The Impact of Electronic Banking Services on Efficiency of Banks in the Sudan: A Case Study of Bank of Khartoum (2016)

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A Dissertation

Submitted to the University of Gezira in Partial Fulfillment of the Requirements for the Award of the Degree of Master of Science

in

Development Economics

Faculty of Economics and Rural Development

August 2018
The Impact of Electronic Banking Services on Efficiency of Banks in the Sudan: A Case Study of Bank of Khartoum (2016)

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Data of Examination: 10/8/2018
Dedication

To my father. To my greatest Mother. To my brothers and sisters.

Who gave all their best and supported to me in all my decision.

To my best friends
Praise be to Allah, the most gracious and the most merciful who granted me the mind, health, strength and patience to conduct this study successfully.

I would like to thank my Supervisor Prof. Omarn Abbas Yousif Abdallha for his support, guidance, helpful suggestion and constructive criticisms. Also many thanks to my co-supervisor Prof. Mutasim Ahmed Abdelmawla Mohamed for his good supervision, encouragement, and assistance during the research period. Sincere appreciation is also extended to the staff of the Department of Economics, Faculty of Economics and Rural Development, University of Gezira. I am also grateful to my parents for their encouragement and support.

I am also grateful to my friends and colleagues who supported and encouraged me. Special thanks go to my brothers Mohammed Ahmad Hamd Alneel Salim and Emad Ahmad Hamd Alneel Salim for help and support. Finally, great thanks go to all the persons who helped and encouraged me to accomplish this work.
The Impact of Electronic Banking Services on Efficiency of Banks in the Sudan: A Case Study of Bank of Khartoum (2016)

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Abstract

Electronic banking operations contribute to save time and reduce effort, recently banking technology has become a reality and an important for institutions in general and financial institutions, in particular. This research aimed at investigating the role of banking services in the efficiency of banks in Sudan: a case study of Bank of Khartoum (2016). The research depended on primary data collected by a questionnaire, distributed to a random sample of 100 employees of the Bank of Khartoum. The research used descriptive methodology as frequencies and percentages to show the basic characteristics of respondents, also an analytical descriptive methodology was adopted (LGIT) model for estimating the relationship between the bank's efficiency as a dependent variable and some explanatory variables, namely; computer services (CS), automated teller machine (ATM), electronic clearing service (ECS), and electronic transaction service (ETS). The research used the Statistical Packages for Social Sciences (SPSS) program to analyze the data. The results of the research showed that there was a positive significant relationship between the bank's efficiency and electronic clearing services (ECS), whereas there were positive insignificant with (computer services (CS), and automated teller machine (ATM)). Also there was a negative relationship between the bank's efficiency and electronic transaction. The research recommended that it's necessary to introduce modern technologies in banking transactions, in order to raise the efficiency of banks.
جامعة الجزيرة
كلية الاقتصاد والتنمية الزراعية
قسم الاقتصاد
ماجستير العلوم في اقتصاديات التنمية (31/8/2018)
أثر الخدمات المصرفية الإلكترونية على كفاءة البنوك في السودان
دراسة حالة بنك الخرطوم (2016)
هبه أحمد عبد النيل سالم

ملخص الدراسة
تساهم العمليات المصرفية الإلكترونية في توفير الوقت وتقليل الجهد، وحديثًا أصبحت التقنية المصرفية واقعة ملموسة وأمرًا مهماً للمؤسسات بصورة عامة والمؤسسات المالية بصورة خاصة. هدف البحث إلى تخصص دور الخدمات المصرفية الإلكترونية في كفاءة البنوك في السودان: دراسة حالة بنك الخرطوم (2016). أعتمد البحث على بيانات أولية تم جمعها عن طريق الاستبان، تم توزيعها على عينة عشوائية تشمل 100 موظفًا بنك الخرطوم.
استخدم البحث المنهج الوصفي ممثلاً في التكرارات والنسب المئوية لتوضيح الخصائص الأولية للمحاوثين، كما تم استخدام المنهج الوصفي التحليلي لتقدير العلاقة بين كفاءة البنك وعوامل تابع وبعض المتغيرات التفسيرية وهي (خدمة الحاسب (CS)، وخدمة الصراف الألي (ATM)، وخدمة المصرفية الإلكترونية (ECS))، وخدمة التحويل الإلكتروني (CS). تم استخدام برنامج الحزمة الإحصائية للعلوم الاجتماعية (SPSS) لتحليل البيانات. أوضح النتائج البحث وجود علاقة إيجابية ذات معنوية إحصائية بين (كفاءة البنوك وخدمة المصرفية، بينما هناك علاقة طردية غير معنوية مع (خدمة الحاسب، وخدمة الصراف الألي). أيضاً هناك علاقة سلبية بين كفاءة البنوك والتحويل الإلكتروني. أوصت الدراسة بضرورة إدخال التقنيات الحديثة في المعاملات المصرفية من أجل رفع كفاءة البنوك.
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Chapter One
Introduction

1.1 Background:

The world witnesses an information and technological revolution. This revolution has touched every aspect of people’s life including banking. Such changes and development have impacts on services quality, future of banking activities, and consequently, it’s continually competition ability in the world markets since going along with technology is one of the most important factors of economic organizations success in general and banks in particular. This motivates banks to spend more on technology and information to achieve maximum returns and attracts large number of clients. Furthermore banks have to provide an excellent service to customers who are demanding and will not accept less than above average service. Thus, the issue of service market in general, and banking services in particular has become one of the most important and modern directions, which have witnessed a substantial expansion during the last years in almost all societies. This is because the increasingly significant role which banking services have the widening and variety that these services are characterized with, thus banking services have touched most aspects of contemporary societies life and activities (Siam, 2012).

The Electronic Banking means any user with personal computer and a browser can get connected to his banks website to perform any of the virtual banking functions. Internet banking is beneficial to both the banks and their customers (Mohammed, 2015). Electronic services provide benefits for both the customer and the Bank, it provides additional channels for the Bank to provide services to customers at less cost and time, and access to wider geographical areas to attract more customers. As the customer is the focus of competition among banks, banks had to create powerful strategies for excellence in the banking services, and overcome competitors in the same sector to enhance customer confidence in the bank's ability to meet their needs with a high level of secrecy, and persuade them to switch from traditional banking services to electronic banking services, and therefore the customer access to the stage of loyalty to the service offered by the bank. Researchers see that there are several
factors that affect the level of customer acceptance of electronic banking compared to traditional banking including ease of use, the benefit of usage, privacy, website design, accessibility, and cost of use. All these factors possible to achieve customer loyalty if studied properly (Al-hawary, 2017). As an example, Finland is the first country in the world to have taken a lead in e-banking. E-banking has been widely used in developed countries and in developing economies; however, the spread of e-banking is much limited in developing countries in general, which have an advantage as they can learn from the experiences of advanced economies. Today, almost all banks are adopting electronic banking as a means of enhancing service quality of banking services, and they are providing electronic banking to their customers to increase customers’ satisfaction in banking services (Claessens, Glaessner and Klingebiel, 2010).

1.2 Research Problem:
As the case in many developing countries, the use of advanced technology in institutions is limited in Sudan. In particular, electronic banking services in Sudan face a number of challenges with regard to technical know-how, power generation, capacities, and awareness, among others. This research tries to answer the following questions:

(1) What is the impact of Computer Services (CS) on the banking efficiency?
(2) What is the role of the Automated Teller Machine (ATM) in the banking efficiency?
(3) What is the effect of Electronic Clearing Service (ECS) on the banking efficiency?
(4) What is the impact of Electronic money Transferring (ET) on the banking efficiency?

