile device. The customer has to have an active Internet connection be it mobile data or Wi-Fi that they will be able to use on the go to be able to utilise mobile banking service. The features offered are balance enquiry, view of a mini bank statement, funds transfer, checking of recent account activity, create and update standing order and direct debit payments, finding the nearest bank branch and ATM's and making payments. In order to use the service of mobile banking the customer has to be registered for internet banking service and they are given the choice of creating their own password and memorable information. Mobile banking is a service that is offered free of charge. The customer has to register using an active mobile line. In addition a customer nowadays does not have to make a deposit physically in the bank they are able to take a picture of the cheque with their smartphone and are able to send the picture via mobile banking or deposit via the ATM.

- **Internet Banking:** One of the older technologies, where the aim of mobile banking was to go paperless. A customer accesses their bank account online by using an active Internet connection and is able to access the account balance enquiry, make payments, funds transfer, international money payments, create and update standing order and direct debit payments and check recent transactions. The customer accesses the website via a personal computer or laptop and the account information can be accessed from anywhere in the world. The following services can be accessed online; account balance enquiry, fund transfer among the accounts, create and update standing order and direct debit payments, remittance, account overview, account history, loan repayment, refill prepaid card and password change [22].
- **Video Teller Machine (VTM):** A new and innovative service available through the banks. A customer is remotely connected to the customer service representative via the VTM for all banking transactions. VTM offer all branch banking services to the customers.
- **Secure Short Messaging Service (SSMS):** SSMS banking is used for customers to send and receive text messages on their mobile phones. Banks keep records of the customers mobile number, the customer is able to make enquires on their bank account. A customer has to register their mobile number to utilise the SSMS Banking service through the bank. The bank also sends the customer messages of each transaction that has occurred on the account. The customer will also be aware of the any transactions they did not make. A transaction is achieved by sending an SSMS to the Mobile Banking Service assigned number. The structured SMS has to have a tag word which the bank provides. The SMS service interacts with the customer as the customer responds. Unlike SMS, which is “store and forward” [12, 5].
- **SIM Application-toolkit:** The SIM Application Toolkit is stated as a standard SIM card with an interactive menu programmed into it, allowing for the customer to interact. The interaction is between the customer and the network, the exchange is done by the customer being shown an interactive menu and inputting of the information for the application to then display. The mobile network operators can send updates for the customers to their SIM cards over the network or to issue completely new SIM cards. The challenge being who will fit the bill, the customer or the network operator? The biggest advantage of implementing the SIM Based Applications for mobile network service providers and financial institutions, it guarantees the firms application is on the SIM and this therefore gives competitive advantage to the bank [12, 5].
- **Near Sound Data Transfer (NSDT):** It is a fast, secure and convenient contactless payment technology used in mobile banking that utilises any mobile phone. NSDT uses a onetime audio password that is issued every time a customer wishes to make payments to verify a transaction rather than using Secure SMS or USSD technologies. NSDT enables secure transactions on the Tagpay platform. NSDT transactions are executed through a customer's cellular and a dealer or operators' acceptance device for payment. A customer deposits money via a registered agent and the money goes into a virtual wallet. NSDT aims for all transactions are speed of Communication and data compression, security and cryptography, error detection and correction and lastly sound optimization and performance. Therefore, NSDT makes effective and excellent transactions, and can even be used in very noisy environments.
- **RFID Technology:** A bank card is embedded with a chip made for payment. Payment is made is simply made by placing the card in front of an RFID reader, and the payment is processed automatically [7].
- **Telephone Banking or Interactive Voice Response (IVR):** A customer has to register for the telephone banking service through the bank. Telephone Banking is an Information Technology (IT) that allows a customer to interact with the system once they place a call to a dedicated number provided by the bank. A customer interacts by selecting various options from a voice prompt system or can also speak to select options. The customer is to select the most applicable option when prompted to by the pre-recorded voice on

the designated number for telephone banking. Voice prompt system utilises speech recognition which interprets the customer's voice. The customer must use simple words such as "yes", "no", or a number to select an option. Telephone Banking proves to be expensive as the customer has to make calls [20].

