Investigation of CORE Banking System

In Sudan

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**Declaration**

I hereby declare that: (1) the above thesis is my own unaided work, both in conception and execution, and that apart from the normal guidance of my supervisor, I have received no assistance apart from that stated below; (2) except as stated below, neither the substance or any part of the thesis has been submitted in the past, or is being, or is to be submitted for a degree in the University or any other University.

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Abstract:

Core Banking System (CBS) is defined as software application used by banks for performing banking business processes, it is installed in all bank's branches and perform all bank function; it provides the customer information management, central accounting and the transaction-processing functions, which are the most fundamental processes in a bank.

Sudanese banks are seeking to upgrade their core banking systems to improve operational efficiency, competitiveness, and regulatory compliance. But, such initiatives are especially challenging for most banks. In the last years, many Sudanese banks replaced their old core-banking systems or currently think about the replacement with new ones.

This research will investigate the CBS used in Sudanese banks, and their success/failures to help bank's managers to select new ones according to their needs and the volume of their customers. The purpose of this research is to determine factors leading to the replacement of CBS in Sudanese banks, establish the challenges effect of the replacement of CBS on the bank's performance. This research was conducted using a descriptive survey design. The target population of this study was 7 banks in Sudan and the research instrument was a questionnaire. Data was collected from IT directors of the operational banks in Sudan as well as system user. This data was manipulated through descriptive statistics such as percentages, range and mean scores and regression analysis. Presentation of data was through tables and charts. Study results indicate that there are various factors that lead banks to replace their cores.

The output of this research was recommendations shown that banks need to be aware of the challenges associated with CBS replacement. Those challenges, once understood should be mitigated properly and perfectly managed. Also the small and medium banks must appreciate that technology as a mean of change and should adapt to that change which makes the technology transformation. Ultimately, banks that have not replaced their core systems should have plans to do so, and should learn from the leaders about the benefits and challenges.
منصف البحث

يدرس النظام المصرفي على أنه برنامج يربط جميع أفرع البنك مع بعضها البعض ويقوم بتوجيه كل المهام المصرفية. يعتبر النظام المصرفي في الأساس القلب لجامعة الأنظمة المصرفية فهو يشكل الجوهر الأساسي للكونية بالبنك لأنه يساعد على إدارة بيئة الأعمال والحسابات المركزية وجميع إجراءات العمل المصرفية.

هذا المشروع يقضي بالتعمل في النظام المصرفي المستخدم في البنك السودانى ويستهدف تحقيق أهداف البنوك. كما يساعد البنك في اختيار الأنظمة الجديدة في حالة التغيير وفقًا لمتطلباته بتجاوز إخفاقات النظام القديم.

الهدف من هذا المشروع تعديل العوامل المؤدية إلى تغيير النظام المصرفي بالبنوك السودانية، وذلك بتحديد التحصيات التي تواجه البنوك في عملية التغيير وتحديد مدى أثر عملية التغيير على أداء البنوك.

تم استخدام المنهج الوظيفي في المشروع وكانت العيد المستهدفة تتكون من سبع من البنوك الرائدة في السودان واستخدام الاستبيان والمقابلات كأدوات للبحث. تم جمع المعلومات من مدراء التقنية بالبنوك ومستخدمي النظام وتم من خلال تحليل الاختلافات وتصفيتها وعرضها باستخدام الجداول والرسومات اليدوية وأظهرت النتائج أية تغييرات في البنوك.

وكان النتائج من هذا المشروع مجموعة توصيات للمؤسسة السودانية توضح أن البنوك يجب أن تكون على رأس التحصيات المرتبطة بتغيير النظام المصرفي وعمل على التحقيق منها وأخيرًا إذا كان لا بد من التغيير فلابد أن يقوم على دراسة كاملة وخطيط لأزمة لتغيير.
Chapter One

(1.1) Background:

The growing role of banks in increasing Economy and raising the performance of citizens and their behaviors to reach maximum possible productivity. Thus banks trying to put into use these goals required from banks to make their processes in an accurate way.

In the past data were written in huge ledgers by employees and all transactions transferred to the center branch at the end of the day [EOD]. After that, these ledgers transformed into programming applications that installed independency in each branch; so if a customer has an account in bank in city (A), he/she cannot utilize the services of a branch in city (B). The bank would usually delay the processing of financial instruments issued from some other branches for two to three working days.

Nowadays, the method enables banks to achieve their requirement is using bank system provide at service smartly and more accuracy with a lower cost is called Centralized Online Real-time Environment/Customer CORE Banking System. CBS is the backbone of the services that offered by bank; so it is important to select and operate an effective processes helping banks to offer best services to their customers. Also attract new customers and to ensure that the bank keep pace with the Modern techniques which invade the world today and appropriate bank's strategy to achieve future success.

Core banking functions that make transaction's of bank differ depending on the kind of the bank; Retail banking (is geared towards individual customers), wholesale banking (is business conducted between banks), and securities trading (involves the buying and selling of stocks, shares etc...).
(1.2) Introduction:-

Banks and financial institutions are seeking to integrate banks among them in order to create clusters banking (it is a full-service approach to cater to the needs through extending banking services) with a larger size and a broader base at the locally and international, as well as concerted efforts to put special laws to exercise Islamic Banking and organize the banking industry and ensure the safety of the system funding. CORE (Centralized Online Real-time Environment/Customer Oriented Application Exchange) Banking System is defined as software application that installed in all bank's branches and manages customer (small and retail business customers) accounts.

Core banking systems manage the customer's account by maintaining records of all banks transactions (see figure 1.1) such as:

1- Making and servicing loans: This is a process that takes a loan application document from a client and returns a selected and approved loan offer.

2- Opening new accounts: There are many official documents should be provided in order to open a bank account as follow:-

   a. Address

   b. Identity

   c. Photograph

Instead of address and ID you can use your driving license, passport or ration card. Most banks expect you to bring a friend or relative who already has an account with the bank as a gesture of trust.

3- Deposits and withdrawals process: "A deposit account is a savings account, current account, or other type of bank account, at a banking institution that allows money to be deposited and withdrawn by the account holder. These transactions are recorded on the bank's books, and the resulting balance recorded as a liability for the bank and represents the amount owed by the bank to the customer".
4- Payments and cheques process:

a- A payment processor:

This is a company (often a third party) appointed by a merchant to handle credit card transactions for merchant acquiring banks. They are usually broken down into two types: front-end and back-end.

b- A cheque:

(Check is a document that orders a payment of money from a bank account. The person is going to write a cheque, the drawer, usually has checking account where their money was previously deposited. The drawer writes the various details including the monetary amount, date, a pavement on the cheque, and signs it, ordering their bank, known as the drawer, to pay that person or company the amount of money stated.

5- Calculating interest: "is a fee paid by a borrower of assets to the owner as a form of compensation for the use of the assets. It is most commonly the price paid for the use of borrowed money, or money earned by deposited funds".

6- Control the user security system.

7- Customer Relationship Management (CRM):

It is a model for managing a company’s interactions with current and future customers. It involves using technology to organize, automate, synchronize sales, marketing, customer service, and technical support.

All bank's branches access this application (CORE banking system) from centralized data centers (data center is a collection of servers the data distributed on them) and they connected through secure communication media (see figure 1.2).

Full Integration (An integrated application that enables the bank to offer any services to all customers anywhere and anytime); therefore Customers can either act
on their accounts from any branch or using ATM and any branch can see all the
details all customers of other branches: this is the most important benefit from using
CORE Banking System which facilitate the bank's work and reduce the cost and time
for the customers to access their accounts.

If using CORE Banking System it become easy to connect all programs and
external systems (ATM, points of sale, Mobile banking system, Swift and else) with
bank system, also all the National electronic check clearance operations done
automatically.

All banks should apply advanced parameterized system to facilitate their work and
easily adding new functionalities.

There are many kinds of CORE Banking Systems used nationally such as
bankcard, Altamira, ICBS (Integrated Computerized Banking System) and others, but
in Sudan the major ones are Symbols, PentaBank, iMAL, ORAbank.
(1.3) Problem Statement:

There is a shortness in core banking systems of Sudanese banks according to service provision (service provision is an economic activity offered by supplier to consumer in order achieving it), scope of services (the whole area deals with or includes), scalability and standards (Efficiency and increased Productivity).

This shortness leads the managers of banks to take a decision of changing their CORE Banking Systems to achieve their goals such as future expansion by opening new branches in different states, be always the leadership when compared with other banks and finding one that is suitable for all electronic changing and satisfy all the requirements.

(1.4) Motivation:

The Sudanese banking sector have already automated most of its business processes through CORE banking systems, however, the services provided by selected CORE Banking Systems don't effectively satisfy some of current and future bank's needs that delay them from national technologies, so an advanced technologies need to be developed.
(1.5) Aims:–

This project aims to:

1- Produce set of results consisting of causes of success/failures about those used CORE Banking Systems in some Sudanese banks by capturing information.

2- Provide a list of recommendations that should be approved by Sudanese banks to help them to selection of their CORE Banking System or adding new functionalities to them in an effective manner.

(1.6) Key research questions:–

1. Describe how can we detect the shortness in any banking system?

2- How can we gather the data and information concerns core banking system?

3- How does a person select the best-fit solution for a bank in the most effective manner to ensure that the selection process realize goals and ensure that the selection process is made goals and Fit the bank's strategy in the future expansion?

(1.7) Objectives:–

1- Survey about the types of core banking systems used in Sudanese banks.

2- Determine the cons and pros of them.

3- Make guidelines for selection new CORE Banking Systems or add another functionalities that satisfy the shortness of already exist CORE Banking System.

(1.8) Project Scope:–

This research project conducted to investigate core banking systems in Sudan, identify the shortness of their core banking systems and finally make recommendations to Central Bank of Sudan in order to help the banks to select the most appropriate solution in most effective manner.
(1.9) Research Methodology:

The researchers undertake two types of methods as follow:-

Part One:-

Survey and gather information; through site visit to Banks. (Questionnaire and interviews).

Part Two:-

Analytical Study:

In this part we will study the collected information for finding satisfactory results and make recommendations for central bank of Sudan to guide other banks to select the best solution.

(1.10) Summary:

Banks play an important role in economic development of a country, where banks play extremely important role within the banking industry. Due to economic reasons, market pressures and regulatory requirements, and for other reasons, banks require changing their CBS from time to time.

CBS projects involve large capital investments and expenditure, are high on risk and consume enormous amount of resources of the banks but do not guarantee achieving desired objectives due to diverse reasons. The success factors of CBS project and issues faced by the Sudan Banks related to such projects have been identified through a pilot survey with the intention of proposing commendations and a set of general guidelines useful for the Sudan Banks in order to minimize the risk of failures in CBS replacement.
Chapter (2)

(2.1) Introduction:

This chapter elaborates the theoretical background of the research and related discussions pertaining to the banking industry of Sudan, replacement and selection of software system in general, project management and the case studies and experiences of the local and global banks related to CBS replacement and selection processes etc. It also contains a review of studies carried out by predecessors on the subject area and related areas.

(2.2) Technology concept:

The most component of the force that stay behind the phenomenon of globalization, the enormous technological revolution achieved in the areas of information and communications during the first quarter of the twentieth century and which is still driven at an accelerated pace.

The devices and process of communication has become available at the global level, and the world has become linked by devices: telex, fax and mobile phone and e-mail, and computers with various types (size and shape and technology), allowing owners to identify what is happening in the world at any moment via the Internet. Investment opportunities anywhere in the world, stock prices in the stock markets of the world, the opportunities for export or import from different places of the world and corporate activity at the global level ... etc. All of this became available in small electronic screen, and the world has become really keyed in part some of what goes where known, moment by moment, like a small village.

Rising importance of information technology and communication every day in light of the implications of direct and indirect exercised by this technique on companies and economies and human beings and the world in general even has become agreed that investment in technology is considered as the capital of (technical) in the production process for the particular good or service, and that the importance of this factor is useful in increasing continuously until taking a certain percentage replaces the human capital in the work of institutions and companies.
Growing the importance of information and communication technology in the world today with the spread of specialized information networks and electronic communications on the regional and global levels. However, the continuous innovation in the structure of information and communication technologies at the international level is expensive, in light of having institutions, companies and individuals to catch up with modern technology and keep up with the ongoing modernization of computers and software.

**2.3 Technology definition:**

Information Technology can be defined, as mechanical or electronic systems to deal with the information, input, processing, retrieval, transfer, exchange and interaction. Include methods of computing and communication.

The modern technical topics related to a basic degree of computing and communication systems, has imposed the need for incorporation to achieve data processing operations on the one hand and exchanged on the other hand, Sort this merger for the new concept of information technology.

Indicate terminology High Technology, and Information Technology, and Information Era, and Information Superhighway, and Communication Era, and Network Era (denote the tangle computing systems through information networks) to the era of reliance on the information parameter strategy realization, production and decision in the modern state. The information is not to be here alone, but the ability to provide, and processed and stored, and indexed, and retrieval and transfer, and exchange, authentication accuracy and comprehensive utilization.

The completion of these requirements cannot be achieved without the adoption of computing systems (PC) components of the physical and moral integrity, and to the extent that allows data entry and processing, storage and retrieval, but it However, this aspect of the sides of the high-tech does not achieve all the requirements of the information age, specifically the transfer and exchange and provide access to it all the time, especially for databases. From here intervened communication systems to achieve this communication was thus the second aspect of high technology, where allowed connectivity between different computer systems, databases and computing transition from the era of closed to open or distributed computing.