1.3 Objectives of the Research:

The general objective of this research is to overview the impact of technology on bank performance efficiency of banks in the Sudan in particular

(1) To examine the impact of computer services (CS) on the bank efficiency in the Sudan.
To investigate the role of automated teller machine (ATM) in banking efficiency.

(3) To highlight the impact of electronic clearing service (ECS) on bank efficiency.

(4) To examine the impact of electronic money transferring (ET) on the banking efficiency.

1.4 Importance of the Research:
The importance of the research stems from the vital role that technology plays in all fields of life, and as a pillar for the realization of both economic growth and development. For the banking system, E-banking reduces the transaction costs for both the banks and customers, thereby increases their returns, competitiveness, and profitability. In addition, online banking enables banks to acquire information on consumer habits and preferences. Furthermore, banking through internet has emerged as a strategic resource for achieving higher efficiency and control of operations.

1.5 Hypotheses of the Research:
The research hypotheses that will be impact of the data analysis can be illustrated as follows:

(1) The computer services (CS) improve banking efficiency.
(2) There is a positive effect of automated teller machines (ATM) on the banking efficiency.
(3) Banking efficiency responds positively to changes in electronic clearing services.
(4) Electronic transactions (ET) enhance banking efficiency.

1.6 Research Methodology:
The research is mainly based on primary data collected by means of a questionnaire distributed to a purposive random sample of 100 employees working in the bank of Khartoum (2016), confined to five branches in Wad Medani, Alhasahieasa, Alkamleen, Algedraife, and Khartoum towns. The research used both the descriptive and empirical methodologies. The descriptive approach is represented in frequencies and percentages to show the basic characteristics of respondents, while the analytical
approach is represented in the regression analysis based on the Logit model for estimating the relationship between the bank's efficiency as a dependent variable and some of the explanatory variables.

1.7 Research Organization:
The rest of the research is organized as follows: Chapter (2) deals with literature review, while chapter (3) highlights the electronic banking services and banks efficiency in Sudan. Chapter (4) illustrates the methodology and data used in the research and discusses the empirical results and policy implications of the findings. Finally, chapter (5) finishes the research with some conclusions and recommendations.
Chapter Two

Literature Review

2.1 Introduction:

This chapter focuses on various theoretical and empirical impact of electronic banking services on efficiency. The chapter consists of two parts: part one deals with theoretical literature review, while part two is on empirical studies to reveal the research gaps.

2.2 The Concept of E-Banking:

Electronic banking, more commonly known as e-banking, is the newest delivery channel for banking services. The term had been defined in many ways by researchers mainly because electronic banking refers to several types of services through which customers can request information and execute transactions via telephone, digital television, computer or mobile phone.

Daniel (1999) defines electronic banking as the distribution of information and services by banks to customers via different delivery platforms that can be used with a personal computer or other intelligent devices. According to Allen (2001), e-banking refers to the supply of information or services by a bank to its customers, via a computer or television. Keivani et al. (2012) describes electronic banking as “an umbrella term for the process by which a customer may perform banking transactions electronically without visiting a brick-and-mortar institution”. Most specialists agree that e-banking ensures 24-hour-a-day, 7-day-a-week accessibility through a type of advanced information system. A common definition for electronic banking comes from the basil committee on banking supervision: “e-banking includes the provision of retail and small value banking products and services through electronic channels as well as large vale electronic payments and other wholesale banking services delivered electronically” (BCBS, 1998). E-banking, a term used for new age banking system, represents an automated delivery of new and traditional banking products and services directly to customers through electronic, interactive communication channels. It is a service that provides customers the
opportunity to gain access to their accounts, execute transactions, and obtain information on financial products and services through a public or private network, including the internet. There are several terms used in the literature all referring to one form or another of electronic banking: personal computer (PC) banking, internet banking, virtual banking, online banking, web banking, home banking, phone banking, remote electronic banking, mobile banking etc., but they are often used interchangeably. Electronic banking services have been around for quite some time in the form of automatic teller machines and telephone transactions. In more recent years, modern e-banking services such as internet and mobile banking has revolutionized banking services.

The evolution of the e-banking industry can be traced to the early 1970s when banks began to look at these types of services as an alternative to some of their traditional bank functions. First, such a choice was considered appropriate since it ensures reduced costs as branches were very expensive to set up and maintain. Second, e-banking products and services like ATMs and electronic fund transfer were an important qualitative element of differentiation for banks that used them (Mobarek, 2007). Given that banks operate in a fiercely competitive industry, their ability to differentiate themselves on the basis of price is limited. Thus, in order to remain on the market it is imperative for banks to adjust their strategies in response to changing customers’ needs and developments in technology. The term e-banking became popular in the early 1980’s referring to using a computer to access banking service via a phone line. E-banking first appeared in New York in 1981, where it was offered by major banks in that city, such as Citibank, chase manhattans, chemical and manufactured Hanover. Banks from the United Kingdom started to adopt the concept in 1983 where the Bank of Scotland was the first to introduce it. The early electronic banking services were basic, covering services like viewing bank statements and paying bills online without being a full transaction banking service (Shannak, 2013).

2.3 The Concept of Computer Services:

Computers are getting more sophisticated, they have given banks a potential and have given bank customers high expectations, from during changes that new technologies have brought to banking are enormous in their impact on officers, employees, and customers of banks. Advances in technology are allowing for
delivery of banking products and services more conveniently and effectively than ever before - thus creating new bases of competition. Rapid access to critical information and the ability to act quickly and effectively will distinguish the successful banks of the future, and the bank gains a vital competitive advantage by having a direct marketing and accountable customer service environment and new, streamlined business processes, consistent management and decision support systems provide the bank that competitive edge to forge ahead in the banking marketplace. (Hassan, 1998).

2.4 The advantages of computer services on banks:

There are three-directional - to the customer, to the bank and to the employee:
Firstly For the customer: Banks are aware of customer's need for new services and plan to make them available. Information Technology(IT) has increased the level of competition and forced them to integrate the new technologies 'in order to satisfy their customers, they have already developed and implemented a certain number of solutions among them, self-inquiry facility ; Facility for logging into specified self-inquiry terminals at the branch to inquire and view the transactions in the account, remote banking; Remote terminals at the customer site connected to the respective branch through a modem, enabling the customer to make inquiries regarding his accounts, on-line, without having to move from his office, anytime - anywhere: Installation of ATMs which offer non-stop cash withdrawal, remittances and inquiry facilities. Networking of computerized branches inter-city and intra-city, will permit customers of these branches, when interconnected, to transact from any of these branches, telebanking; A 24-hour service through which inquiries regarding balances and transactions in the account can be made over the phonemes, electronic banking; This enables the bank to provide corporate or high value customers with a Graphical User Interface (GUI) software on a PC, to inquire about their financial transactions and accounts, cash transfers, cheque book issue and inquiry on rates without visiting the bank. Moreover, LC text and details on bills can be sent by the customer, and the bank can download the same. The technology used to provide this service is called electronic data interchange (EDI), it is used to transmit business transactions in computer-readable form between organizations and individuals in a standard format, and as information is centralized and updates are available simultaneously at all
places, single-window service becomes possible, leading to effective reduction in
waiting time such as: Secondly for the bank, during the last decade. Banks applied IT
to a wide range of back and front office tasks in addition to a great number of new
products. The major advantages for the bank to implement IT are, availability of a
wide range of inquiry facilities, assisting the bank in business development and
follow-up, Immediate replies to customer queries without reference to ledger-keeper
as terminals are provided to managers and chief managers, automatic and prompt
carrying out of standing instructions on due date and generation of reports,
generation of various MIS reports and periodical returns on due dates, and fast and
up-to-date information transfer enabling speedier decisions, by interconnecting
computerized branches and controlling offices and tiredly for the employees IT has
increased their productivity through the followings there are, accurate computing of
cumbersome and time-consuming jobs such as balancing and interest calculations on
due dates, automatic printing of covering schedules, deposit receipts, pass book pass
sheet, freeing the staff from performing these time-consuming jobs, and enabling
them to give more attention to the needs of the customer, signature retrieval facility,
assisting in verification of transactions, sitting at their own terminal, avoidance of
duplication of entries due to existence of single-point data entry, and a search of the
banking literature reveals that banks are moving rapidly to take advantage of recent
and new customer service and cost reduction opportunities that new technologies
offer (Hassan, 1998).