- **Wireless Application Protocol (WAP):** It is a technology utilised in mobile banking where the customer accesses the bank website via the Internet using a browser on the mobile phone. A customer is able to access their bank account information using the mobile which acts as a computer. The customer is able to gain access without having to download any software [19].
- **Unstructured Supplementary Service Data (USSD):** Is an SMS service with a menu and timed session. It is a standard that is utilised in all handset models. The customer has to choose from the list of options in the menu to continue as opposed to using sentences to reply. A major advantage of USSD: the customer replies quickly by choosing the applicable options from the menu. USSD allows for communication between the customer, mobile network and bank. To use the USSD service the customers SIM card is preinstalled with the commands required for the service. A customer uses the dedicated numbers for the USSD service provided by the bank or the mobile network operator. The customer starts the request by dialling the USSD service number, the mobile network operator returns a menu. The customer enters a choice from the available options [12].
- **Contactless Payments using Near Field Technology (NFC):** It is a two-way radio waves communication, as well as mobile contactless and wireless form of payment using a smart mobile devices which run compatible software and are also touched together within close proximity of each other. NFC is a short-range, high-frequency technology, which allows an exchange of information between devices within 10 cm. NFC was built upon the RFID technology. Allowing wireless communication and data exchange between devices. A device is either active or passive modes. Encryption is used to secure sensitive data, antivirus and phone lock must be used to secure the phone in case it's lost or stolen. As stated in the NFC website NFC technology is mostly popular in Europe, America and Asia. NFC aim is to keep the queues short, faster times for transactions to be processed, less cards to carry around as one just has to remember to carry their mobile device for payment [7].
- **Mobile Money:** Also referred to as mobile wallet, mobile payment and mobile money transfer. Mobile money service is used worldwide, mainly used in Africa for those with or without bank accounts. The service is provided by the mobile network operators who are in partnership with the commercial banks. The mobile money accounts can also be linked with a customer's bank account. The mobile money service is another way of banking money, without the hassle of opening a bank account. The money in the virtual "wallet" can be used to pay for anything for example buying of mobile credit, payment of bills, goods and services rendered. A PIN number is used to verify the transactions made. The service is at a cost to both the sender and receiver. Mobile Money customers have a virtual wallet where there funds are kept, they deposit, make payments and withdraw from funds [10].

3. Literature Review on Mobile Banking

As discovered by all the literature read, demand of mobile banking has increased worldwide but a small percentage of people utilise the service. Thus prompting banks, micro-finance institutions, software houses and service providers to offer the services to existing and potential customers of mobile banking services [18] within developed and developing countries. The banks, micro-finance institutions, software houses and service providers are to ensure they are to make potential and existing customers aware of the huge benefits that are involved with the use of mobile banking. Theoretical models were used to attain information on different

customer's perceptions of the acceptance of mobile banking. For example, Chitungo and Munongo [6] Extended the Technology Acceptance Model (TAM) by Davis [8] and researched on the acceptance and adoption of mobile banking in the rural communities of Zimbabwe. Yu [22] Extended the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh [21] which is model used to research on what impacts individuals to adopt mobile banking technology, their usage and behaviour.

4. Adoption Theories

The most used adoption theories/models utilised in research are Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT). Many determinants that affect the way customers would adopt mobile banking.

Technology Acceptance Model (TAM): The model discovered by Davis [8] is an extension of Ajzen and Fishbein's [4]. Theory of Reasoned Action (TRA). TAM started with 2 constructs/determinants namely Perceived Usefulness and Perceived Ease of Use. Later studies conducted by other researchers such as Chitungo and Munongo [6] have extended the theory when researching on the rural communities of Zimbabwe by including Relative Advantage, Perceived Innovativeness, Social Norms and Perceived Costs. In comparison of studies conducted from 2005-2015, TAM is the most popular research theory used to explain the customer attitudes and behavioural intention towards the use of mobile banking service adoption.

User Technology Acceptance User Technology (UTAUT): This model was discovered by Venkatesh et al. [21], is an extension of the Technology Acceptance Model (TAM) mentioned above. UTAUT aims to explain a customer's intention to utilise an IT and customer's behaviour when they have used the IT. There are namely four constructs or determinants Performance Expectancy, Effort Expectancy, Social Influence and the Facilitating Conditions. UTAUT is a review of eight other models used in earlier research. The 8 models being Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Motivational Model, Theory of Planned Behaviour, Model of Personal Computer Use, Diffusion of Innovations Theory and Social Cognitive Theory. UTAUT is a model that is not widely used as stated by Zhou et al. [23] having drawn researchers attention and having been applied to mobile technologies recently.

Shaikh and Karjaluoto [18] are right in stating that further research needs to be conducted in other aspects of Mobile Banking Adoption. Areas including the research on smartphone and tablet users and adoption of mobile banking from service providers and the network operator's perspective in mobile banking. As Mobile Banking is a new and exciting topic that needs to be researched thoroughly and customers being made aware of the service and the advantages associated. The other topics include infrastructure, technology, innovation, post-adoption usage and the customer's intention to use mobile banking continuously after the first use. The above mentioned will assist in gaining a better understanding of mobile banking adaptation.

5. Conclusion

In conclusion, the banking sector is now using new technologies to provide better services to customers. The banking sector realises that customers' needs have changed with the advancements in technology and their own needs. IT has allowed for improved banking products, competitive markets, implementation of consistent methods for control of threats and has aided mobile banking services to reach geographic distance and varied markets. Extensive work needs to be done in the acceptance of IT in the banking sector so that the risks are eradicated. Customers need to be informed on suitable precautionary measures for safety. To avoid failure regular security checks are also required. Back-up and recovery plans to restore customer confidence in IT. For inclusive growth, the benefits of mobile banking should reach to the common man at the remotest locations in the country. Mobile Banking is a very powerful tool that is used to deliver payment services and account queries for those with accounts.