The fruit of true integration between computing and communications, called
information networks, which are located in the forefront of the internet due to its coverage and capacity, not only the content, but the number of subscribers and protocols for the exchange of texts and information approved in their environment, and progress day after day of consolidation continued between the visual and auditory means, and means of sound and image, performance and movement.

The means of access to information heading towards absolute, infinite in options to provide information to interested in any time and any place. The key to understanding the information in the information age, necessitating handle complex and conscious with the technical elements of the world: computing, communications, networking, and multimedia

**2.4 Technology and globalization:**

Globalization canceled state borders and establishes a society connected without intervals and geography, society reduces the limits of place and time limits, and is achieved through communication technology covered by this aspect of the globalization process. Advanced communication technology comprises that helped to unite the time and place in a single unit, and made all the modern present or the product to know the moment it happens.

The technology of globalization not only its main part of technical contact, and telephone of the utmost importance, but it is one of the main rules that have built it, but it also extends to all areas of life, globalization is a natural progression towards a world without breaks spatial or temporal, a world without geographical boundaries or political or social.

In front of this has some felt that globalization this is a series of interconnected technical processes dynamic which is to free markets, and enable the private ownership of assets, and the marginalization and reduce the control of the state bureaucracy on economic activity and make the state's role is limited to certain activities alone, and can waived in the future for the benefit of entities larger than the states, and it takes it from the application conditions of Technology super-capacity, dense deployment, simple and easy to use, and has supported the technical ability of the projects on globalization, as there are system reliability every key player which
pays the other driven and urging him to reach the goals set macro and micro and private and public or comprehensive and integrated, to ultimately produce a better picture of what it was the previous situation.

The most important of these rules as followed:
1- Induction and payment for technical innovation.
2- The existence of a market is always open to innovative product.
3- The division of labor on an international scale for the products.
4- Achieve an enormous capacity for globalization in all fields.

(2.5) Motivations to investment in technology:

1- To support the bank's strategic plans:
Modern banking branches in the capital and regions

2- Reduce expenses and improve the business performance of the bank's operational
   - Reduce the effort and errors resulting from daily operations
   - The transition to the operational phase electronic business

3- To support the bank's approach to improve and speed up customer service
   - Means of innovation and new products and talking to customers.
   - The use of technology and the application of the concept of comprehensive bank employee.

4- The introduction of modern technologies and the addition of new banking products:
   - Work on the development of electronic service outlets.
   - Expand the bank's ability to compete in the local and regional market.
   - Application of electronic banking.
   - Application of electronic payment systems.
(2.6) Importance of technology on the banking industry

The technical workers in the field of IT and communications paramount acquired importance in the banking industry, and so out of the importance of banks in the economic life of the public and being funded for other business activities and investment and overall economic, and that banks need to achieve steady increases investment in technology depending on the need to keep up with the requirements of increasing customer day after day for new forms of deposit, investment and financing, and also the need to provide financial and banking products to an audience of customers on the diversity of their jurisdiction, their beliefs and their goals, whether within the country or across borders. It is important necessities, important parts of the bank link to each other, both between the head office and branches or between branches of the same bank, as well as within the various departments of the bank. Has become the technology of information and communication a fundamental determinants for the growth and development of any bank or financial institution you want to expand in the market and increase the size of its activity, because the work modern banking has become anchored at the moment to provide banking services, electronic such as credit cards and services automated teller and other.

The wide interest in the technical element of the bank’s balance sheets periodic justified, and perhaps fortunate that the Sudanese banks generally have began the application of modern technology in their work and keep up with technology in the field of IT and telecommunications. And provide these technical services great for banks Sudan where contribute to reducing operating costs and operations and provision of banking services and modern finance, in addition to that they had to decision-makers to take appropriate and adequate them to the success and development of the bank, and aims localization technique in banks to increase their competitiveness in local and regional markets and international.
(2.7) Applications of Banking Technology:

"Banking Technology" is a product of the uses of computer technology and communication devices banking different countries, which include the "e-banking" which can be defined as "all traditional banking services and innovative based on computerized systems and communication systems, are channeled through modern", also includes banking technology also states "unified payment systems" in any country or among different country. Also includes technical development in banking systems the introduction of information systems management "MIS / EIS" and the Central Bank Information System.

There are many models that have been used for the purpose of providing modern banking services based on the technology and quality at lower costs and shorter periods of time and from these models:

1. Providing banking services to customers in foreign currency, and that creates room to deal in foreign currency.

2. **ATM (Automatic Teller Machine):**
   And is considered a modern method and a marketing tool to provide the name of the bank to the public and attract more customers, deposits and achieve ease of quality and save time in the same time.

3. **Smart card:** It's also a link to the ATM, where considered as a means of payments as credit transactions can be completed and the city is safer and the ability to cope with fraud.

4. **Phone Bank:** Which are system whereby phone calls as the client connects to a dedicated number is linked to the computer's central bank and then asks the customer to enter the secret number on your phone, and then asks the client to the service they want the client or the client starting selected and then the client will hear the voice telling him that the account balance as well as the The Spokesman bank offers a variety of services.

5. **Facsimile Service:** Is hardware you transfer an image beneficiary Normal telephone line when you need to send documents to the other party.
6. **Electronic mail e-mail**: Operate this service on the transfer of messages between people by means of special devices connected to computer electronic devices.

7. **View Data**: This means working to transfer and display information through satellites or receives data special or regular on a television screen or colored or through a network of regular phones at customer's request for a special subscription.

8. **Customer Relationship Management**: Modern banking systems allow banks to build customer databases for affiliates, and updating the data permanently, as well as retrieve information from them when needed and the required speed. The existence of such databases serve as a "treasure" of the bank, as it allows new computer systems considering the bank's relationship with the client. These systems via the bank can pursue its relationship with its clients and to identify and according to many criteria, bearing in mind the goal of refining and improving the service it provides, and offer more new products and services to them. If the bank can adjust the cost of preferential services in line with client mode. There is no doubt that the advanced examples clearly show what can be offered by banking technology for banks and their customers. These banks interested in customer service and low-cost administrative and spread its services in an area greater than the area of geographical spread. The centrality of the organization means assembling disciplines to client service. In the center there are departments such as investment and foreign exchange where staff gather highly experienced specialists, and the branches find more time to focus on customer service. Departments of banks Modern heading towards administration adult, and find enough time for planning and expansion aided tools many offered by a technology such as executive information systems (Executive Information Systems - EIS) which enables the management of the bank and its business and conditions in his neighborhood and instantaneous. The administrations in modern banks be able to calibrate the risks and take corrective steps, and the sound practice of banking business.
9. **Internet banking:**

Bank is the possibility of direct contact and banking operations by customers via the Internet safely, and there are many reasons why the banks to engage in internet banking, including:

1. Low cost banking service on the internet
2. Reports submitted by the experts: Indicates that the bank Web sites in a steady increase year after year
3. Multiplicity of how to logging into the network:
4. Shrinking profitability bank: It has shrunk in profitability bank at the end of the twentieth century and the beginning of the present century, despite increasing public in productivity and is due to several reasons, including: the continued weakness in the mediation bank because of the openness of institutions on the financial markets reduced the difference between the revenue the city and payables due to intense competition and increased public expenditure and as a result of the weight of the shoulders of the banks continued with a number of labor than they need to meet the obligations of political, social, and especially in developing countries. The contraction of bank profitability banks to pay more pressure on the cost of operations and lifting productivity, and this certainly helps to invest in Internet banking due to lack of operational costs and overheads and high productivity provided by the technical.
Core banking system application

Figure (2.1)
(2.8) **CORE BANKING SYSTEM:**

Core Banking System (CBS) is networking of branches, which enables Customers to operate their accounts, and avail banking services from any branch of the Bank on CBS network, regardless of where he maintains his account. The customer is no more the customer of a Branch. He becomes the Bank's Customer. Thus CBS is a step towards enhancing customer convenience through anywhere and anytime banking. Previously a bank's core operations such as keeping a ledger of various transactions, maintaining customer information, interest calculation of loans and deposits, adjustments to accounts on withdrawal and deposits of funds etc. were done manually. With the advent of Information Communication Technology, efforts were done to automate various banking processes using software applications so as to make them simple, efficient, effortless and cost effective. Thus, the platform where ICT (Information Communication Technology) is used to perform the core operations of a bank, like those mentioned above, is known as Core Banking System. Thus, Core Banking System has radically changed the way in which banks function. The greatest advantage of having a Core Banking System is that new features and functionalities can be easily added to the system that customers will have a whole lot of services that they can use. Electronic funds transfer between banks, online trading in the stock markets etc. are examples of this.

Core banking and bank run is synonymous for the most part. Basic banking services is a meeting point for banking services increased more banking services to individuals and is commercial, cutting edge Information Technology and the advancing Communication Technology. It is the heart of a modern financial service organization and is all about providing the banking customers with the right products at the right time through the right channels 24 hours a day, 7 days a week through a multi-location, multi branch network. Core Banking Solution are banking applications on a platform enabling a phased, strategic approach the lets people improve operations, reduce costs, and prepare for growth. Implementing a modular, component-based enterprise solution ensures strong integration with your existing technologies. An overall service-oriented-architecture (SOA) helps banks reduce the
risk that can result from multiple data entries and out-of-date information, increase management approval, and avoid the potential disruption to business caused by replacing entire systems. Core Banking Solutions is new jargon frequently used in banking circles. The advancement in technology, especially internet and information technology has led to new ways of doing business in banking. These technologies have cut down time, working simultaneously on different issues and increasing efficiency. The platform where communication technology and information technology are merged to suit core needs of banking is known as Core Banking Solutions. Here, computer software is developed to perform core operations of banking like recording of transactions, passbook maintenance, and interest calculations on loans and deposits, customer records, balance of payments and withdrawal. This software is installed at different branches of bank and then interconnected by means of communication lines like telephones, satellite, internet etc. It allows the user (customers) to operate account from any branch if it has installed core banking solutions. This new platform has changed the way banks are working. Normal core banking functions will include deposit accounts, loans, mortgages and payments. Banks make these services available across multiple channels like ATMs, Internet banking, Mobile bank and branches.

Previously a bank’s core operations such as keeping a ledger of various transactions, maintaining customer information, interest calculation of loans and deposits, adjustments to accounts on withdrawal and deposits of funds etc. were done to automate various banking processes using software applications so as to make them simple, efficient, effortless and cost effective. Thus, the platform where ICT is used to perform the core operations of a bank, like those mentioned above, is known as Core Banking System. In Core Banking System, software applications record transactions, maintain customer information, calculate interest on loans and deposits etc. The data, instead of huge ledgers, are stored in backend databases in digital form. Now, the same software can be installed in various branches of a bank and can inter connect through the internet or telephone lines to form a core banking network of the bank. The advantage, a customer can operate on his account from any branch of the bank and if the bank owns Internet Banking or ATM facilities, then the customer can operate on his account from virtually anywhere.
(2.9) **Elements of core banking include:**

- Making and servicing loans.
- Opening new accounts.
- Processing cash deposits and withdrawals.
- Processing payments and cheques.
- Calculating interest.
- Customer relationship management (CRM) activities.
- Managing customer accounts.
- Establishing criteria for minimum balances, interest rates, number of withdrawals allowed and so on.
- Establishing interest rates.
- Maintaining records for all the bank's transactions
  
  - Limited Professional Manpower to be utilized more effectively
  - Customer can have anywhere, more convenient and easier banking
• ATM, Internet Banking, Mobile Banking, Payment Gateways, Referral Business
• More Strong and economical way for MIS
• Reduction in Branch Manpower
• Additional Manpower available for Marketing, Recovery and Personalized banking
• Instant Information availability for decision support
• Quick and Accurate Implementation of Policies
• Improved Recovery Process causing reduction on recovery costs, NPA Provisions
• Innovative, redefined or improved processes (e.g. Inter Branch Reconciliation) causing reduction in Manpower at Head Office
• Reduction in Software maintenance at Branch and Head Office
• Centralized Printing and Backup resulting in reduction in capital and revenue expenditure on printing and backup devices and media at branches
• Electronic Transactions with Other Financial Institutions
• Increased Speed in working resulting in more business opportunities and reduction in penalties, legal expenses etc.

**Advantages of Core Banking**

**Centralized Accounting**

• All the transactions of the bank directly impact the General Ledger and Loss and profit Account. This provides a real time total picture about the financial position and situation of the bank
• This helps for effective decision making for management; a very dynamic and critical function in today’s banking.
Centralized Product Control & Monitoring

- Centralization helps in product analysis, monitoring and rollout.
- Aspects like product modification, interest rate modifications and interest application can be done centrally from one place for all the branches.
- Bank can quickly respond to customer needs and market scenario. This gives competitive edge to the bank.

Technology Based Services

- Network channels such as ATM, either on-site or off-site, can be started.
- Cheque Deposit Machines (CDM) can be installed.
- Cheque book printing machine installed at central location to give personalized cheque books.