2.5 The Concept of Bank Efficiency:

Efficient and effective utilization of resources are key objectives of every banker,
these topics have always been important in banking, but a number of recent events
are helping to bring even greater emphasis to banking efficiency. Increasing
competition for financial services, technological innovation, and banking
consolidation, for example, are all focusing more attention on controlling costs in
banking and providing services and products efficiently. Increasing competition from
nonbank institutions and from banks expanding into new markets is putting strong
pressure on banks to improve their earnings and to control costs. Efficiency is clearly
a critical factor in remaining competitive, and a number of recent statistical studies
have shown that the most efficient banks have substantial cost and competitive
advantages over those with average or below average efficiency technological innovation, in the form of improvements in communications and data processing, is also bringing added emphasis to efficiency. Such improvements are giving banks and other financial institutions opportunities to dramatically raise productivity and begin delivering many services through electronic means. Even the smallest banks are automating more and more of their operations, and banks and nonbank firms of all sizes are finding cost-effective ways to introduce new products and compete more directly with each other. Much of the consolidation movement is also being spurred by the hope of increasing efficiency. Organizations commonly view acquisitions as a way to spread the costs of backroom operations and product development over a larger base and to design more efficient branch delivery systems by eliminating overlapping offices, personnel, and other duplicative resources and services. All of these trends suggest that cost control must be a central objective of bankers and that utilizing resources in an efficient and effective manner will be of paramount importance to banking success. This study identifies a number of characteristics of the most efficient and least efficient state-chartered banks in the tenth federal reserve district by comparing financial characteristics, ownership, and management of these two sets of banks, the study will attempt to reveal factors that can contribute to efficient banking operations (Hunter et al. 1993).

2.6 The Impact of Efficiency Bank to the development of the banking sector and its impact on economic growth:

Levine (1997) highlighted in his work that the level of financial development is a good predictor of future rates of economic growth, capital accumulation and technological change. Financial instruments, markets and institutions arise to mitigate the effects of information and transaction costs, finding ways to reduce transaction costs influences saving rates, investment decisions, technological innovations and the long-run growth rate of the economy. In the same way, innovations in telecommunications such as internet banking and technological changes the use of EFTPOS and ATM) have affected the financial services industries and the way commercial banks deliver services to their clients.
The works of Schumpeter (1912) point out that a well-functioning financial system encourages technological innovations by increasing funding to entrepreneurs which ultimately leads to economic growth that establishes the link between the functioning of the financial systems and economic growth, these findings also include firms and industries that rely heavily on external financing and grow disproportionately faster in countries with well-developed banks and securities than in countries with poorly developed financial systems. In addition to many other important aspects, the performance and long-term economic growth and welfare of a country are related to its degree of financial development, financial development is measured by factors such as the size, depth, access, efficiency and stability of a financial system, this includes markets, intermediaries, range of assets, institutions and regulations world-economic forum (WEF,2012) financial intermediation and financial markets contribute directly to economic growth and aggregate economic welfare through their effects on capital accumulation (the rate of investment) and technological innovations. First, greater financial development leads to greater mobilization of savings and its allocation to the highest-return investment projects, this increased accumulation increases economic growth. Second, by allocating capital to the right investment projects and promoting sound corporate governance, financial development increases the rate of technological innovation and productivity growth, further enhancing economic growth and welfare world-economic-forum, 2012.The financial sector can be developed in many different ways, such as with improvements in the efficiency and competitiveness of the sector (ADB, 2015), the range of financial services that are available may increase the diversity of the institutions which operate in the financial sector; the amount of money that is intermediated through the financial sector may also increase, along with the extent to which capital is allocated by private sector financial institutions to private sector enterprises, and the regulation and stability of the financial sector may improve, and more importantly the improvement in access to financial services is considered important from a poverty reduction perspective (World-Bank ,2011); ADB (2015).

2.7 Efficiency Classifications.

According to Sherman and Zhu (2006), Overall productivity of a bank depends on four components of efficiency classification they are: Technical efficiency, also
known as global efficiency measures the ability of banks to produce actual outputs with fewer inputs, or less resources used indicates higher efficiency. scale efficiency refers to the optimal activity volume level whereby inefficiency may arise if goods or services are produced above or below optimal level that resulted in added fixed cost, also price efficiency bank could increase its efficiency if it could purchase the inputs human capital and material at lower price without sacrificing the quality, and allocative efficiency measure the optimal mix of several inputs in order to produce products or services, such as banks incorporate automatic teller machines (ATM) and Internet banking for capital labor tradeoffs to increase efficiency.

2.8 The Automated Teller Machine (ATM):

The ATM is a machine which facilitates banking transactions and makes the customers life peaceful and easy, to access the funds which are kept in the bank at any time is not an easy task but today it is not at all difficult, a person just has to tell his bank that he wants an ATM card, the bank issues him an ATM card which is pass coded and could be used by him alone. ATM card is called by different names like bank card, MAC (Money Access Card), client card, key card or cash card, etc. In most cases even debit and credit card could be used, the ATM card helps the customer to be identified by a plastic ATM card with a magnetic stripe or a plastic smartcard with a chip, the security is provided by the customer entering a personal identification number PIN, and the ATM card is slowly replacing cheque, the personal attendance of various customers, has increased banking hours and reduced the holidays, they do not require any paper based verification (Meena, 2015).

2.9 Types of ATM’s there are three types of ATM’s by Nature:

Bank ATM’s, brown label ATM’s and white label ATM’s 3 types by location: onsite ATM’s, offsite ATM’s and standalone ATM’s:2.3.2 ATM’s by nature there are, bank ATM’s: The ATM’s which are owned, installed, managed by banks, brown label ATM’s: They are outsourced to a company who installs, manages and look after, and the ATM’s, these have a logo of the bank that ensures it is installed by the bank, these are mostly used by private sector banks, white label ATM’s: These are similar to label ATM’s except they don’t have any logo of the bank.
(a) **ATM’s by Location there are**, onsite ATM’s: these ATM’s are seen in the bank or its branch building, offsite ATM’s: these ATM’s are in separate building but in the area where the bank or its branch is, and Stand Alone ATM’s: these are similar to offsite ATM’s except they are now here in the bank or its branch area. It is mainly found in malls and stations, etc.

(b) **Features of Automated Teller Machine are**: An Automated Teller Machine is a computerized machine which was designed for certain transactions but today it can do much more like: Withdrawal of money, view bank statement, fund transfer, cash deposit, balance enquiry, cheque deposit and printing bank statements, etc.