Mobile Banking has brought-in enormous benefits to customers, banks, and staff particularly in terms of increase in productivity, speedy and efficient service delivery, cost reduction and increased profits. With the advancement of IT in the banking sector, customers do not always want to visit banks branches. They are able to utilise the IT services provided to make transactions. Banks now are facing serious challenges in stiff competition, security issues, making potential customers aware of the mobile banking and also keeping the old customers satisfied. More focus needs to be done on enhancing customer's awareness and intention to use mobile banking services by more research being conducted using the adoption theories. The mobile phone developers and the operating software providers need to design more advanced technologies. The developers of the mobile banking applications need to be aware of security, risk and trust issues that customers have. Solutions need to be developed to solve security and trust issues customers may have with mobile banking issues.

References

- [1] Aboelmaged, M.G., & Gebba T.R. (2013). Mobile banking adoption: an examination of TAM and Theory of Behaviour. *International Journal of Business Research and Development*, 2(1), 35-50.
- [2] Acholiya, R., & Keshari, V. (2013). Benefits of IT in Banking Sector. *Pioneer Journal*, 2013. Retrieved from: <http://pioneerjournal.in/conferences/tech-knowledge/15th-national-conference/3899-benefits-of-it-in-banking-sector.html>
- [3] Al-Jabri, I.M., & Sohail, M.S., (2012). Mobile Banking Adoption: Application of the Diffusion Innovation Theory. *Electronic Commerce Research*, 13(4), 379-391.
- [4] Ajzen, I., & Fishbein, M., (1980). Understanding attitudes and predicting social behaviour. *Englewood Cliffs, NJ: Prentice-Hall*.
- [5] Cano, M.D., & Domenech-Asensi, G. (2011). A security energy-efficient m-banking application for mobile devices. *The Journal of Systems and Software*, 84, 1899-1909.
- [6] Chitungo, S.K., & Munongo, S. (2013). Extending the Technology Acceptance Model to mobile banking adoption in Rural Zimbabwe. *Journal of Business Administration and Education*, 3(1), 51-79.
- [7] Dahlberg, T., Mallat, N., Ondrus, J., & Zmijewska, A. (2008). Past, present and future of mobile payments research: a literature review. *Electronic Commerce Research and Applications*, 7(2), 165-181.
- [8] Davis, F.D. (1989). Perceived usefulness, perceived ease of use and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.
- [9] Gu, J., Lee, S.C., & Suh, Y.H. (2009). Determinants of behavioural intention to mobile banking. *Expert Systems with Applications*, 36, 11605-11616.
- [10] Kemp, R. (2008). Mobile payments: current and emerging regulatory and contracting issues. *Electronic Commerce Research and Applications*, 7(2), 165-181.
- [11] Khajeh dangolani, S. (2011). The impact of information technology in banking system: a case study in Bank Keshavarzi IRAN. *Procedia - Social and Behavioural Sciences*, 30, 13-16.
- [12] Krugel, G.T. (2007). Mobile banking technology options: an overview of the different mobile banking technology options, and their impact on the mobile banking market, 2007. Retrieved March 18 2015, from: http://www.gsma.com/mobilefordevelopment/wpcontent/uploads/2012/06/finmark_mbt_aug_07.pdf
- [13] Luarn, P., & Lin, H., (2005). Toward an understanding of the behavioural intention to use mobile banking. *Computers in Human Behaviour*, 21, 873-891.
- [14] Lin, H.F. (2011). An empirical investigation of mobile banking adoption: the effect of innovation attributes and knowledge-based trust. *International Journal of Information Management*, 31, 252-260.
- [15] Luo, X., Li, H., Zhang, J., & Shim, J.P. (2010). Examining multi-dimensional trust and multi-faceted risk in initial acceptance of emerging technologies: an empirical study of mobile banking services. *Decision Support Systems*, 49(2), 222-234.

- [16] Railieno, G. (2014). The use of IT in relationship banking, In: Proceedings of the 19th International Scientific Conference; Economics and Management, Riga, Latvia, Kaunas University of Technology, 569-579.
- [17] Ryu, M.H., Kim, J., & Kim, S. (2014). Factors affecting application developers' loyalty to mobile platforms. *Computers in Human Behaviour*, 40, 78-85.
- [18] Shaikh, A. A., & Karjaluoto, H. (2015). Mobile banking adoption: a literature review. *Telematics and Informatics*, 32, 129-142.
- [19] Shaikh, A.A., & Karjaluoto, H. (2015). Making the most of information technology and systems usage: a literature review, framework and future research agenda. *Computers in Human Behaviour*, 40, 541-566.
- [20] Tan, G.W.H. (2014). NFC mobile credit card: the next frontier of mobile payment? *Telematics and Informatic*, 31(2), 292-307.
- [21] Venkatesh, V., Morris, M.G., Davis, G.B., & Davis, F. D. User acceptance of information technology: toward a unified view. *MIS Quarterly*, 27(3), 425-478.
- [22] Yu, C.S. (2012). Factors affecting individuals to adopt mobile banking: empirical evidence from the UTAUT Model. *Journal of Electronic Commerce Research*, 13(2), 104-121.
- [23] Zhou, T., Lu, Y., & Wang, B. (2010). Integrating TTF and UTAUT to explain mobile banking user adoption. *Computers in Human Behaviour*, 26, 760-767.