Centralized Customer Account Management

- Any customer becomes the customer of the bank rather than of a branch.
- With unique ID / Account Number the accounts of the customers can be viewed centrally by the bank. As such, customer profile, details of products and services availed by him and customer behavior about business of the bank can be well understood.
- Such customer view gives the bank opportunity to decide directions for business development and marketing strategies.
Centralized Reporting

- Presence of centralized data constantly live up dated at any time ensures comprehensive report / statement generation.
- This tremendously helps in decision making as well as submission to various authorities.
- Operational efficiency of the bank gets increased due to quick report generation for bank as a whole.

Centralized System Administration

- Centralized system / I. T. administration enhances system security and user management.
- In TBA mode man-power for I. T. administration is required at each branch. But in core banking it is required only at one place. Thus reduction in man-power need and cost.
- Due to single point resource available I. T. manpower is utilized properly.

Advantages to Head Office

- Consolidation of MIS / statements / reporting at one place reducing duplication of tasks at branches and it is of real-time.
- Supervision of branches on risk perceptions possible as on going process.
- Frequent audits and timely control measures can be initiated.
- Quick informal decisions on real-time MIS.
- Faster and practically real time reconciliation of accounts.
- For statutory reporting and compliance no need to wait for branch compliance.
- Product-wise, customer-wise, customer profile based analysis and decision making possible.
- Analysis of data on any aspect of banking business and control issues gives scope for keeping the bank professionally healthy.
- Clearing function is centralized reducing man power requirement at each branch for the purpose.
- Audit on operational aspects of the accounts can be done at a single location as entire data is available at one place.
- User access to the computer system in the bank can be restricted to his/her needs and authority only that achieves safety.
- Printing of several matters such as follow-up notices, statement of accounts etc. can be done centrally on “line printer” that reduces the printing time, printer and man-power need at each branch. Such printer can be activated by any branch on WAN command.
- Account opening and scanning of signatures can be done at central location.

**Advantages to Credit Department**

- Reduced credit processing time for existing loan accounts as the Credit Department gets information handy.
- For processing of new loan accounts the information on product is available that facilitates proper decision.
- Real time credit tracking by setting alerts about delays, deviations, penalties etc.
- Corrective measures in credit portfolio can be quickly taken due to credit portfolio analysis.
Advantages to Accounts Department

- Centralized real time General Ledger and Profit and Loss Account almost eliminates accounting work.
- Greatly reduces paper work, inward communication needs and work of tallying.
- Deadlines of statutory compliance and submissions are met in time.
- Balance sheet of the bank available at any day, any hour, any moment.
- Accounts Department can concentrate on policy, compliance and reporting issues.

Advantages to I. T. Department

- I. T. Department becomes the focused entity and back-bone of the operations of the bank.
- Central data management and application reduces logistical problems and reaction time for system changes and/or troubleshooting.
- Parameter settings, interest application and such other works being done at one place avoid chances of otherwise repetitive mistakes at different branches and then load on I. T. Dept. for rectification work.

Advantages to Customers

- Customer can operate his/her account from any of the branch of the bank.
- More service channels can be available to the customer.
- Customer can make immediate credit if the transaction is between the branches of the bank.
- Customer obtain full attention and service satisfaction at the branches.
as the branches are freed from all back office functions, clearing functions and almost all accounting functions.

- Customer can get SMS alerts on his mobile or e-mail alerts through net for transaction taking place in his/her account. This gives him comfort and security.

**Advantages to Branch functionality**

- With reduced work at the branches they can focus on development of business, customer service and attendance and meaningful liaison with customer for getting new business.
- Since customer needs are known with proper analysis they can be well attended even before their demands that boost the image of bank as customer savvy.
- This increases business and then profit
(2.10) What core banking system does not do?

- Core banking system doesn't deal with the customer-facing front end of the bank. Core banking system also doesn't deal with the analytics embedded in an industrial-strength data warehouse design.

- Core banking system doesn’t include a comprehensive CIR (customer information repository) though they do include CIF (customer information file) or CIS (customer information system) focused on their own processing and reporting needs. These components have only the necessary customer information or capabilities embedded.

- In the service oriented architecture solution, the CIR will sit on the top of core banking system, as it is assumed that a bank will always have multiple core system which needs to interact and share customer information.
(2.11) Pre the core banking system

Traditional Banking

Traditionally the relationship between the bank and its customers has been on a one-to-one level via the branch network. This was put into operation with clearing and decision-making responsibilities concentrated at the individual branch level. The head office had responsibility for the overall clearing network, the size of the branch network and the training of staff in the branch network. The bank monitored the organization’s performance and set the decision-making parameters, but the information available to both branch staff and their customers was limited to one geographical location. For this to some banks resorted to the introduction of technology in their banking services. IT is no longer a matter of choice for the banking industry today. If you consider the banking scenario 10 years from now, you will notice a vast difference in the way it operates.

Today, nearly all banks have Core Banking System (CBS) in place. In fact CBS has already become the technology backbone for banks today. The sector has witnessed unprecedented growth and transformation over the last five years, as it moved towards universal banking. Banks started to leverage IT and technology-based services for offering alternate channels such as smart cards, ATMs, internet, social and mobile banking. Banks have taken considerable measures to improve not only their functioning and internal efficiencies, but have transformed the overall customer experience. And all these have been possible because of technology. Therefore, the focus now is to go beyond core banking to create a differentiation that can further enrich the experience of customers. Data warehousing is an area banks are now looking into as a huge amount of data is generated through CBS. The idea is to leverage this data and analyze it in order to understand your customer better. Therefore, the other related technology that is coming up in banking is business analytics. This technology has huge opportunity for banks in the coming years. Customer Relationship management (CRM) will also be an integral part of banking because it will enable them to understand and
connect their customers in a more organized and effective way. With financial inclusion in focus, banks are moving beyond their role of finance providers and are acting as consultants, tapping the unbanked population and creating tremendous opportunities for themselves as well as for the customers by leveraging IT prudently. Mobile banking is one area I would like to mention here that's currently creating a buzz but it will continue to be an even more powerful technology that will further transform the banking landscape.

(2.12) HISTORY OF CORE BANKING SYSTEM IN THE WORLD:

The first core banking solutions appeared in the 1970s in the United States. Most of them ran on mainframe computers and was designed by the banks themselves or by third parties in conjunction with the large US banks. Limitations to exporting these systems outside the US were that these were mainly single-currency-based as they were designed for the US market only. In the 1980s, these solutions moved to all continents, mostly as a result of following the major US banks such as Citibank. During the 1970s, 1980s and most of the 1990s, packaged banking solutions flourished in international operations. For domestic retail operations, however, most large banks preferred to stay with the systems they had developed in-house. Some brave top-tier institutions did try replacing the in-house systems with package solutions customized by top-tier banks, but these efforts consistently failed.

In the 1980s, we saw package solutions coming from other parts of the world, primarily Europe, Asia and Australia. Vendors with a different but comparable background also entered the arena, for example the private banking solutions developed in countries such as Switzerland and Luxembourg. Because due to the nature of their business - these were more customer-focused than the transaction-oriented, transaction-crunching engines available before, they had a natural fit with the customer centricity that was coming increasingly into focus. Limitations of these systems mainly had to do with the ability to handle large volumes.
The 1990s saw new players emerging in India, benefiting from the opening up of the Indian economy, the availability of English language skills, and the huge pool of highly skilled engineers. I-flex solutions (and its legal predecessor C-JIL) can be considered as the first successful software product company from India that managed to sell outside the Indian subcontinent. It was followed by the likes of Infosys and Tata Consultancy Services (TCS) - companies that originally focused more on providing off-shoring, consulting and outsourcing services but moved into the software product business - and later by other product companies such as Polaris Labs and Nucleus.

At the end of the 1990s, new players entered. ERP giants such as SAP and IBM started entering the market (following a strategy of organic growth and development and with a presence at the heart of the accounting domain in many banks), followed a few years later by Oracle (through the acquisition of i-flex solutions and Siebel and aligning these to their technology and application strategies).
Around the world

In countries such as India and Hong Kong that were a part of the erstwhile British Empire, it is only recently that core banking has caught on. This is mainly due to the restrictions by the UK government on free movement of money throughout the region. Also, the IT infrastructure necessary for such services did not exist in these countries until recently. After liberation from the UK, the economies of these countries went through a drastic change - thus the demand for such services increased and the need to meet such demand were met with today's technologies. Most of the nationalized banks in India for example: State Bank of India, Punjab National Bank, Allahabad Bank, HDFC and ICICI Bank today supports core banking. As of 2007, many Cooperative banks in India such as Jain Urban Cooperative Bank, Kangra Central Cooperative Bank, Udaipur Urban Cooperative Bank, Kollam District Cooperative Bank, Kerala State Cooperative Bank and Panchshheel Mercantile Cooperative Bank have started to use and offer centralized core banking too. The three standard software used are Flex cube from iFlex Solutions, Finical from Infosys and B@nes from TATA Consultancy Services.

In countries such as Japan, core banking is still in its early stages. Although having autonomous reign over their currency for over half a century, the consumers themselves do not see much use for such services - low demand, thus fewer services. It is only within the last decade that banks started placing ATMs outside the bank premises. Many of the bank services must be done in person at the account holders registered branch. Japanese banks rely heavily on paperwork and physical evidence, such as the personal chop or Inka - thus rendering core banking impractical.
(2.13) BANKING SYSTEM IN SUDAN:

When computer enter Sudan and banks!? 

The Computer entered country in the year 1967 at the University of Khartoum, and was followed in the following years several government institutions such as the central administration and the interest of the census, as well as some private institutions such as the textile factory Sudanese and Weaving Factory Japanese, while the banks have been introduced the first device in which the Bank Accreditation year 1978. Then continue to enter computers in Sudanese banks as well as the computerized systems and packages program, has witnessed a period of nineties initiatives from several banks for the introduction of systems that operate on a personal computer especially in light of the update in the communications network that carried out by the Sudan Telecommunication Company "SUDATEL".

Since the beginning of the nineties central Bank of Sudan began to the implementation of programs and procedures designed to enhance the safety of the banking system. In addition to meet the challenges that were produced by the demands of globalization. In 1998 Bank of Sudan issued a policy of comprehensive banking reform in the Sudanese banking system to execute its first program during the four years 1999, 2002. In the form of policy introduction of modern technology banking work one of the important themes, and since that time continued overall banking policy programs. In the area of technology that policy aimed to the following:

- Update banking systems, including connecting branches with presidencies and facilitates customer service.
- Create a national system of payments in order to serve the national economy of the country.
- The development of an information system the central bank.
- Linking Sudanese banking system global banks.

And now the Central Bank supervised on the establishment of a unified network of ATMs mechanism, POS, and an electronic system for clearing checks. The banks have gone estimated updated their banking systems and the adoption of the latest allow them to connect their branches and provide better services and the introduction of new services. And now there is a technically development speedy waiting to have
an important reflection on the Sudanese banking system. The introduction of modern
technologies in the work of the most important themes of this banking policy

**Development the banking system is Sudan:**

Over the banking system in Sudan several stages began before independence since
1903, where the first bank was opened a branch National Bank of Egypt. Successive
then branches of foreign banks remained this stage is the stage of foreign banks until
1957, where the Agricultural Bank of Sudan opened in 1957 as the first national
banking Sudan Successive then commercial banks - beyond the historical evolution
that governs its work can be divided this development to the following stages:

**Full interest-based banking system**

This phase represents the period that stretched since independence in 1956, the
beginning of the era of national commercial banks until 1978.

The sovereignty at this stage of the capitalist economic thought and work
base of the banking system based on usury. The concentration of all commercial
banks in its banking and financial contracts on the interest rate was the motivation to
save and which gives the right to campaign as they represent deposits of return earned
by the bank in all its loans and its financial facilities

**Dual banking system**

Represent this stage the period from the mid-seventies (after 1976) to the mid-
eighties in 1983.

Where Islamic law issued and integrated with these legislative actions conviction
among many employers money in investing their money in accordance with the
provisions of Islamic Sharia. Then the establishment of Islamic banks began starting
with Faisal Islamic Bank and the Bank of solidarity for the impoverishment and a
group of other banks. And thus became the banking system works with two systems -
the interest-based system represents traditional commercial banks and the Islamic
system and represents the first of Islamic banks. But Based mostly on monetary policy
in that period is usurious tools and direct intervention approach is optimal in the use
of resources of Islamic banks at the time this is because banks' resources usury they
represent a majority in the volume of resources available to the banking system was
not the central bank at the time trends and mechanisms deals with the Islamic banking system only ratios cash reserve and liquidity reserve internal policy of direct involvement and distribution policies ceilings credit.

**Islamic banking system:**

This stage began in 1983 after the application of Islamic law and after the enactment of transactions low which committed all economic activity in Sudan legitimate transactions. Bank of Sudan issued under this Act circular committed commercial banks to turn to the Islamic formulas and remove usury of all transactions and this phase lasted until 1991. At this stage, commercial banks began a formal transition to Islamic banking system but they faced a number of obstacles, including:

- The inability of the workers in these banks to accommodate Islamic financing methods.
- Lack of conviction among some with concept of the Islamic banking system and thus prevalence of dealing picture in these banks.
- Transportation difficulties of party-list legal and procedural and professional in these banks where it was dominated by a culture of the interest-based system.