(c) **The advantages of are that, ATM**, there are provides 24 hours service, ATM gives convenience to the bank’s customers, ATM reduces the workload of bank’s staff, ATM provides service without any error, ATM is very beneficial for travelers as they don’t have to carry large amount of cash, ATM may give the consumers new currency notes and not soiled notes, it reduces the hustle and bustle which is involved in a transaction when done through teller, ATM provides privacy while conducting banking transactions, the bank customers expect high reliability in their ATM’s, which provide incentive to the bank to minimize machine and network failures, there is no need of filling forms because ATM requires no such document, the customer is able to access the bank from any part of the world and can conduct essential banking services like deposits, withdrawals, transfer of funds, etc, a lot of expansion of services can happen with an ATM to any corner of the world by providing electronic access to its customers, ATM’s help in reducing the cost of operation as it reduces human intervention and increases profitability of banks, the financial consequences which would arise of an incorrect machine also provides incentive to the bank to minimize malfunctions, Some ATM’s print each transaction to a roll paper journal which is stored in the ATM. This allows the users and the related banking institution to settle things based on records if any dispute arises, for customer security the lobbies have extensive security camera coverage, a courtesy telephone for consulting with the bank staff and a security guard on the premises, and openings on the customer-side of ATMs are often covered by mechanical shutters to prevent tampering with the mechanisms when they are not in use (Meena, 2015).
2.10 The Disadvantages of Automated Teller Machine:
Are that ATM Card cloning fraud, fake ATM’s, attack on ATM’s, PIN crack, if ATM networks do go out of service, customers could be left without the ability to make transactions until the beginning of their bank’s next time of opening hours, the ATM machine doesn’t guarantee a 100% availability of cash. it may run low of funds and the customers have to wait till the management takes care of it, the cost levied to a customer using an ATM can be higher, robbers preyed on people using money machines in poorly lit or otherwise unsafe locations and criminals also devised ways to steal customers’ PINs, consumers were faced with an increase in ATM crimes and scams, ATM’s cannot be provided in rural areas, in a country like India, where banks are having large number of rural and non-computerized branches, ATM services become difficult to be provided, the presence of various constraints makes it more difficult to introduce ATM services in the country side like illiteracy, security concern, etc., there is a limitation of cash withdrawals from ATM’s. Many banks do not permit withdrawal of more than 25,000 at a time, the cash deposit facility is restricted and not safe as dropping of envelope in an ATM is not advisable, and there is strong possibility of misusing ATM card if misplaced, lost or stolen number of such reported incidences nowadays, Meena, 2015).

2.11 The concept of electronic clearing services:
It is a mode of electronic funds transfer from one bank account to another bank account using the services of a clearing house. This is normally for bulk transfers from one account to many accounts or vice-versa. This can be used both for making payments like distribution of dividend, interest, salary, pension etc, by institutions or for collection of amounts for purposes such as payments to utility companies like telephone, electricity, or charges such as house tax, water tax, etc, or for loan installments of financial institutions/banks or regular investments of persons (Bank of Guyana, 2018).

2.12 Types of ECS, there are two types of there are:
(a) ECS (credit) is used for affording credit to a large number of beneficiaries by raising a single debit to an account, such as dividend, interest or salary payment.

(b) ECS (debit) is used for raising debits to a number of accounts of Consumers/account holders for crediting a particular institution, clearing on banks there are, trouble free – eliminates the need to go to the collection centers banks by the customers and no need to stand in long for payment, Peace of mind customers also need not track down payments by last dates, and the debits would be monitored by the ECS users (Bank of Guyana, 2018).

2.12 The Concept of Electronic Transfer Services:

Electronic funds transfer is a system of transferring money from one bank account directly to another without any banknotes/coins changing hands. EFT refers to the computer based systems used to perform financial transactions electronically initiated through the exchange or transfer of money either within the same financial institution or across multiple institutions using an electronic terminal ATM, point-of-sale, credit card, etc, the telephone or the computer, it is also used for both credit transfers payroll payments and debit transfers mortgage payments. Transactions are processed by the bank for payments where funds are transferred electronically from one bank account to the billing company's bank and usually takes less than a day after the scheduled payment date, the cost for an EFT may vary among the commercial banks, and the growing popularity of the EFT for online bill payment is paving the way for a paperless environment where cheques, stamps, envelopes and paper bills are obsolete (Bank of Guyana, 2018).

2.13 The Advantages of Electronic Transfer Services:

time savings, money transfer between virtual accounts usually takes a few minutes, while a wire transfer or a postal one may take several days, also you will not waste your time waiting in lines at a bank or post office, expenses control, even if someone is eager to bring his disbursements under control, it is necessary to be patient enough to write down all the petty expenses, which often takes a large part of the total amount of disbursements. The virtual account contains the history of all transactions indicating the store and the amount you spent, and you can check it anytime you
want, this advantage of electronic payment system is pretty important in this case, reduced risk of loss and theft, you cannot forget your virtual wallet somewhere and it cannot be taken away by robber, although in cyberspace there are many scammers, low commissions. If you pay for internet service provider or a mobile account replenishment through the unattended payment terminal (UPT), you will encounter high fees, as for the electronic payment system: a fee of this kind of operations consists of 1% of the total amount, and this is a considerable advantage, user-friendly, and usually every service is designed to reach the widest possible audience, so it has the intuitively understandable user interface (Claessens, Glaessner, & Klingebiel, 2000).

2.14 The Disadvantages of Electronic Transfer:

There are restrictions each payment system has its limits regarding the maximum amount in the account, the number of transactions per day and the amount of output, the risk of being hacked. If you follow the security rules the threat is minimal, it can be compared to the risk of something like a robbery, the worse situation when the system of processing company has been broken, because it leads to the leak of personal data on cards and its owners, even if the electronic payment system does not launch plastic cards, it can be involved in scandals regarding the identity theft, the problem of transferring money between different payment systems. Usually the majority of electronic payment systems do not cooperate with each other, in this case, you have to use the services of e-currency exchange, and it can be time-consuming, if you still do not have a trusted service for this purpose, the lack of anonymity, the information about all the transactions, including the amount, time and recipient are stored in the database of the payment system, and it means the intelligence agency has an access to this information, you should decide whether it's bad or good, and the necessity of Internet access, if Internet connection fails, and you cannot get to your online account. (Claessens, Glaessner, & Klingebiel, 2000).

2.15 Empirical Studies
Okiro and Ndungu (2013) investigated the impact of mobile banking and internet banking on financial performance of financial institutions in Kenya. The study also sought to identify the extent of use of mobile and internet banking in financial institutions. The population of interest in the study consisted of 61 financial institutions operating in Kenya, the study revealed that among the financial institutions surveyed, commercial banks had the highest usage of internet and mobile banking; SACCOs had the second highest usage whereas none of the microfinance institutions used internet banking. The study found that mobile banking faces various challenges among them being, system delays by the mobile money transfer service providers, slow processing of transactions especially during the weekends, high transactions costs, limit on the amount of money that can be withdrawn in a day and fraud. It would be important to extent the study to a wider electronic banking and check whether it would have an effect on their financial performance.

Malhotra and Singh (2009) studied the impact of internet banking on bank performance and risk in India. The study was done on 85 commercial banks over the period 1998-2006 which represented nearly 39 percent of total scheduled commercial banks in India. Using information drawn from the survey of 85 scheduled commercial bank’s websites, the results showed that nearly 57 percent of the Indian commercial banks are providing transactional Internet banking services. The unvitiated analysis indicated that internet banks are larger banks and have better operating efficiency ratios and profitability as compared to non-Internet banks. Internet banks rely more heavily on core deposits for funding than non-Internet banks do. However, the multiple regression results reveal that the profitability and offering of internet banking does not have any significant association, on the other hand, internet banking has a significant and negative association with risk profile of the banks. Since the study was based on only internet banking it’s important to extend the study to cover other forms of electronic banking.

Siam (2006) investigated the role of electronic banking services on the profits of Jordanian banks. He investigated the reasons behind providing electronic banking services through the internet and their impact on banking services in general and banks profitability. The study was done in 20 commercial banks operating in Jordan. The sample period was between (2003to2006) and they interviewed 98 managers.
Accounting data was used to measure banks performance using regression analysis. He concluded that the effect of electronic banking services on banks profitability is negative in the short run because of costs and the investments the bank carry in order to have the technical and electronic infrastructure in place, training the employees to be skilled and competent but will be positive on the long run. Jordanian people are conservative as opposed to Kenyans who are widely known to be technology savvy. It would therefore be important to investigate whether many of the innovations in e-banking adopted by commercial banks in Kenya has an effect in their financial performance.