**Deepening Islamic banking system:**

This stage began in 1990 after the National Salvation Revolution and adopted the Islamic approach in all aspects of political and economic life and social and reviews at this stage reviews full of low regulations and systems to ensure compliance of Islamic commercial banks, issued at this stage the law regulating banking business for the year 1991 and established the Supreme Audit legitimacy of the banking system and financial institutions in 1992.
The terms of reference of the Commission as follows:

- Contribute to the development of contracts and agreements for all banking transactions.
- The control of operation in the Bank of Sudan and financial institutions.
- Issuing legislation and reviewing laws and regulations.
- To contribute to the training in the field of banking.
- Prepare research.

(2.14) The economic importance of technology in Sudan:

No longer Sudan in isolation from developments that have made the Industrial Revolution is an example of the information revolution and the Internet, and perhaps the effect is greater than the lived world when the invention of printing machine or the invention of writing paper itself, the world under-century atheist twenty live in an era of exchange and sharing of information on a global level, and Sudan is part of this global market, which are distributed on the basis of business opportunities of electronic payments, and we also like the rest of the world specialized electronic employment.

At first glance it seems that the recognition of strong technical force is not enough if it is not linked to fundamentals economic system, and therefore the technique role in our lives if we recognize as the main factor in the manufacture of economic wealth as they decide the nature of the resources membership in the country, and preferably scientists to call those resources warehouse the capitalist national, and there is the fact that a second should be recognized is to provide technical determined by our ability to process information, and the third fact that we know, but we hope that does not remember always and is that difference Universal Technical (i.e. the economic gap and is a national Register of opportunities forgone resulting from the lack of the application of advanced technology), which measure the current global economic growth at the level of the individual and the community, this difference is expanding day after day, Suppliers and their banks combined, and especially those who are in control of the trade in the last two decades of the twentieth century, returned entering the present era goods, new and forms new, and there are companies that specialize in Internet software offering in the market helps to narrow the technical difference. And
therefore, the measures to narrow the gap are the number of global business opportunities that are available to us day after day.

**2.15 Structure of the financial sector in Sudan:**

The financial sector in Sudan includes: banking system and non-bank financial institutions and Khartoum Stock Exchange.

**Vulnerabilities in the banking sector and the reasons for reform:**

With a banking sector for several decades suffering from weak self elements although multiple attempts at reform. addition to elements of self-weakness has negatively affected the banking system by several factors and local economic developments and as global developments also have clear implications on Sudanese banks.

1. **Self weakness elements:**
   the most important elements of self-weakness suffered by the banking sector in the past decades:
   1 - The small size of the banks than foreign banks.
   2 - Double the efficiency of accounting systems and financial control systems and administrative and internal control of ready-banking units. Not keep up with those systems developments.
   3 - Lack of banking experience and qualified staff.
   4 - Weak returns on deposits and investment banks invested in stocks compared to other investment opportunities.
   5 – Slow process of banking technology.
   6 - Difficulties resulting from the economic environment in which the banking system works.

2. **Local economic developments:**

There accelerating local economic developments affected the performance and imposed inevitable creation of the banking sector to face and is in the transformation of the national economy.
3. Developments and global economic shifts:
Affected by the banking system and many most important global shifts
Economics of large entities.
The world has witnessed the creation of large entities through gatherings (for States) or mergers (for enterprises) is an indication that small units probably will not find a place in the context of globalization.

**General Administration of Banking Technology**

- **Department of Banking Technology**
  - Information Security
  - System development
  - Networks and communication
  - Operating and support
  - Maintenance

**Department of Information Technology**
Is the basic task management is to follow up the work of the Bank of Sudan and technical branches and to overcome all the difficulties encountered and her broad powers to facilitate it’s jobs and its coordination with the Department of Banking Technology in some joint business as well as its cooperation with the electronic banking services Co. EBS.

**Department of Banking Technology**
Its primary objective technical follow-up work in the banking sector and the development of standards
Routers and international standards for both software and hardware, and has a close cooperation with the Banks operating in the country in order to overcome the difficulties that hinder technical progress.

- **Maintenance Department**
  Power section consists of a Chief of Section and a number of engineers limited their daily tasks in the maintenance of equipment and all the accessories the network on a regular basis and report weekly to the Director of the Department of Information Technology, in addition to the contribution of the department in the development of standards and international standards for each regards technology in addition to the functions of other technical.

- **Operating and support department**
  Is one of the most important section in terms Section is composed of the head and technicians and bankers who provide support and assistance to all users presidency, branches and oversee install new systems and user training them and follow them and solving all the problems of technical in addition to the management of the banking system and to give powers to the users in addition to the department to supervise the copying process Reserve for different operating systems within the network.

- **Networking and Communications Department**
  Which are directly responsible for all parts of the network and periodic maintenance and emergency, as well as put it to international standards and specifications relating to software and hardware management of networks, as users organize and give them the powers and passwords help them to accomplish their tasks within the network.

- **Systems Development**
  Department which responsible for the development of any system needs any section of the Bank of Sudan and its branches, also contributes opinionated Technical in any system is to buy ready from any point of whether the internal or external so-cum criteria and standards world-related systems and method development, and Section is composed of a group of programmers and systems analysts.
Department of Information Security

It is considered one of the sections is very modern in Sudan, where the mission is to partition the fundamental in the development of policies, procedures and controls to protect data during its progress within the local network or the petition and that guidance using all the techniques of protection from firewalls and software detectors hackers, antivirus and other means that mitigate disaster breakthrough and disclosure of information, and it is worth mentioning that this section reports directly to the Director of Information Technology because of its importance.
(2.16) Central bank of Sudan:

In the past, some of the functions of the Central Bank of Sudan were divided between the Ministry of Finance, Sudan Currency Board and the National Bank of Egypt. The Ministry of Finance maintained part of the official foreign exchange balances through two accounts, one in USD and the other in Sterling Pounds which were managed respectively by the National Bank of Egypt and Barclays Bank (C. O. D). As to the Currency Board it used to perform the task of issuing and managing the currency and to keep a part of the country’s balance in foreign currency as a cover to the national currency. Also the branch of the National Bank of Egypt used to manage the banking activities of the government besides discharging its main role as the bank of commercial banks (bank of the banks) at the same time. During this period, the Egyptian and British currencies were prevailing until established Sudanese currency in 1956 issued the first national currency in 1958.

After the independence of Sudan, the need for having a Central Bank to replace the existing bodies and to perform its functions of regulating the process of the issuance of the national currency, formulating and directing monetary and finance policies to serve various economic sectors, build up a strong, efficient and effective banking system that meet the development needs of the country, maintain government accounts, act as adviser for the government on financial affairs and provide foreign currency for the development projects adopted by the government at that time. To achieve the abovementioned objectives, a committee of three experts from the USA Federal Reserve was formed in December 1956. The Committee was requested to conduct a study on the possibilities of establishing a Central Bank in Sudan. It submitted its report in March 1957. This was followed by the issuance of the Bank of Sudan Act of 1959. The Bank opened for business on February 22, 1960.

The Act stipulated that the Bank of Sudan shall have an independent corporate personality, legal personality and a perpetual succession and a common seal and may litigate in its own name as a plaintiff defendant. Following the establishment of the Bank of Sudan, Sudanese officials were appointed to replace Egyptian officials, while the junior staff that used to work for the National Bank of Egypt was retained. The first Governor of Bank of Sudan was His Excellency
Figure (2.4)
(2.16.1) History of Technical work in central Bank of Sudan:

- **Stage 1:**
  
  Date back to the technical work of Bank of Sudan to the early eighties, where you use account management system cards perforated Punched Card, after this development to the stage of computer use the Main Frame, who was working on the operating system Unix, there were six screens Dummy Terminals attached with the device's main plus printer kind of Epson to print various reports and the system of accounts developer of the company NCR, and the processing of data for each accounting operations take about three hours, and we can say that the work in that period was half of a technical where walking business books accounting along with the main computer. This situation continued until early 1988, where he began to think in a comprehensive technical venture of the Central Bank and the banking sector, the kidneys, the project objected to several administrative and political problems led to a freeze in 1990.

- **Stage 2:**

  **Computer center:** In July 1995, after the separation of accounts, Main Branch of the presidency has been the opening of the computer center, which was the development of work it was to use server-capacity storage large has been increasing the number of entry screens and matching has become a process of data processing for so short and it was possible to dispense entirely notebooks traditional accounting and rely entirely on the computer, at that time, followed by the computer center to manage accounts (the General Administration of public accounts and computer). And spread the umbrella of the center to serve the all the presidency computer centers and branches. Seemed computer center workers are looking to be the nucleus of what Kako Center dreaming of a comprehensive technical work. At the beginning of 1998 published study from the computer center recommended upgrading the center to the public administration for achieves the following objectives:
• Implement policies and strategies issued by the leadership of the bank with respect to information technology.
• Provision of appropriate technologies, which help speed the completion of the business and everyday tasks and thus help the senior management of access to information that will help in decision-making.
• Upgrading information technology systems and modernize in order to serve the objectives of the organization.

Stage 3:
Bank of Sudan Networks project: Based on that recommendation was in 1998 project configuration networks Bank of Sudan informatics and that was under the leadership of Brother / Secretary Abdul Rahim O'Shea, where the work of the project to develop the study and visualize complementary for shape of banking technology at the level of the Bank of Sudan and its branches and at the level of the banking sector. Phase began installing and connecting network Bank of Sudan local after signing a tender delivery and installation for a national company, a company ACTS, has been delivered to cable type CAT5 UTP any wire dual is encased Unshielded Twisted Pair, and bundles of fiber optic Fiber Optic, in terms of hardware has been adopted Servers (Compaq 1850R)) and PBX or switches brand Bay Stack)) and on the software was running the network operating system and Ndozan T:4 (Windows NT4), was also comply with international specifications for each of the devices and other equipment and adopted the Specifications several points of global such as the IEEE and others.

Stage 4:
Phase composition of the General Administration of banking technology: Phase of establishment of an internal information network to bank of Sudan is over in 1999 and the work of all the different technical tests have been assured to put it quite technical and seemed to work out in the same year. At the beginning of the year 2000 issued by Mr. / Governor of the Bank of Sudan, a decree by the General Administration of banking technology has been appointed Abdul Rahim O'Shea general manager and the administration follow directly to the senior management of the Bank of Sudan, which gives it
a distinctive in terms of decision-making.
The administration continued from its inception to configure its structure are training their staff in addition to those who have been appointed, pursued administration also policy literacy technical Bank of Sudan, where he has been training for all staff of the presidency and the branches on the basics of computer use, then everyone know how to deal with the computer, and after qualifying technical administration administrative structure was developed for the general management of the banking and technology.

**(2.16.2) Efforts by the Bank of Sudan to keep up with banking technology:**

Not only the role of the Bank of Sudan to keep pace with information technology on its work only but also meant the development of technology in the banking system so banking technology is the most important contents of the universal banking policy Where the universal banking policy reported the following:

- Consideration banking technology in all banks is an integral part of the Bank of Sudan control program
- Begin to insert magnetic Cheque and complete computer networks in the banking operations in all branches of banks
- Linked to the Bank of Sudan led by commercial banks through computer networks
- Linking commercial banks to electronic communication networks in order to provide better services and faster to its customers

The General Administration of technology banking issued a group of publications which includes several directives concerning the insertion of banking technology in commercial banks, these directives are:

- Directing banks using Cheque encoded magnetic ink
- Bank of Sudan said banks that standards and specifications were issued aimed case of linking banks to each other in terms and to the Central Bank on the other hand and the possibility of providing banking services to their customers through all banks in standard way which does not depend on the quality of systems, equipment and different from one bank to another
For software, the standards and specifications relating to applied software systems for private core banking system must be understood, applied and developed.

- Bank of Sudan directed against the adoption of any new core banking system or renovation of the current system without taking the approval of the Bank of Sudan to ensure that these systems satisfy the standards

(2.17) Core banking Challenges:

With intense competition and changing market dynamics, banks have to be ready to face obstacles all the time. Moreover, Core banking Challenges with intense competition and changing market dynamics, banks have to and compliance requirements, industry consolidation, delivering cost effective products and services, maintaining secure data platforms, meeting ever increasing customer demands and other strategic issues have all made banking far more complex than it used to be in the past. In order to handle increasing transaction volumes and stay with the current systems, banks need the right CBS in place, and can summarize the most important challenges in:

- Inflexible and manual banking processes
- Complex and costly IT infrastructure
- Vendor capabilities and credentials
- Dependence on legacy/vendor applications and impact on envisioned technology architecture
- Bank’s business goals and alignment to leverage the new technology
- Customer demand for tailored products

Some of challenges are political represented in the U.S. blockade on the movement of clearing dollar beside the siege imposed on many companies operating in the country, and some legislative case of the former governing handle it, especially Sudan is witnessing shifts in regulations Financial to comply with the peace agreement that stopped the bloody war lasted nearly half a century decades between the north and south.
The Business Challenges:

The replacement of an existing system is a challenge for any institution, especially when it comes to financial institution, with financial transactions involving high sensitive segments. There are key challenges when changing CBS by banks such as:

- **Long implementation periods:**
  Standard banking technology software solutions were largely inapplicable to individual organizations. As a result, the tailoring of the solution and its roll-out for the organization was a long and often drawn-out period.

- **Return on investment (ROI):**
  Making the very significant capital investment required for a technological package was a challenge in the environment of strong competition and slim margins. Senior management and shareholders demanded a clear quantification of the ROI involved, which was difficult to accurately evaluate and compute.

- **Connectivity:**
  Connectivity at broadband levels could not be expected at every branch. The solution needed to be able to work even in areas with poor or intermittent Internet access.

- **High costs:**
  High upfront investment was in many cases an inhibiting factor for investment. Core Banking is normally defined as the business conducted by a banking institution with its retail and small business customers. Many banks treat the retail customers as their core banking customers, and have a separate line of business to manage small businesses. Larger businesses are managed via the Corporate Banking division of the institution. Core banking basically is depositing and lending of money. Nowadays, most banks use core banking applications to support their operations where CORE stands for "Centralized Online Real-time Exchange". This basically means that the entire bank's branches access applications from centralized datacenters. This means that the deposits made are reflected immediately on the bank's servers and the
customer can withdraw the deposited money from any of the bank’s branches throughout the world. These applications now also have the capability to address the needs of corporate customers, providing comprehensive banking solution.

(2.18) Trends in Core banking system:

New trends are emerging in the post credit crunch banking environment that are causing banks to realize the urgency of core-banking transformation. Older platforms are proving expensive to maintain, demand greater data consistency, quality, and visibility across the bank. Furthermore, as banks work to differentiate themselves, the demands for flexibility and scalability within operations and core banking systems are heightened. Thus banks should design and implementation solutions that reduce operating costs, manages risk and regulatory compliance more effectively, enhances service quality and optimizes the customer experience. As a result, banks can reduce total cost of ownership, boost operational efficiency and flexibility, and ensure they have in place and IT platform that will be sustainable into the future.

Other Some global trends among the large banks are preference for an SOA-based system. With many large banks having a number of independent systems working from different vendors and in different environments, a service-oriented architecture can provide better integration between disparate entities.

Analytics, customer-centricity, and multichannel technologies, Banks increasingly want a core system that utilizes data analytics to provide a more complete view of the customer, which then allows for better customer-bank communication.

Multichannel options like ATM, mobile and Internet are crucial in attracting and serving customers. Core banking solutions are also expected to facilitate product development and provide flexible customization capabilities. Reduce implementation time. Replacing and centralizing a new system needs to then be done in a phased but efficient way as to minimize this impact. For large banks with a lot of branches, a complete replacement with reduced implementation time would be a challenge for the vendors. Branches for large institutions might adopt for a hosted solution, especially when engaging in an outsourced service agreement.
(2.19) Why to change?!!

Banks invest to increase customer touch points and channels to provide better customer service and to maintain a single view of the customer, across all channels.

The legacy core systems are inflexible to meet current market demand and to be on par with technological advancements.

The banks face difficulty in offering new services to customers using inflexible banking systems, which affects banks’ ability to Compete in banking market.

Banks come to change their Core banking system for many reasons and directions, these reason may be one of the following:

- Business need.
- Process.
- Regulation.
- Rules-systems.
- Finical reason.
- Customer.
- People.
First:

Modern techniques:
Most of the old systems were built before issuing global standards and specifications approved today in the systems industry to keep pace became slow compared to the rapid development in today's business world and especially Techniques related to relational databases (RDBMS) and networking technologies (Systems, Communication protocols).

With the increasing demand for technical solutions to institutions emerged there are several regional and international companies offering solutions across different platforms may be these solutions do not fit with operating systems in the enterprise concerned, especially in the case of the acquisition of existing institutions their old systems.
Second:

The ease and reliability of the system:

some systems are unable to provide the same level of service compared to the
development of business in the institution. It must necessarily provide system
flexibility in use and simplicity development and the development of banking
operations and services coupled with the development of new and flourishing
business institution.

Third: Annual maintenance programs for the system RLF:

Annual maintenance is one of the issues that confused some concern from the
financial and administrative Sometimes, due to the continuous additions to existing
hardware maintenance and stability of the annual cost.

Fourth: Immediate and update the manual update:

most modern systems rely on automation of all processes and complete the procedures
Walia services including notices, and other documents. While the old regimes need to
take longer to pass some of the processes and thus be conducted by traditional manual
system (MANUAL HANDLING).
(2.20) **Summary:**

The vast majority of the sundae's banks have set very high standards of excellence for themselves in terms of technology, customer service and customer orientation with all aspects of computerized operations completely. Banks also make extensive use of communications technology to provide off-site banking facilities like ATMs. Adoption of country specific economic system, and the call to its central bank to perform certain functions like regulating, the process of the issuance of the national currency, formulating and directing monetary and finance policies to serve various economic sectors, build up a strong, efficient and effective banking system that meet the development needs of the country. The central bank of Sudan does these functions. This chapter shown extends definition of Core Banking System and their main functionalities also shown that the Core banking projects are complex, time consuming and is a resource intensive activity. Banks face difficulties in achieve simplicity, customization and greater control for you in meeting your customers' needs, agility of their system. So many banks go toward changing their CBS to meet these needs.
Chapter NO (3)

(3.1) Introduction:

This chapter describes the conceptual overview and the research methodology, which are fundamental to this research work. The research methodology was based on literature review on the subject matter and on the outcome of the survey, which were focused on collecting and analyzing both qualitative and quantitative data.

(3.2) Descriptive Overview:

The requirement of topic under survey implies use of several tools and methodologies to achieve the desired aim.

It is necessary to learn the concept of CORE banking system as whole, its definition, elements and understanding all its functionality in addition to the effect of CORE banking system inside and outside Sudan specially according to the history of developing the CORE banking system and the stages until now as mentioned in chapter two.

An attempt to conduct a field study of CORE banking system used in Sudanese banks was carried out by visiting some of banks in Khartoum and interviewing their IT managers whom help in gathering more information about their systems and the range of convenient between business process and CORE banking system.

Formal questionnaire was presented to IT department managers as well as CORE system users, it contain all the information needed to determine the successes and failures of CORE banking system using this questionnaire mainly for analysis.

Statistical package tool was used for the analysis of data gathered from questionnaires, STATA, etc... to evaluate the results according to concept of business process, software architecture, project management and finance costs.

Finally, the result of the analysis is demonstrated in a formal recommendation as detailed in chapter 5.
(3.3) Research Design:

The structure of the research is shown in Figure 3.1. Initially a field study was conducted to establish the requirement for a research in the subject area.
(3.4) Methodology:

The methodology which goes through to gain useful results consists of two parts:
Part one:
Survey and gather information:
In order to fully understand the CORE banking system, an initial survey was conducted from the literature and internet resources, then visits to some of Sudanese banks were made and interviewing their IT managers to know their used banking system and gathering information also the research handed a comprehensive questionnaire that determine the success and failure of CORE banking system; which one needs to be change and add other functionality or modules.

Part two:
Analytical study:
In this part, an analysis has been done to collected information by using statistic methods SPSS, beside others methods to reach for recommendations that guide banks in selection the best solution.

3.4.1 The field study
The field study was done in order to understand the basic information related to the research and ascertain the requirement for and the feasibility of the proposed research related to the subject matter. Another objective was to identify the target population for the research, in order to make it feasible. For the purpose of the pilot survey, Heads of Information Technology of the local banks were targeted to obtain the required information related to CBS implementation experience for the preparation of the study. This basic information was used to determine the validity of the proposed research and was used subsequently during the preparation of the final research questionnaire.

During the field study, it was revealed that CBS implementations involve substantial level of investments and resources, where risks were taken by the respective banks in varying degrees. Under usual circumstances, the IT department of the banks initiates the CBS projects on the requirement and at the request of the business. A typical CBS project involves both selection of a suitable CBS and implementation of the selected CBS, which could be considered as distinct phases of the project. Typically the Business users together with the IT department staff of the banks evaluate the system for the functional requirements, based on which the vendors would be short-listed. The senior management of the banks would get involved in the process of negotiating
with short-listed vendors and make their final recommendation to the board of
directors. The field information indicated that at the time of implementation of CBS,
the project teams generally consist of members from IT department of the bank,
business users and the technical representatives and possibly a project manager from
the vendor.

It was noted that many banks have used external consultants for the selection process
but implementation was done solely by the vendor with the assistance of the bank
staff. There was evidence of few instances, where external consultants were used for
implementations as well.

During the field study it was revealed that out of the senior management team, only
few of the senior managers got actively involved during a CBS selection and/or
implementation processes. However, it was practically difficult to single out members
who had actually participated in the CBS project. Hence, the total senior management
was included for the population. The CBS project team consists of a project director
and/or project manager and team members who get involved in the project on full
time basis. The field study revealed that a typical CBS project team consists of staff
members drawn both from the business and the IT department of the Banks.

(3.4.2) Formulation of Questionnaire:

Questionnaire is a suitable tool to collect data for survey based research as it allows
the collection of large amount of data within a short period of time. Hence, a survey
questionnaire was used as the primary tool for collection of data for the purpose of
this research. This research used two questionnaires to collect data from two separate
categories of respondents.

The questionnaire for the interview process was used to validate the success factors
found in related literature and to collect additional success factors, if any, other than
success factors found in literature for the purpose of framework development. During
the interview process open ended questions were used to obtain more information
related to the subject. Also certain questions were posed to interviewees in order to
cross validate responses for the previous questions to make the analysis more reliable.
The second questionnaire was used to collect data for the “research proper” from the
target population. The preliminary part of the questionnaire was designed to capture
the demographic attributes of the respondents which would be useful in analyzing data. Criteria of measuring the project success, influence of individuals or groups of individuals on selection and implementation processes and the degree of influence and criticality of different factors on the success of the project etc. were included in the questionnaire to evaluate the project objective and dependent factors. The questionnaire was primarily aimed at collecting data from respondents who were having experience in CBS implementations. As much success factors as possible were included in the questionnaire to minimize the uncertainty. This was expected to enable the participants to answer all questions with their experiences of CBS implementations in which they have participated. In certain questions, free space was allocated enabling the respondents to indicate any other factors or related information, which in their opinion deemed to be important for the research.

(3.4.3)Sample Selection
Sampling is one of the most crucial steps in any survey research the primary objective of the sampling is to select elements that represent the total population accurately, so it is important to select an appropriate sample, which provides more value for the survey based research.

The sample was expected to cover all functional areas, involving those who have experience in CBS selection and implementation processes representing members from the IT department as well as their counterparts from main stream banking. As for the choice of banks under consideration, banks were selected based on the number of their customers and employee also from related study these banks are considered the leading banks in Sudan.
(3.4.4) Data collection:

A total copy of the questionnaire were distributed among the seven local banks. Most of them were distributed through known contacts within these banks while some were officially sent to the respondents. Information was given to these contacts on the expected target population and on the manner in which the questionnaires were to be distributed. They were requested to distribute the questionnaire among the team members who have participated in the latest CBS project of each bank. Some of respondents were interviewed in order to obtain clarifications as well as to enhance the material gathering in developing the decision making framework. Further, field observations were carried out with regard to the validation and verification of facts gathered through the questionnaires and during the follow up interviews.

(3.4.5) Data Analysis:

The data collected from the questionnaires were entered into SPSS worksheets. SPSS version 16 and descriptive analysis was used to analyze the data. The graphs, tables and charts were used for better and clear representation of the results of analysis of variables which is shown in chapter 4. During the analysis, a descriptive statistical analysis was carried out, followed by a more in-depth discussion related to the data presented.
(3.5) Outputs: further details on chapter 5

Causes of successes/failures concern the used CORE Banking System in some Sudanese banks by gathering information about them.

1. Analysis results of those captured information using statistical analytical software methods as SPSS.
2. A list of recommendations that should be approved by Sudanese banks to help them in select new CORE Banking System or adding new functionalities to ones that already existed in an effective manner.

(3.6) Summary

In this chapter, the research approach, conceptual framework, population, sampling, data collection methods and data analysis techniques were discussed. Also show that the manager and project team members selected as the target population to validate the CSF/CFF identified in the literature and during interview process. Questionnaire and interviews were the basic data collection methods for the study while descriptive analysis was used to analyze data with a discussion using graphs and charts.
Chapter NO (4)

Implementation

(4.1) Introduction

In this chapter, data which was collected through the questionnaire is analyzed and inferences were made in relation to the respondents and their responses. Results of the descriptive statistics of the respondents were presented in this chapter. The result of the identification of Critical Success Factors (CSF) and Critical failure Factors (CFF) in Core Banking Systems were described as the main component of the data analysis.

According to the previous chapter which includes explanation of research parts; survey and analysis, this chapter will use input-process-output method to describe the methodology of the research and explain their part (survey and analysis) in more details.

This chapter consists of two parts:

(4.2) Part one:
Survey about general information of key consideration in analysis:

(4.2.1) Input:

1. Learning the basics concept about CORE banking system which include definition, elements, functionalities, effectiveness, efficiency and so on
2. Scope of study that determine which banks should be visited to gather required information.
3. Key persons are met to help in gathering required information.

(4.2.2) Description:

As mentioned the CORE Banking System is a transaction processing:

- Gives bank the ability to process large number of transactions in a fast and efficient way.
- Offers customer level accounting and reporting of the deposits and loan products processed in the bank.
• Deals with transactions such as interest and fee calculation, pre-proc, assessing for statement printing, and end-of-day processing and calculation of daily individual transactions.