Agboola, (2006) was examined electronic payment systems and telex-e-banking services in Nigeria, selected for the study thirty-six out of the eighty-nine banks in 2005. He used the questionnaire method for gathering data from bank workers. The findings of his paper revealed that ware had been a very modest move away from cash. Some payments ware now being automated and absolute volumes of cash transactions have declined. Connectivity via the used of networks had facilitated electronic transfer of funds. He was observed that thirty-five out of the thirty-six banks, he was had studied have fully networked their systems to ease communication of account information. The paper concluded that telex banking is capable of broadening the customer relationship, retain customer loyalty and enable banks to gain commanding height of market share if their attendant problems are taken care of. E-banking operations have continued to change payment systems in Nigeria; many efforts are however required to fully utilize its numerous capabilities.

Guru, (2005) argued that the majority of Islamic countries are still in the early stages of developing internet banking. He was observed that some Islamic banks in the Middle East have well-developed internet banking websites for the convenience of their customers. However, since these banks are still in the infancy stage, there are stillroom for improvement. Evidence shows that Islamic countries are moving steadily towards e-internet banking. Given time, Islamic banks may one-day stand along their conventional counterparts in the field of internet banking. They concluded that: “Despite the rather late debut of Islamic banking the global financial arena, there is evidence to indicate its rapid growth not only in the number of financial institutions around the globe including both in Islamic countries and non-
Islamic countries such as the United States and the United Kingdom. Internet banking is increasingly used by banks and other financial service providers to gain competitive advantages operational efficiencies, and faster processing to direct marketing opportunities. This showed that only some of the banks had very well developed internet banking while most others did not have well developed features since 41.4% of the banks web sites surveyed in this study had a rating of less than 10 on a maximum rating of 27.Used by banks and other financial service providers to gain competitive advantages.

Jarrah, (1999) has reported that Arab electronic shoppers spent approximately 95 million US Dollars in April 1998. Payments were made mainly by credit cards (82%), followed by bank transfers of 11 per cent, cash upon delivery of nine per cent, and checks of three percent. 78 percent of online shoppers said that they believed fax transmission of private financial information was secure enough, versus telephone at 70 per cent, and e-mail at confidence of 50 per cent. This suggests that opportunities are available to banks in order to strengthen their on-line presence and assure both security and privacy of their operations to customers.

According to Abdelgadir (2016), this study aims to provide an analysis of the attitude toward three banking services technologies in Sudan, namely, automated teller machines (ATMs), mobile banking and internet (online) banking. The study started by conducting an exploratory factor analysis, on the valid responses received from a random sample of bank customers in Sudan toward the three technologies. Design methodology approach: The study used the “technology acceptance model” as a conceptual framework to investigate the factors that influence customers’ acceptance and intention to use bank technologies. Findings: The study found that the customers’ attitude toward various bank technologies is not the same and is influenced by different factors. The results revealed that bank customers who are users of ATMs are influenced by its convenience, ease of use and service quality, whereas credibility was not seen as a significant driver. Mobile users were found to be influenced more by the benefits and ease of use and service quality, whereas internet customers were influenced by the benefits and ease of use and credibility of the systems.
Mohammad (2015) has examined the influence of telecommunication regulation on the development of e-banking. The importance of his study comes from its contribution on accelerating the development of banking through the application using the information and communication technologies. The result of the e-banking in Sudan has improved at last decades but not the customer of satisfaction levels.

Khaled (2012) examined the negative effects of technology from the perspective of bank employees and customers of banks in Sudan. He used of simple descriptive statically techniques to test hypotheses. The negative aspects of those surveyed agree that the staff devices banking technologies, because is expensive and sensitive and require regular so leading to increase cost, and Applications of information Technology in Sudan.

Magda (2005) was she light on the practice of Islamic banking system in Sudan. The main objective of her study was to show how successful the Islamic banking system in Sudan and how this in turn system succeeded in converting all existing banks in to interest-free banks at the beginning of the 1990. Moreover, it emphasizes the establishment of new Islamic banks in all the regions of Sudan, and those banks succeeded in minimizing dealing with interest, attracting more depositors and financing the different sectors.
Electronic Banking Services and Banks Efficiency in the Sudan:

3.1 Introduction:

This chapter discusses the literature related to electronic banking services and banks efficiency in Sudan. The Chapter is divided into four parts namely, Sudanese Banking System, E-banking in Sudan, Problems Facing E-Banking in Sudan, Applications of Information Technology Sudan’s Financial Institution, and Background of Bank of Khartoum.

3.2 The Banking System:

The traditional banking system was inherited from the Anglo-Egyptian condominium (1899-1955). When the National Bank of Egypt opened in Khartoum in 1901, it obtained a privileged position as banker to and for the government, a "semi-official" central bank. Other banks followed, but the National Bank of Egypt and Barclays Bank dominated and stabilized banking in Sudan until after World War II. Post-World War II prosperity created a demand for an increasing number of commercial banks. Before Sudanese independence, there had been no restrictions on the movement of funds between Egypt and Sudan, and the value of the currency used in Sudan was tied to that of Egypt. This situation was unsatisfactory to an independent Sudan, which established the Sudan Currency Board to replace Egyptian and British money. It was not a central bank because it did not accept deposits, lend money, or provide commercial banks with cash and liquidity. In 1959, the Bank of Sudan was established to succeed the Sudan Currency Board and to take over the Sudanese assets of the National Bank of Egypt. In February 1960, the Bank of Sudan began acting as the central bank of Sudan, issuing currency, assisting the development of banks, providing loans, maintaining financial equilibrium, and advising the government (Alam, 2010).

Banks were nationalized in 1970 but in 1974, foreign banks were allowed to open branches in Sudan. Banks are required to maintain 20% of total deposits as a statutory reserve with the central bank. They must also direct to the agricultural
sector 40% of the funds that they have for lending under the new credit ceilings. Currently there are about 26 banks with total capital of over US $ 700 million. With opening up of the Sudanese economy to the great extent in the last few years, new banks like Al Salam bank, from the United Arab Emirates (UAE), Africa Bank started to enter Sudanese market. These foreign banks are coming with huge capital, new technology, new ideas and new vision. (Bank of Sudan, 2007).

3.3 E-banking in Sudan:

Over the past decade, the number of banks in the Sudan has been steadily increasing; from 27 in 2002 to 32 banks in 2012 Central Bank of Sudan, 2012. Currently the Central Bank of Sudan (CBS) oversees 32 licensed banks of which 27 are registered as commercial, including one state-owned bank, three branches of foreign banks, and 23 joint-venture banks (Table 1). Five banks are registered as "specialized" of which three state-owned banks and two joint-venture banks. The specialized banks provide funds to specific sectors of the economy; agriculture, industry, and social development. All the banks in Sudan are head quartered in Khartoum, the capital city.

Table (3.1) Licensed Banks in Sudan

<table>
<thead>
<tr>
<th>Type</th>
<th>Commercial bank</th>
<th>Specialized banks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>State–owned</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Foreign</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Joint-venture</td>
<td>23</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>5</td>
<td>32</td>
</tr>
</tbody>
</table>

The Sudanese banking industry as a whole has a network of 506 branches, which is quite low compared to the area of the country (1.9 million square km) and the size of population which is estimated to be 35 million in 2012. In addition, the geographical distribution of banks' branches is uneven across the 17 country's states with 190 branches located in Khartoum state, representing 37.5% of total branches (Fig. 1). The bank usage in Sudan is quite low, with 144 banks accounts per thousand adults in 2009 compared with a much higher average of 240
accounts per thousand adults in Africa (World Bank, 2009). This reveals that cash is still the most dominant medium of exchange.