Therefore CORE Banking System is very important for banks and should be kept pace the technology to produce more products and achieve banks goals. This led CORE Banking System replacement to become a hot topic in banking.

**CORE Banking System Replacement:**

Replacing or even upgrading the CORE Banking System is a complex and high risk process requiring more resources and time.

If the bank wants to start an effective CORE Banking Replacement program, the bank must manage the expectation of all parties involved, and defer the decision until the change becomes imperative.

Decision making process includes financial and business justification to the management and evaluating the risks and returns (Risk-Return analysis has to be coupled with development of business objectives, gap analysis of the existing infrastructure and delta analysis of future needs.

In some cases, a bank might not need to change the CORE Banking System but just refresh an ageing front-end/front-to-back system (it is a system for integration end-to-end trade solutions comprised of best-of-class front-end and back-office systems. On the bank’s back-office side, it offers several systems, each targeted for different levels of usage, geographical location and IT infrastructure. On the customer’s front-end side, it offers a single, unified compliant system that is fully integrated with all of back-office systems). In other cases a bank might need to do both; replace the CORE Banking System and simultaneously replace front-end systems of the bank.
Reasons for replacement:

The key demands for new systems which identifying the critical current and future needs to be met by new system are as follow:

<table>
<thead>
<tr>
<th>Problems with legacy system</th>
<th>Demands for new system</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Outdated architecture.</td>
<td>- Flexible scalable.</td>
</tr>
<tr>
<td>- Lack of flexibility.</td>
<td>- Component based architecture.</td>
</tr>
<tr>
<td>- Lack of scalability.</td>
<td>- Competitive edge.</td>
</tr>
<tr>
<td>- Product-centric.</td>
<td>- Customer-centric with single view of customer.</td>
</tr>
<tr>
<td>- Discrete system lacking information accessibility.</td>
<td>- Easy information access.</td>
</tr>
<tr>
<td>- Slow response time.</td>
<td>- STP ability.</td>
</tr>
<tr>
<td>- Product innovation difficult.</td>
<td>- Product differentiation easy.</td>
</tr>
<tr>
<td>- High operating cost.</td>
<td>- Lower operational and maintenance cost.</td>
</tr>
<tr>
<td>- High maintenance cost.</td>
<td>- Lower TCO.</td>
</tr>
<tr>
<td>- Scarce trained manpower.</td>
<td></td>
</tr>
</tbody>
</table>

The main reasons that many banks failed in replacement process are due to:

1- Inadequate planning.

2- Lack of risk mitigation and inability to make the right decisions at the right time.
3. The mismatch between deliverables and expectations often arises from inaccurate estimation of requirements and scope of project and corresponding unplanned changes in the proposed project.

Replacement approaches:

Banks can choose from multiple approaches for upgrading or replacing their CORE Banking System based on their individual requirements and availability of financial and human resources. Those approaches would vary with the availability of technical skills, complexity of the tasks, availability of products, and cost involved.
Figure (4.2)

Approaches to CORE Banking System Replacement

**In-house development and implementation**
- Ownership of hardware and software.
- Software either develop in-house or purchase from vendor.
- Implementation of system done in-house.
- In-house IT expertise required suitable for large banks.
- Approach adopted by many large banks.

**Purchase of system software and services**
- Ownership of hardware.
- System integrator hired for software.
- Vendor customises, integrates and implements solution according to the bank's requirements.
- Critical to select the right software and vendor with domain knowledge.
- Approach adopted by many medium and small banks.

**Complete Outsourcing**
- Outsourcing of software and hardware.
- ASP hired to meet the core banking need of bank.
- ASP maintains the account and branches through its own data center and meet all the core banking needs of banks.
- Charges calculated on per transaction or per branch bases.
- ASP provides expertise but may commoditise services.
**Phases of CORE banking replacement and critical considerations:**

This section discusses in detail the key requirements, critical considerations, challenges, and success factors in each stage of core banking replacement, also targeting both business decision-makers and IT people involved in the transition process.

There are four key phases identified required to a successful core banking replacement:

![Diagram](image)

**Figure (4.3)**

1. **Business justification and blueprint:**

   **Business justification process**

   ![Diagram](image)

   **Figure (4.4)**

   The objective of this phase is to develop business objectives and establish the vision and justification of the target future state.
According to above figure the key activities to consider for the business justification stage are:

- Define the business objectives and desired outcome.
- Assess the current operation and existing IT infrastructure against the business objectives.
- Develop and visualize the blueprint of the future state of operations and the enabling technology.
- Define the implementation approach and timeline to achieve the future state.
- Formalize the business justification for the future state.

**Key requirement from core banking system requirement:**

- **Integration**: seamless integration of system and operations for time saving and cost effectiveness.
- **Single customer view**: ability to have easy access to a single and precise view of customer relationship.
- **Product factory**: customer-centric system that facilitates development and deployment of new product and services with ease and real-time information.
- **Straight through processing**: advanced, faster and comprehensive banking functionality.
- **Multi channel sales and services**: ability to implement cross channel sales effectively and efficiently.
- **Data warehouse**: large volume of data made easily accessible to facilitate quick decision making.
- **Flexibility**: ability to adapt constantly changing requirement of business in future.

Successful core banking replacement projects are driven by clear business objectives, a strong business justification, and a blueprint for the future and a roadmap on how to reach the target.
2. **Selection:**

*Selection process*

Issue RFI refine vision → Issue RFP → Select system and service provider → conduct negotiation and contracting

**Figure (4.5)**

The objective of this phase is to select and acquire the enabling technology and service provider; so selection of the right core banking system is critical step of the project.

- **Issue RFI / refine vision:** The selection process should start with a request for information (RFI). The RFI should be kept simple, concise and open-ended. As the name implies, the objective of RFI is to obtain information for deciding the final shortlist to kick off the request for proposal (RFP) process. If the RFI contain too much detail it can render the RFP process obsolete and make the preliminary analysis in the RFI stages very laborious. As the banks has to analysis and weigh RFI responses, it is important to keep the workload of the reviewer to manageable level.

In brief, well written of RFI and RFP addressing the critical points the bank is interested in would be more worthwhile for the bank's reviewer and management, than a long of "laundry list" of functions and features which describes more or less the existing system of the bank and not the future. The RFI process should focus on the essential requirement for the future.

- **Issue RFP:** RFP is issued after the shortlist has been prepared, at this stage the choice of platform should already have been made; The RFP should
concentrate the requirement of the new world. And it should demand compliance of the bank's visualization or at least a brief description of what requirements cannot be met by the core banking solution and describe reasons. The RFP should not be sent to more than three vendors for a major component such as trade services, multi channel delivery and core banking. The bank should also have an understanding of how the selection would be conducted and know if it necessary to obtain the proof of concept. Ultimately, the key drivers here are cost and timing.

- **Select system and service provider:** One of the challenges the selection team faces is that they have to not only select the vendor but also justify why this vendor was chosen over others. Hence, it is important to have a solid and transparent selection process in place. In addition, it is critical that the selection is conducted for new world operation and does not degenerate into a selection of the emperor's new clothes, e.g. where legacy operations are deployed with the new technology.

- **Conduct negotiation and contracting:** This step is completed with an agreement contractual agreement with the vendor and service provider.

It is important that bankers focus on business solutions and neither technology solutions. However, business should have the final say on the solution, and the choice should be based on business need and not technology considerations, it is so important during the selection process that IT first picks out proven core banking systems and then considers their underlying technology platform, programming language and tools not in preserve order.

**Key consideration in selection process:**

- Identify key deliverable to meet long term need; consider long term strategic of the bank.
- Develop selection matrix: identify 'go' or 'not go' criteria, develop a rating system detailed to provide objective and subjective assessment.
- Develop request for proposal and invite bids; invite bids from vendor that have long experience in similar projects, reputation and track record.
- Initial filter to eliminate unsuitable vendors; eliminate the product and vendor that do not meet the essential criteria.
• Invite presentation from short-listed vendors; final selection should comprise detailed analysis of vendors and its partners in the project.
• Financial assessment and final selection; financial assessment is important but decision should be based on product and vendor capability.

**Critical factor that determine the selection criteria:**

• Business goals.
• Scale and complexity of operation.
• Product feature.
• Financial impact.
• Business culture process.
• Human resource.
• Existing system technical capability.

The bank need to develop selection criteria based on its unique requirement and business objectives.

**Key consideration in vendor selection:**

• Track record.
• Product functionality.
• Financial impact.
• Reliability.
• Commitment of business.
• On-going support.

Evaluating vendor track record and financial viability is a must, but equally important is for the bank to assess its comfort level with the vendor ability.

According to the architecture and platform concepts, banks have to select the right architecture for the banking system in general and the core banking system specifically to suit their unique requirement most bank s today are shifting their systems to attain more flexibility, scalability, modularity, Straight Through Processing(STP), integration, customer –centric single view of customer and service oriented architecture.
Flexibility: As a convergence of the financial services and highly competitive environment, banks need to display a high degree of flexibility. Agility and efficiency in its processes and product and service development, whatever the platform and solution that the bank selects, it has to be flexible to meet the constantly changing banking requirements.

Scalability: It is important for retail banking. A bank can expect healthy growth rates in this segment of market and must plan for an increase in transaction volume.

Functional requirement: It is essential to have comprehensive management information system to cover all products, all customers' grouping and all geographical locations.

Modularity: This means that one part of the system can be changed without affecting other parts.

Straight through Processing (STP): One key feature which has led to the success of core banking systems today is front-to-back office Straight through Processing. While this is essentially the ability to have a series of underlying business event generate multiple account events without having to physically transfer the data from point to point. This translates into a substantial decline in
cost of ownership and control because of the need for less reconciliation. Further, it allows banks to reduce manual intervention and redeploy their existing resource.

- The architecture of the banking system should integrate the core banking system such that there is customer centricity of a single view of customer across function. In customer centric environment, the customer is paramount and drives all business decisions from technology to organization structure.

- **Business process modeling (BPM):** It is a mechanism for the orchestration of process, with its ability to precise model and possibly change the context in which enterprise component are used.

- **Service oriented architecture (SOA):** is a relatively recent addition to the architecture of banking system. SOA in its purest sense is centered on loosely coupled component which support generic service and are based on web technology. In core banking context it means reducing barriers in antiquated infrastructure.

Those components should be flexible so they are reused to create new business function both within and across enterprise.

**Selecting the architecture:**

Most mainframe-based core banking solutions are designed for raw horse power, the idea here is to support high transaction volumes.

Core banking system built on other platforms is typically focused on functions and features and do not offer the same level of stability, availability and end-user response time.

**Selecting the platforms:**

An important consideration for the replacement of core banking system is the platform upon which the solution will operate. Typically, banks choose between mainframe and UNIX platform for their core banking environment. This decision should be made after conclusion of the request for information
(RFP) process, so that request for proposal (RFP) is issued only to vendor with solutions for the selected platform.

The platform decision is critical as it can automatically exclude certain platform-specific core banking systems. To business user, this may seem counterintuitive after all, it is the core banking system which wanted to select. However, the functionalities and features of the core banking system are not the sole determinants of the appropriate solution. First, the solution must be able to handle the bank’s requirements for volume, availability, reliability, scalability, security, response time, and other non-functional qualities. For these, the choice of platform is paramount.

3-Implementation:

Implementation process

![Implementation Process Diagram]

**Figure (4.7)**

The objective of this phase is operation and pilots the transformed future state, including technology process and organizational change.

The core banking implementation phase can be divided into four distinct stages:

- **Delta analysis**: A delta analysis is the identification of difference the desired state and selected package and ways to resolve these differences. One objective of delta analysis is to identify the package modifications required to address
country-specific regulatory requirement. The package modification is necessary if configuration through package-embedded parameters is not possible.

For the remaining delta there is the number of resolution options available, such that:

a. No change / out of the box fits your needs
b. Rationalize process.
c. Rationalize product.
d. Customize and modify package.

Some of the recommended activities to consider for delta analysis are:

a. Conduct a delta analysis to identify the differences between the required future state and the selected solution.
b. Conduct a solution to determine the appropriate customization to suit the future state.
c. Define and estimate interface, data conversion and coexistence efforts.

Typical deliverable of this task includes delta definition and resolutions, configuration definition, interface definition, data conversion definition and coexistence definition.

- **Detailed design**: A detailed design of the future is needed for subsequent build and test stage. A detailed design done right can save a bank a lot of time and money by avoiding unnecessary rework and change request. Many products run into difficulties because the design is never stable. In those project, coding start even before the detailed design was approved. This is one of the major causes of the project failure.

The detailed design documentation should include business design, system design, interface design, data conversion design and coexistence design.
For this stage the initial project need to be expanded and some of the recommended activities to consider are:

a. Prepare a detailed business design including rationalized product and process designs.

b. Prepare a detailed system design for customization and configuration of the selected solution.

c. Prepare a detailed integration design for the interface, data conversion and data coexistence components.

- **Build and test:** the customization and configuration of the selected solution begins here. At this stage it is important to freeze the design and to apply the rigorous change management process to any unavoidable changes. Hence the sign-off of the detailed design documents of the previous stage is compulsory before this stage begins.

At this stage prefer to use the term "business acceptance testing" over "user acceptance testing" to avoid the confusion.

Some of the recommended activities to consider for delta analysis are:

a. Customize and configure the selected solution.

b. Prepare operational manuals, training materials and train the trainer programs.

c. Customize and configure the interface, data conversion and data coexistence components.

d. Prepare and conduct system, operations and business solution testing.

- **Pilot:** A live pilot is the final acceptance test; the system can truly be tested for real-life usability. The pilot should be representative of the bank’s core operation. The product with well-executed testing run into trouble as the test and production environment were different, and even in cases where the production environment itself was used for bank-wide testing by the actual end-users reposting real business transactions prior to big bang deployment.
The pilot should be used to assess the effectiveness and completeness of the end-user training and the new business processes and procedures as well as the customer's acceptance of the new product and new operations. It should also be used to identify bugs and ultimately to fine-tune the applications before deployment on the enterprise-wide scale. This stage will deliver a future state of a new world operation in a live environment.

Some of the recommended activities to consider for delta analysis are:

a. Plan and prepare for the pilot deployment including training of pilot users and dress rehearsals of the pilot cutover and operation.

b. Deploy, support and refine the pilot operation.

**Comprehensive Implementation Chart**

![Comprehensive Implementation Chart](image)

**Figure (4.8)**

The software project failures, where there are more risks in large software projects. The software implementation faces challenges such as people, technology, culture and communication.
4. **Deployment:**

**Deployment process**

![Deployment Process Diagram](image)

**Figure (4.9)**

The objective of this stage is enterprise-wide rollout of the refined future state operation.

After the successful completion of the pilot, the bank is ready to execute the roadmap for deployment of the pilot operation of the whole enterprise. To do this, number of planning tasks need to be updated and finalized:

- **Logistic:** Managing logistic is critical for the rollout of the new core banking solution to branch network, the logistic include rollout sequence (where, when, how many), possible change to branch layout, bank image, update and / or replacement of hardware and software infrastructure. It also includes the planning and execution of training logistic for the enterprise-wide deployment. The bank may need to hardware rapidly build and dismantle mobile training branch environment for hand-on system training.

- **Training:** Once the core banking system is ready for rollout, training is one of the important activity required to successfully deploy the new world to the enterprise-wide scale, to do this the bank's project team must fine tune and update the training plan and materials taking into account the lesson learnt from the pilot deployment.
• **Change management and communication:** The effective change management is essential to obtain buy-in and acceptance of the new operation throughout the enterprise.

Change management done right is a very involved program touching every level of the organization from the CEO to end-user in the branch, successful change management of the project as complex, high risk and high profile as a core banking enabled transformation can ultimately only be led by one person: the CEO. The chief executive is supported in this task by the entire senior management team of the bank.

Communication of the change is divided into two parts internal and external; the effectiveness of the communication can be significantly enhanced through the use of multimedia technology.

Usage of these tools ensures consistency of the message and rapid deployment to the enterprise and public alike. The bank will need different communication programs depending on the audience they want to address.

• **Go live:** As soon that the successful of deployment is normally conducted through the carefully prepared rollout plan which clearly identifies the time and sequence of each task. The rollout is undertaken by trained rollout team, which among other thing, conduct a train the trainer program in their respective rollout clusters. A best practice analysis has shown that it is more effective to train key branch employee as trainers for their respective units than make external trainers responsible for the training deployment, this approach is a part of the change management program and foster ownership and accountability. The employees are likely to be more attention to the task if they know that they will have their peers and accountable for all the predefined deployment activities.

The implementation teams are usually supported by central command centre which coordinates and directs all implementation activities and have one or two rapid deployment team available to be dispatched to support trouble spots. The drawback of this approach is that bank will be required to do a lot of
methodical planning, conduct massive training of key and branch employees and be held accountable for the result.

- **Fun-tune:** the final activity in the final stage is fine-tuning of the operation based on feedback received during deployment. Successful organization has gradually turned this fine-tuning activity into a continuous improvement program managed and led by former member of the rollout team.

CORE banking architecture and deployment practices reveals that the process of replacement consists of several critical building blocks which need to be taking into consideration during planning. In this section will examine some of these core banking building blocks in more detail and explain their purpose in the overall programming of the core banking enabled transformation.
Deployment strategy

A core banking solution, once implemented, should be robust, scalable and future-proof and serve the business interest for at least 10 years. Thus the bank should identify the deployment approach most suitable for the bank’s needs.

There are primarily two options: big bang implementation and package phased implementation.

- Big bang is deployment strategy which assume that all system will be deployed at the same time. As the result bank don’t need to worry about coexistence.
- Phased approach is deployment of new CBS by branch or regional cluster. The entire solution is deployed in one-go but only for a manageable cluster and not for the entire enterprise. This approach keeping risk within manageable level.
- The choice of one approach may vary depending on the complexity and scale of the project.

Service Oriented Architecture (SOA)

Loosely coupled modular services support both business and IT requirements. Its do the following in banking sector:

- Enables abstraction of core systems for isolation and potential replacement.
- Enables efficient messaging and business processes from the front end channels.
- Enables reuse of common business processes for greater efficiency.

In other mean the SOA allow the bank’s IT team to make change without touching the base code, ensuring minimal vendor dependency, lesser operational risk, faster adoptability to changing business condition.

Risk mitigation:

CORE Banking System Replacement process has high Risks and loses; so banks need to tread carefully with cautions at each step. The following is figure that identifies five broad stages in the replacement process and their risk characteristics:
Figure (4.10)

The primary reason of those risks is lack of management commitment; which could be solved by achieving CORE Banking System replacement with business and management support in totality, and should not perceived it as an IT project, and management commitment should not be limited to simply business and managerial involvement at all stages of the project but extended to strong leadership support.

Evaluation at each stage must be comprehensive:

**Stage one: Evaluation risk and management commitment**

Inadequate assessment of functional and technical requirements will lead to improper selection and possibly expectation mismatch at a later stage. It is critical for banks to understand the type and depth of functionality provided by CORE Banking Solution in the context of its own requirements and replacement objectives.
Stage two: Selection of vendor, service, and providers

Improper selection of vendor and system can lead to project failure; availability of multiple solutions with varying technology and comparable functionalities has made this task more difficult.

Stage three: Solution Risk

The foremost issue in selecting CORE Banking System is the solution; if the solution is right then the bank will achieve most of its goals, otherwise it may lose.

Stage four: Implementation Risk

Transformation from an old system to a new technology is a risky proposition in any bank; because it contains multiple types of risks and errors.
Stage five: Long-term Technical support Risk

Financial Implications:

Investments and Costs Implications

Figure(4.12)

Replacing CORE Banking System requires strong business and financial justification to meet its huge costs; this cost consists of:

1-Software and services Cost (30%): It is depends on the scale and complexity of the project.

2-System Integration Cost (20-25%).
3- Hardware and Infrastructure Cost (45-50%).

4- Maintenance Cost: depending on the implementation approach used.

5- Other Costs hidden in the process:

A- Costs come from Service disruptions.  
B- System Downtimes. 
C- Other system problems during the course of implementation or from unexpected delays in project implementation.

Interface confederations

Interfaces are a key concern for any core banking replacement project. Every major application in the bank is interconnected or interfaced with core banking system.

According to some experts, an enterprise service bus (ESB) is a software architecture model used for designing and implementing the interaction and communication between mutually interacting software applications in service-oriented architecture (SOA) and an SOA together can help to reduce the number and complexity of interfaces, enabling the bank to focus on its core business rather than the maintenance of IT infrastructure.

Coexistence

It is strategy and process taken to operate two CBS concurrently for a limited period of time.

Type of interfaces that is believed is better ways of dealing with coexistence are:

Branch:

How will inter-branch transaction be handling during coexistence?

Call centres:

The second most important customer contact point is call centre. During coexistence, the call centre transaction can be handling through an online transaction switch without posing any problem for the operation.
So how will the call centre service requests during coexistence?

**ATM**

Coexistence of ATM transactions is usually not of any major concern. Due to the nature of ATM transactions, the infrastructure is already in place to deal with multiple back-end systems.

**Data cleansing and data conversation:**

Bankers often refer to core systems migrations as open heart surgery - the vast platforms that support all retail transactions is that critical to the life of a bank. Accordingly, the costs -- and risks -- of core banking projects are high.

To help you improve the prognosis for your core banking modernization initiative, Bank Systems & Technology asked some bankers who recently completed or are in the middle of a core banking upgrade, as well as the analysts who help them, for their advice on what makes such a project smooth and successful. Data cleansing is an entirely separate project with its own organization structure and milestone. It should be an ongoing operation at the bank and great care should be taken to avoid creating dependencies between data cleansing and the core banking project.

Data should be cleansed either before or after its converted, but not during the conversation. However, the other type of data transformation is required during the core banking data conversation to accommodate differences in data format between the old and new systems. But this should not be confused with data cleansing, which changes the meaning of existing data rather than its format or structure.

Data conversation can be executed in three stages:

**Data mapping:** the banks start the data conversation process with data mapping. This essentially entails the old world data elements to the new world data elements.
Data conversation extracts: during this second stage of process, customer and account information is extracted from the existing system and put into the conversation staging area in preparation for loading into the new world system.

Data conversation loads: this is the final stage where the customer and account information is loaded into the new core banking system and reconciliation reports are automatically generated.

Product rationalisation:

Product rationalisation is essentially the process of assessing the value of the bank’s current product and services offering. Banks often also check if an existing product or service can be migrated to the new platform in a cost effective manner? (Without too much customisation). Also to be considered is how the bank can make full use of new core banking solution and launch competitive new/enhanced products and services.

Process rationalisation:

Core banking replacement will impact most of the front-and back-end users. Hence, process rationalisation provides the bank with a chance to overhaul its fragmented and perhaps outdated business process as an explicit outcome of the core banking enabled transformation. It allows discontinuation of legacy processes and elimination of paper-based or semi-automated processes. It also provides an opportunity for process re-engineering to utilise the new core banking solution to its fullest.

Project Organization and program management:

The project of the CORE Banking System replacement requires strong project organization (which should be adjusted depending on the phase of the project) and program management (determine the responsibilities and accountabilities of project decisions).
Figure (4.13)

Steering Committee: Should be chaired by CEO (Chief Executive Officer)

The overall responsibilities of project organization depend on it.

It is important in demonstrating commitment to the project.

Members of steering committee should include bank's full time program director, heads of all the business units, the CIO, and key risk management and finance personnel.
Bank's full time program director:
. Should have complete authority over the project.
. It should be used in making decisions after consultation with business and IT (an overridden decision should be immediately reported to steering committee, which can veto decision if necessary).
. It should be supported in his day-to-day activities by the project managers for the business and technology transformation.

Project Organization:

The project organization will change depending on the stage of the project. The following figures illustrate the different stages of the project and the corresponding organization required to execute the project effectively.

**Stage one: Delta analysis and Design:**

This stage focuses on diagnosing the current business and IT environment in the bank and defining how the bank should operate in the future.

Based on the current environment and the target environment, the bank defines the "delta" followed by the delta resolution.

**NOTE:** Delta analysis looks forward not backward.
Figure (4.14)
Stage two: Build and Test

This stage moves from delta analysis and resolution to Build-and-Test step. It focuses on the rapid technical implementation of the solution.

Figure (4.15)
Stage Three: Pilot

This stage moves from Build-and-Test step to pilot implementation step; which focuses on deployment of a live pilot to test the new CORE Banking Solution and its processes and procedures.
PART TWO:

(4.3) ANALYSIS:

(4.3.1) Input:

Filling questionnaire.

(4.3.2) Description:

Using SPSS tools to analyze collected data and form the analysis number of results were concluded.

Composition of the Sample
The sample comprises staff members of Sudan Banks, having participated in the current used CBS project, on full-time basis as Project Managers or Team Members or Senior Manager who have served in IT or Project Steering Committees as a committee chairperson or committee member during a CBS project.

Analysis of Sample Distribution
All questionnaires were distributed among the staff of seven local banks targeting randomly selected staff members, who were CBS Implementation Project Team members, CBS Implementation Project Managers and the Senior Managers.

<table>
<thead>
<tr>
<th>Name of Bank</th>
<th>Name of Core Banking System</th>
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<td>Farmer's Commercial Bank</td>
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</table>
(4.3.3) **Evaluation of core banking system in Sudan:**

This part of analysis includes evaluation of core banking system in terms of

1. Ease of user interface.
2. Ease of system changing.
3. Technical support.
4. System flexibility.
5. Cost.
6. Change management process.
7. Viability.
8. Availability.

According to the collected data the indicators above have been reached, next section shown more details about them.
1. Ease of user interface:

This indicators is important to be considered in evaluation of core banking system evaluation because it is the interface between the system and it's user.

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<tr>
<td>Total</td>
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Approximately 62.5% of respondents indicated that the core banking system in Sudan is good in terms of user interface and 37.5% indicated it is very good.
2. Ease of system changing:

Most banks face challenges when they need to change their core banking system. The figure below explains the decision of respond.