(Figure 1: Geographical distribution of banks' branches)

3.4 Problems Facing E-Banking in Sudan:

Electronic banking has been around for some time in the form of ATMs and telephone transactions. More recently, it has been transformed by the internet, a new delivery channel for banking services that benefits both customers and banks. Access is fast, convenient, and available around the clock, whatever the customer's location. Plus, banks can provide services more efficiently and at substantially lower costs. There are many trends in electronic banking that are gaining ground. Banks increasingly operate websites through which customers are able not only to inquire about account balances and interest and exchange rates but also to conduct a range of transactions. In Sudan there are many problems facing the proper practice of e-banking, such as: Firstly, lack of co-ordination between the private and public sectors to create the right environment for banking, secondly, lack of awareness of e-banking and distrust of online payments and security and lack of legal protection against online intrusions, fraud and money-laundering; and thirdly, inadequate infrastructure, computer internet literacy and connectivity, and, lastly, most of the banks are not have their web-site pages. Barriers to ICT in Financial Institutions (Mohammad, 2013). Some barriers to information, communication technology are:
3.4.1 Costs: Most of the banking institutions have not been able to benefit from the opportunities of information flow because of various barriers they are confronted with. One of these involves the costs arising from the acquisition and maintenance of new information technology. It is observed that the cost of establishing networks and tariffs charged are so high that even if computers, are available it is only the privileged few who can have access to the service, but nowadays these instruments have low costs, then, the banks must adopt and provide services via electronic transactions. Meanwhile, the average cost of a direct banking transaction via Web is $0.10, in comparison, an ATM transaction costs $0.27, a phone transaction $0.54 and a branch transaction cost $1.07 (Kurtas 2000).

3.4.2 Standardization: In banking institutions, there is also the problem of the standardization of hardware facilities. The information superhighway has engineered the importation of various brands of information technology by Financial Institution. Technologists assert that imported technologies are designed to operate in an air-conditioned, dust free environment with a good maintenance support.

3.4.3 Illiteracy: Illiteracy in banking institutions is one of the serious constraints to the effective use of information technology. The quality of training in information communication technology is also unsatisfactory. Introduction to physical equipment will not solve the problem of information availability and flow unless it is coupled with human capacity and skill lack of infrastructure remains the main setback to the development of information communication technologies in banking institution. Telephone line failures and electronic blackouts are frequently experienced.

3.5 Applications of Information Technology Sudan’s Financial Institution:

Internet users as of September, 2009 stood at 4,200,000, or 9.3% of the population, this includes the population of South Sudan as the figures pre-date its independence.) In 2010 the total number of mobile subscribers in Sudan was 17,739,175 and in 2011 the total was 23,035,202, an increase of 29.85%. This figure includes both contract and pre-paid connections for both Sudan and South Sudan, as the data pre-dates the latter’s independence. In the 2012 the internet subscribers were 6.5 million in the Sudan. To enable Sudanese financial institutions from leveraging the benefits of this international network the Shamik SWIFT service center was established in 2000 to connect Sudanese Banks to SWIFT. This center acts as the SWIFT Sudanese service bureau.
The center manages the transfer of various financial data based on the standards set by SWIFT guaranteeing the success and security of these transactions and in order to satisfy our clients we guarantee that we cope with all the developments in this area by continually updating our equipment and systems. Currently, almost 90% of all banks in Sudan whether local or international are connected to this network via our center. A mirror center has been established in order to guarantee a continuous service in case the original center faces any unwarranted malfunctions. The center has an ambitious plan to provide connectivity to the SWIFT network for non-financial institutions in Sudan to enable them from leveraging the benefits of the various services provided by the network in their operations in and out of Sudan (Mohammad, 2013). The national assembly passed the electronic transaction act 2007, which enable all financial institutions in the country to provide their services through electronic system.

3.5.1 Automatic Teller Machine (ATMs): The ATMs were introduced in the retail banks with the objectives of reducing personnel costs associated with traditional “teller window” customer services transactions. Most of the Sudanese banks are providing their services via branches and thought the utilization of ATMs, table no. 1 shows there were around 25 ATMs in the year 2005 which increase to 865 in 2012 (Central bank of Sudan and Shamik Company, 2013).

3.5.2 Smart Cards: Smart cards are small sized piece of plastic devices with embedded integrated circuit and used as payment instrument. The power of smart cards lies in the ability to store and manipulate data, to handle multiple applications on one card and to perform secure transactions. table no. 1 shows the issued were less 55,848 smart cards in the year 2005 which increase to 1,326,931 in 2012(Central bank of Sudan and Shamik Company, 2013).

3.5.3 Global Depository Receipt Program: Through this instrument, the financial institution was able to attract, institutional investors from diverse markets such as Europe, Middle East and other countries in Africa to Sudan.

3.6 Background of Bank of Khartoum

Bank of Khartoum one of the modern Sudanese banking, it has established in 1913, with new and innovative models of intervention to deal with chronic social problems, such as, poverty and unemployment, as part of the Sudanese economics system, it operates as Shariah bank. In 2002, Bank of Khartoum was registered as a private
limited company and subsequently was acquired and managed by Dubai Islamic Bank, the largest Islamic Bank from United Arab Emirates by purchasing about 60% of the government shares in 2005. Was first established the call center in 2006, as one of the many planned steps to open new bridge of communication for customers wishing to inquire about the various bank's products and services. Farther more contributing to modern electronic banking services in Sudan: such as first as initial point of contact for customers wishing to inquire about of these services, ATM, saving plus, auto finance and home finance have seen the call center, and with the support for assistance from the Islamic development bank from was established in (2009), and also the IRADA has carefully developed a network of business development service, operates under Islamic banking standards and it offers services to corporate, retail, microfinance and investment business segments, the equity of the bank as of Dec 2012 is SDG 860 Million). In the bank of Khartoum, has 1300 employees. Its major shareholders include local and regional businessmen and various institutions such as Dubai Islamic Bank (DIB), the Islamic Development Bank, Abu Dhabi Islamic Bank (DIB), Sharjah Islamic bank and United Arab Emirates Etisalat has a comprehensive suite of retail services including a network of 58 branches. Its product portfolio includes auto finance, home finance, education finance, and takaful. It has included e-banking with 137 ATMs, internet banking and mobile banking, SMS alerts, discount and supplementary cards and call center. Its programs and activities are influenced by its strategic approach theme, which states .Today the poor are our clients, but tomorrow they will be our business partners, has been partnering strategically with institutions of the public and private sectors, to eliminate poverty and empower all under privileged categories, we provide its services by from of Islamic financing, with finance terms ranging between six month and three years, and grace period ranging between one to six months, our strength draws on its strategic position as pioneer in this filed supported by its experience in the field micro finance, was established in 2009 in collaboration with one of its shareholders. The MFI services targets woman, the disabled and men in poverty pockets across the Sudan, and provides them financing well as emotional and technical support they need to fuel their success, include training technical, the expend their abilities to provide for themselves and their families, create hope, opportunity and build their confidence.(Bank of Khartoum,2015).

Chapter Four
Research Methodology, Data and Empirical Results

4.1 Introduction:

This chapter focuses on the research methodology adopted in the analysis, and discusses empirical results.

As mentioned earlier, this research uses primary data collected by a means of a questionnaire to investigate the impact of electronic banking services on the efficiency of banks in Sudan. To realize this objective, a purposive random sample of 100 respondents is selected from the employees working in the bank of Khartoum (2016), confined to branches in five towns namely, Wad Medani, Alhasahieasa, Alkamleen, Algdraife, and Khartoum, with 20 samples for each. The research used both the descriptive and empirical methodologies. The descriptive approach will firstly be used to describe the characteristics of the respondents. Hence, the Logit model will be estimated to investigate the relationship between the banking efficiency and its regressors. The empirical model to be estimated takes the following form:

\[ Y = F (X_1, X_2, X_3, X_4) \quad F_1, F_2, F_3, > 0 \quad F_4 < 0 \]

Where:

Y: Banking Efficiency (BE)

X_1: Computer Services (CS)

X_2: Automated Teller Machine (ATM)

X_3: Electronic Clearing (EC)

X_4: Electronic money Transactions (ET)

Each of the explanatory variables is expected to promote banking efficiency through accuracy, saving time, and minimizing the cost of banking operations.

4.2 The Logit Model Regression:
4.3 Introduction

Logit regression analysis studies the association between a categorical dependent variable and a set of independent (explanatory) variables. The logistic regression is used when the dependent variable has only two values, such as 0 and 1 or Yes and No. The name multinomial logit regression is usually reserved for the case when the dependent variable has three or more unique values. In multiple regression, a mathematical model of a set of explanatory variables is used to predict the mean of a continuous dependent variable. Suppose the numerical values of 0 and 1 are assigned to the two outcomes of a binary variable. Often, the 0 represents a negative response and the 1 represents a positive response. The mean of this variable will be the proportion of positive response. If p is the proportion of observations with an outcome of 1, then 1-p is the probability of an outcome of 0. The ratio p/(1-p) is called the odds and the logit is the logarithm of the odds, or just log odds.

Mathematically, the logit transformation is written.

\[ l = \text{logit}(p) = \ln\left(\frac{p}{1-p}\right) \]  

(1)

4.4 The Log Odds Ratio Transformation:

The difference between two log odds can be used to compare two proportions, such as that of males versus females. Mathematically, this difference is written.

\[ l_1 - l_2 = \text{logit}(p_1) - \text{logit}(p_2) \]

\[ = \ln\left(\frac{p_1}{1 - p_1}\right) - \ln\left(\frac{p_2}{1 - p_2}\right) \]

\[ = \ln\left(\frac{p_1}{1 - p_1}\right) - \ln\left(\frac{p_2}{1 - p_2}\right) \]

\[ = \ln\left(\frac{p_1(1 - p_2)}{p_2(1 - p_1)}\right) \]

\[ = \ln(OR_{1,2}) \]  

(2)

This difference is often referred to as the log odds ratio. The odds ratio is often used to compare proportions across groups. Note that the logistic transformation is closely related to the odds ratio. The reverse relationship is
In logit regression, a categorical dependent variable $Y$ having $G$ (usually $G = 2$) unique values is regressed on a set of $p$ independent variables $X_1, X_2, \ldots, X_p$. $Y$ will take on the values 1, 2, $G$. In fact, NCSS allows $Y$ to have both numeric and text values, but the notation is much simpler if integers are used.

$$X = \left( X_1, X_2, \cdots, X_p \right)$$

$$B_g = \begin{pmatrix} \beta_{g1} \\ \vdots \\ \beta_{gp} \end{pmatrix}$$

The logit regression model is given by the $G$ equations

$$\ln \left( \frac{P_g}{P_1} \right) = \ln \left( \frac{P_g}{P_1} \right) + \beta_{g1} X_1 + \beta_{g2} X_2 + \cdots + \beta_{gp} X_p$$

$$= \ln \left( \frac{P_g}{P_1} \right) + X B_g$$

Here, $P_g$ is the probability that an individual with values $X_1, X_2, \ldots, X_p$ is in outcome $g$. That is,

$$P_g = \Pr(Y = g | X)$$

Usually $1 \equiv X_1$ If these prior probabilities are assumed equal, then the term $1/ \ln P_g$ becomes zero and drops out. If the priors are not assumed equal, they change the values of the intercepts in the logit regression equation. Outcome one is called the reference value. The regression coefficients for the reference value are set to zero. The choice of the reference value is arbitrary. Usually, it is the most frequent value or a control. Outcome to which the other outcomes are to be compared. This leaves $G-1$ logit regression equations in the logit model. The $\beta$'s are population regression coefficients that are to be estimated from the data. Their estimates are represented by $b$. The $\beta$'s represents unknown parameters to be estimated, while the $b$s are their estimates. These equations are linear in the logit of $p$. However, in terms of the probabilities, they are nonlinear. The corresponding nonlinear equations are,

$$p_g = \text{Prob}(Y = g | X) = \frac{e^{X B_g}}{1 + e^{X B_2} + e^{X B_3} + \cdots + e^{X B_G}}$$
Since $e^{XB} = 1$ because all of its regression coefficients are zero.

A note on the names of the models. Often, all of these models are referred to as logit regression models. However, when the independent variables are coded as ANOVA type models, they are sometimes called logit models.

A note about the interpretation of $e^{XB}$ may be useful. Using the fact that may be re-expressed as follows

$$e^{XB} = e^{\beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_p X_p}$$

$$= e^{\beta_1 X_1} e^{\beta_2 X_2} \cdots e^{\beta_p X_p} \quad (8)$$

This shows that the final value is the product of its individual terms.

4.5 Sample Size:

Sample form study population was selected using the statistical formula, the sample size was determined using Corhan (1963):

Where:

$$n_0 = \frac{t^2 Pq}{d^2}$$

$n_0$ = Initial Sample Size

t= Initial Value

P=population anticipated proportion

q=1-p

d=Statistical precision

Taking   P=50%   d=10%   $n_0=100$

4.6 The Empirical Results:

The internal consistency of the data ensures the reliability coefficient to means of data collection (the questionnaire).

Table (4. 1)
The Value of Reliability Coefficient

<table>
<thead>
<tr>
<th>Item</th>
<th>Number of the sentences</th>
<th>Cranach's alphacoefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over all reliability coefficient</td>
<td>0.27</td>
<td>0.86</td>
</tr>
</tbody>
</table>

Source: researcher own data (2016).

From the results in table (4.1) the value of Cranach's alpha coefficient was 0.86 indicating that, the questionnaire has a high degree of reliability.

Table (4.2)

Distribution of Respondents according to Sex

<table>
<thead>
<tr>
<th>Sex</th>
<th>Frequencies</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>59</td>
<td>59</td>
</tr>
<tr>
<td>Female</td>
<td>41</td>
<td>41</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: researcher own data (2016).

From the results in table (4.2) the study showed that the percentage of males is higher than that of females, this may due to the policy adopted by the Bank of Khartoum, favoring males over females in its staff.

Table (4.3)

Distribution of Respondents according to Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequencies</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 30</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>30-40</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>More than 40</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: researcher own data (2016).

The results that the table (4.3), show that the majority of respondents are in the age group less than 30 years, representing 55% of the total of respondents. This indicated that the bank has depended on young staff from fresh graduates.

Table (4.4)
The Distribution of Respondents According to Educational Level

<table>
<thead>
<tr>
<th>Educational level</th>
<th>Frequencies</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diploma</td>
<td>04</td>
<td>04</td>
</tr>
<tr>
<td>Bachelor</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Post-graduate</td>
<td>46</td>
<td>46</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: researcher own data (2016).

The results in table (4.4) show that the majority of respondents have Bachelor qualifications, representing 50% of the total respondents, 46% of them have Post-graduate degree and the rest have a Diploma degree. This indicates that the bank encourages training and graduate study among its staff.

Table (4.5)
The Distribution of Respondents according to Experience Level

<table>
<thead>
<tr>
<th>Experience Level</th>
<th>Frequencies</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less 5 years</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>5-10 years</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Over 10 years</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: researcher own data (2016).

The results in table (4.5), shows that the majority of respondents with experience of less than 5 year representing 50% of the total respondents, 35% of them have employees 5-10 years, and the rest over 10 years, how's majority manager in section bank. This indicates that the bank also encourages fresh graduate study among its staff.

Table (4.6)
The Proportions of Electronic Services Provided by the Bank

41
The results in Table(4.6) shows the electronic services provided by the Bank of Khartoum scored the highest average at (4.47) followed by providing of ATM service at (4.39), third electronic audit services at (4.30), and electronic transfer service at 4.21. This means that the Bank uses computers in its all transactions.

The study used a questioner as data collection, by using descriptive analytical method and SPSS, and used logit model for independent variable and dependent variables, so has been transformation we obtained the following table to regression results:

\[
Y = 0.55 + 0.180X_1 + 0.105X_2 + 0.30X_3 - 0.17X_4 \\
T\text{-ratio} \quad \begin{array}{cccc}
(1.73) \\
(0.903) \\
(2.85) \\
(1.56)
\end{array}
\]

\[
R^2 = 0.176 \\
F = 5.085 (000)
\]

The results showed that the model as a whole is significant at 1%. About 0.18% of the changes in banking efficiency according to the respondent, as the result of coefficient of determination \(R^2\) cross section data.

**Chapter Five**
Conclusion and Recommendations

5.1 Conclusion:

This research attempted to examine the electronic banking services on the bank' efficiency in the Sudan. The research used primary data collected by a means of questionnaire to investigate the impact of electronic banking services on the efficiency of banks in Sudan. To realize this objective, a purposive random sample of 100 respondents is selected from the employees working in the bank of Khartoum (2016), confined to branches in five towns namely, Wad Medani, Alhasahieasa, Alkamleen, Algdraife, and Khartoum, with 20 samples for each. The research used both the descriptive and empirical methodologies. The logit model was adopted, the results showed that there were appositive significant relationship between the bank's efficiency and the explanatory variables (computer services (CS), automated teller machine (ATM), and electronic clearing services (ECS). Whereas there was a negative relationship between the bank's efficiency and electronic transaction.

5.2 Recommendations:

- Government through bank of Sudan should provide adequate security measures towards the various e-banking products in Sudan, this will aid in reducing the rate of fraud and forgery in the banking industry and encourage investors which in turn will increase the banks’ cash inflow use of available fund for granting of credit facilities,

- Banks should regularly train their workers who in turn will educate their customers on electronic banking system and its products, will enhance the in-depth understanding of the products and the way they are being used, more customer's deposits will be attracted. Besides this, the bank should also organize seminars, workshops, symposia and public lectures to bank customers and general public on the application of information and technology cum e-banking system, this will aid to increase the use of various e-banking products in Sudan especially in this era of cashless economy drive, and banks should in addition to the storage of information in the computer, maintain the manual filing of all the relevant documentary evidence of information in their financial statement so as to avoid loss of audit trail, with an understanding that e-banking in Sudan.
This research recommends that the supporting of banks to expand their electronic services in a planned and well-articulated strategy for the long run, in order to have customer satisfaction and increase in banks profitability.
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بسم الله الرحمن الرحيم
جامعة الجزيرة
كلية الاقتصاد والتنمية الريفية
قسم الاقتصاد
برنامج بحث تكميلي لنيل درجة الماجستير في اقتصاديات التنمية
أثر الخدمات الالكترونية على كفاءة البنوك في السودان
دراسة حالة بنك الخرطوم
بنك الخرطوم

1. اسم الفرع: ..................................

2. تصنيف المصرف من حيث القطاع الذي يعمل فيه؟

   بنك قطاع ( ) بنك قطاع مشترك ( ) فرع بنك اجنبي ( )

أولًا: الرجاء وضع علامة ( ) داخل المربي المقابل للخيار المناسب:

   1. النوع: ذكر ( ) اثني ( )

   2. العمر: أقل من 30 سنة ( ) 30-40 سنة ( ) أكبر من 40 سنة ( )

   3. المؤهل العلمي: جامعي ( ) فوق جامعي ( ) ثانوي ( )

   4. الخبرة العملية:

   أقل من 5 سنوات ( ) من 5 الى 10 سنوات ( ) أكثر من 10 سنوات ( )

وضوح درجة تأثير الخدمات المصرفية الالكترونية علي أداء فرعكم من حيث:
سرعة تقديم الخدمات ونمو الودائع والإيرادات:

<table>
<thead>
<tr>
<th>الخدمات المصرفية</th>
<th>درجة تأثير الخدمة على أداء المصرفكم</th>
</tr>
</thead>
<tbody>
<tr>
<td>لا أوفق بشدة</td>
<td>أوفق بشدة</td>
</tr>
<tr>
<td>أوفق</td>
<td>لا أوفق</td>
</tr>
<tr>
<td>محايد</td>
<td></td>
</tr>
</tbody>
</table>

خدمة الحاسب الالي
خدمة الصراف الالي
خدمة البريد الالكتروني
خدمة المقاصة الإلكترونية

1. كفاءة البنك من خلال (الودائع، الأرباح)

<table>
<thead>
<tr>
<th>لا أوافق بشدة</th>
<th>لا أوافق</th>
<th>موافق</th>
<th>موافق بشدة</th>
</tr>
</thead>
<tbody>
<tr>
<td>تقديم خدمات جيدة</td>
<td>نشر الوعي المصرفي</td>
<td>التوزيع الجغرافي للفرع</td>
<td>تسويق الخدمة لأكبر عدد من العملاء</td>
</tr>
</tbody>
</table>

2. يستخدم مصرفكم مقاييس محددة للتقييم أداء الربحية من خلال:

<table>
<thead>
<tr>
<th>لا أوافق بشدة</th>
<th>لا أوافق</th>
<th>موافق</th>
<th>موافق بشدة</th>
</tr>
</thead>
<tbody>
<tr>
<td>كفاءة الخدمات المصرفية (الأرباح)</td>
<td>البنية التحتية المصرفية (الاتصالات)</td>
<td>تقنية المعلومات متوفرة بصورة كافية</td>
<td>المحفظة النقدي (الأولية في التمويل المصرفي)</td>
</tr>
<tr>
<td></td>
<td>المشاريع الاستثمارية</td>
<td>الأسباب التي تؤدي إلى حدوث خسائر بالمصرف بالرغم من الموارد المصرفية أولية في التمويل المصرفي</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(الودائع الجارية)</td>
<td></td>
</tr>
</tbody>
</table>

كفاءة الخدمات المصرفية (الخسائر) |
<table>
<thead>
<tr>
<th>لا أوافق بشدة</th>
<th>لا أوافق</th>
<th>موافق</th>
<th>موافق بشدة</th>
</tr>
</thead>
<tbody>
<tr>
<td>سوء إدارة السرية</td>
<td>مشاكل تمويل</td>
<td>التخطيط والرقابة</td>
<td></td>
</tr>
</tbody>
</table>
برأيكم إلى أي مدى تؤثر المتغيرات الآتية في ارتفاع المصروفات في إدارة مصرفيكم من خلال:

<table>
<thead>
<tr>
<th>كفاءة الخدمات المصرافية (المصروفات)</th>
<th>لا أوافق بشدة</th>
<th>لا أوافق</th>
<th>محايد</th>
<th>أوافق بشدة</th>
<th>أوافق</th>
</tr>
</thead>
<tbody>
<tr>
<td>المصروفات العالية (كهرباء، مياه، الخ)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>التثر المصري</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>إعادة هيكلة المصارف (التأمين، الدمج)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>عوامل التضخم</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>