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</table>

![Figure 2.18](image)

Approximately from the figure, find that 57.5% of respondents indicated the change of system to be good and 17.5% indicated it to be very good, but 25% if respondents see that system change process is very hard and face difficult in term of system change.
3. Technical support:

Technical support refers to a range of services by which organizations provide assistance to users of technology products. Technical support services attempt to help users solve specific problems with a product rather than providing training, customization, or other support services. Technical support may be delivered over the mobile or online by website or e-mails or a tool where users can log a call. Larger organizations frequently have internal technical support available to their staff for computer-related problems. The internet is also a good source for freely available technical support, where experienced users may provide advice and assistance with problems.

<table>
<thead>
<tr>
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</table>
From the figure above; 55% of respondents indicated that technical support and its responsiveness to the issues was good and 27.5% of them indicated technical support was very good. But 17.5% of respondents see that there was not any technical support related to core banking system.
4. System flexibility:

Flexibility is used as an attribute of various types of systems. In the field of engineering systems design, it refers to designs that can adapt when external changes occur. Flexibility can be defined as the ability of a system to respond to potential internal or external changes affecting its value delivery.

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</table>
According to the above figure, conclude that the core banking system in Sudan is flexible enough to provide the ability to deal with the system because 70% of respondents see the system is flexible and 22.5% see the system is very flexible. But 7.5% of respondents suffer from inflexible system.
One of the advantages of core banking system is to reduce the cost of banking operations so cost was be considered when evaluating the core banking system.
According to the result above conclude that the core banking system is reducing the cost of banking operations because 67.5% said yes and 20.0% said maybe but few of respondents about 12.5% from all respondent indicate that the core banking system is not reducing the operations cost.
6. **Change management process:**

Change management process is the sequence of steps or activities that a change management team or project leader would follow to apply change management to a project or change. Based on Prosci's research of the most effective and commonly applied change, most change management processes contain three phases, these phases are preparing for change, Managing change and Reinforcing change. Then for effective system change must follow the change management processes phases.

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</table>
Figure (4.22) indicates the response of banks to follow the steps of change management process and explained that most of bank about 67.5% follow all step of change process but 25% don’t follow all step and 7.5% don’t follow any steps of change management process.
7. Viability:

This indicator is the main indicator to evaluate any core banking system, when the system is Viable mean that it successful and achieve all organization requirements and keep pace with economic development.
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**Figure (4.23)**

Figure (4.23) indicates the role of system to increase country economic to keep pace with the banking market and technology development. From answers of respondents conclude to most Sudanese bank related to economic development but 27.5% of banks don’t relate to economic development.
8. Availability:

Availability means the continuity and availability of system around the clock.

![Pie chart showing system continuity and availability]

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<td>Total</td>
<td>41</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Bar chart showing system count]

Figure (4.24)
Figure (4.24) indicates that the core banking system in Sudan is 63.4% good and 27.5% very good then there is not problem in term of availability and continuity of core banking system around clock.

9. **Scalability:**

Scalability is the ability of a system to handle a growing amount of work in a capable manner or its ability to be enlarged to accommodate that growth. Thus it is important to be considered in evaluating of core banking system.
The figure illustrates the distribution of scalability scores for a system, categorized as 'bad', 'good', and 'very good'. The table below shows the frequency and percentage distribution of these scores:

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bad</td>
<td>2</td>
<td>4.9</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td>good</td>
<td>26</td>
<td>63.4</td>
<td>05.0</td>
<td>70.0</td>
</tr>
<tr>
<td>very good</td>
<td>12</td>
<td>29.3</td>
<td>30.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>97.5</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Missing System</td>
<td>1</td>
<td>2.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure (4.25)
From figure (4.25) conclude to the core banking system in Sudan is 65% good in term of scalability but 5% of banks their system is not scalable enough.

(4.4) **Summary:**

In this chapter, the research data was analyzed and presented. The analysis success factor related to CBS selection and replacement were initially identified.
Chapter five:

Results and conclusion

(5.1) Results

Case Study

This section discusses case study of core banking system in Sudan to give general comparison and evaluation of CBS in leading bank (Bank Names) based on critical key factor which are considered when evaluation process.

The comparison below covered six core banking systems. The result depends on the evaluation of respondents according to their experience in dealing with the certain system.
**Comparison on Core banking system:**

**Comparison in term of ease of use interface:**

<table>
<thead>
<tr>
<th>Interface</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penta bank</td>
<td>80%</td>
</tr>
<tr>
<td>system bank</td>
<td>80%</td>
</tr>
<tr>
<td>Ora bank</td>
<td>47%</td>
</tr>
<tr>
<td>Bank plus</td>
<td>79%</td>
</tr>
<tr>
<td>Symbols</td>
<td>79.5%</td>
</tr>
<tr>
<td>iMAL</td>
<td>46%</td>
</tr>
</tbody>
</table>

![Bar chart showing percentage of user interface ease of use](image)

**Figure (5.1)**

From the figure below conclude to the user interface of CBS in general is good because all percentage centralize between 47-80%.
Comparison in term of ease of change:

<table>
<thead>
<tr>
<th>Change process</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Penta bank</td>
<td>58%</td>
</tr>
<tr>
<td>system bank</td>
<td>73%</td>
</tr>
<tr>
<td>Ora bank</td>
<td>33%</td>
</tr>
<tr>
<td>Bank plus</td>
<td>60%</td>
</tr>
<tr>
<td>Symbols</td>
<td>43%</td>
</tr>
<tr>
<td>iMAL</td>
<td>60%</td>
</tr>
</tbody>
</table>

Figure (5.2)
Figure (5.2) explains case of change the system, result is between 33-73% It is noted that there is a Contrast between the value of any core banking system and that indicate to there is problem in this term of evaluation.

**Comparison in term of scalability of system:**

<table>
<thead>
<tr>
<th>Scalability</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pentabank</td>
<td>78%</td>
</tr>
<tr>
<td>System bank</td>
<td>73%</td>
</tr>
<tr>
<td>Ora bank</td>
<td>47%</td>
</tr>
<tr>
<td>Bank plus</td>
<td>73%</td>
</tr>
<tr>
<td>Symbols</td>
<td>73%</td>
</tr>
<tr>
<td>iMAL</td>
<td>53%</td>
</tr>
</tbody>
</table>

![Scalability Chart](image)  
**Figure (5.3)**
From the figure below conclude to the user interface of CBS in general is good because all percentage centralize between 47-78%.

**Comparison in term of Continuity of system:**

<table>
<thead>
<tr>
<th>Continuity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Penta bank</td>
<td>68%</td>
</tr>
<tr>
<td>system bank</td>
<td>67%</td>
</tr>
<tr>
<td>Ora bank</td>
<td>60%</td>
</tr>
<tr>
<td>Bank plus</td>
<td>67%</td>
</tr>
<tr>
<td>Symbols</td>
<td>80%</td>
</tr>
<tr>
<td>iMAL</td>
<td>47%</td>
</tr>
</tbody>
</table>

![Continuity Chart](image)

**Figure (5.4)**

As mentioned in previous section; the continuity and availability of system is very important key factor in evaluation of core banking system.

From the figure above the continuity of core banking system in Sudan is very good and symbols core banking system is excellent in term of continuity.
Comparison in term of flexibility of system:

<table>
<thead>
<tr>
<th>Flexibility</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penta bank</td>
<td>69%</td>
</tr>
<tr>
<td>system bank</td>
<td>67%</td>
</tr>
<tr>
<td>Ora bank</td>
<td>53%</td>
</tr>
<tr>
<td>Bank plus</td>
<td>80%</td>
</tr>
<tr>
<td>Symbols</td>
<td>73%</td>
</tr>
<tr>
<td>iMAL</td>
<td>53%</td>
</tr>
</tbody>
</table>

Figure (5.5)

From the figure below conclude to the user interface of CBS in general is very good because all percentage centralize between 53-80%.
Comparison in term of reducing operation cost:

<table>
<thead>
<tr>
<th>Reducing operation cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penta bank</td>
</tr>
<tr>
<td>system bank</td>
</tr>
<tr>
<td>Ora bank</td>
</tr>
<tr>
<td>Bank plus</td>
</tr>
<tr>
<td>Symbols</td>
</tr>
<tr>
<td>iMAL</td>
</tr>
</tbody>
</table>

Figure (5.6)

From the figure above concluding to all Core banking systems on Sudan is reducing the operation cost of bank.
Comparison in terms of keeping pace with economic development:

<table>
<thead>
<tr>
<th>Keeping pace with economic development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penta bank</td>
</tr>
<tr>
<td>system bank</td>
</tr>
<tr>
<td>Ora bank</td>
</tr>
<tr>
<td>Bank plus</td>
</tr>
<tr>
<td>Symbols</td>
</tr>
<tr>
<td>iMAL</td>
</tr>
</tbody>
</table>

Figure (5.7)

Despite the economic circumstances which are experienced by the Sudan and limited scope in transactions, from the results above, conclude to core banking system in Sudan keeping pace with the economic development.
Comparison in term of follow change management process:

<table>
<thead>
<tr>
<th>Follow change management process</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Penta bank</td>
<td>84%</td>
</tr>
<tr>
<td>system bank</td>
<td>93%</td>
</tr>
<tr>
<td>Ora bank</td>
<td>87%</td>
</tr>
<tr>
<td>Bank plus</td>
<td>93%</td>
</tr>
<tr>
<td>Symbols</td>
<td>80%</td>
</tr>
<tr>
<td>iMAL</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure (5.8)

From the bar above concluded to most bank in Sudan follow all change management process steps to insure the successful of system selection.
Comparison on Core banking system in general:

<table>
<thead>
<tr>
<th>General</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Penta bank</td>
<td>76.75%</td>
</tr>
<tr>
<td>System bank</td>
<td>81.625%</td>
</tr>
<tr>
<td>Ora bank</td>
<td>62.625%</td>
</tr>
<tr>
<td>Bank plus</td>
<td>75%</td>
</tr>
<tr>
<td>Symbols</td>
<td>73.69%</td>
</tr>
<tr>
<td>iMAL</td>
<td>66.625%</td>
</tr>
</tbody>
</table>

**Figure (5.9)**

Figure (5.9) depicts the evaluation of core banking system in Sudan in terms of all key evaluation factors.
(5.2) Conclusion

This project was undertaken to enhance and increase the process of CBS replacement in Sudan, and provide recommendations that required for both staff and managers of the banks to guide them for successful replacement.

The project has passed through several stages to achieve our aims. There are some stages that include sub-steps:

First stage beginning by learn the concepts relating to CBS that can be applied in banking system Globally and locally through literate review and the survey that conducted.

Second stage studied the current situation of the IT department in some of Sudanese banks (case study: Central Bank of Sudan, Khartoum Bank, Faisal Islamic Bank, Alslam bank, Omdurman National Bank, Saudi Sudanese Bank, Farmer’s Commercial Bank, and Sudanese French Bank), interviewed formally staff and managers, and offered questionnaires to gather the required information.

Thirdly CSF and CFF of CBS are determined according to collected information and analyzed them through descriptive statistics tools.

Finally identified recommendation for guiding banks to replace the existing CBS by new one or add new functionalities.
Chapter six:

Recommendation:

(6.1) Introduction

This chapter will contain the recommendations for successful CBS replacement and for the project.

(6.2) Recommendations

The following recommendations are made in order to enhance the effectiveness of the CBS in Sudanese Banks:

1- Banking Technology Project and work procedures:

(1) Business Process Management

1-Make documentation for measures of implementing existing business works:
- Access to all documents that define ways of business implementation.
- Knowing about all regulations and laws.
- Documented of all Existing work sessions.
- Drawing a blueprint for implementation procedure.
- Execute the work actually.

2-Make documentation for implementation ways of business system:
- Work on the experience environment of the system.
- Identify the steps to implement the operational processes of the system works.
- Refer to the documentation provided by the system.
- Determine the authorities.
- Identify the documents required for the implementation of any step.
- Sketch each action.
- Design modules.

3- Analysis of differences:
- Comparison between the procedures for the implementation of the put ting-based business and the implementation procedures that the system works.
- Review and identify key differences and determine the extent of its impact on the workflow of the system.
- Discuss the differences with the officials and implementing business.
- Get support from senior management.
4. Re-engineering of implementing ways for the business:

- Decision to change the procedures for the implementation of the business by conventional methods to follow the typical ways to implement the business system works.
- Issuing measures of implementing with the actual business participants.
- Make the Workshops Change Management.
- Adopt all the procedures.
- Make Staff training on the new work procedures.

(II) Manual work procedures

1. The Plan: Securing the business and make it going and flowing automatically arranged, easy, understandable.

2. The steps: Each employee explains the best way to perform the business and determine the mechanism of the transition from one step to another, and documents required by and resulting from each step.

3. Responsibilities table: Identify the tasks, responsibilities, and powers functionalities.

4. Documentation table: Documents required for each step, and documents resulted from each step, and save documents in places.
2. Training:

I. Focuses on work and systems training procedures.

II. Develops of appropriate training materials for all levels in the bank.

III. Creating trainees to branches and public administrations for the same systems and programs.

IV. Commitment to the annual training plan and approved by senior management and to instruct the Director of training to prepare monthly and annual reports.

V. Reward employees excelling in the training process and that their findings are reflected on the performance evaluation.

When the banks follow the previous guidelines and recommendations, the results will be gained are:

1. Control all operations.

2. Customer satisfaction and confidence in dealing.

3. Implementation of spread expansion plan.

4. Reduce operating expenses and make the best use of resources.

3. Having Clear Organizational Objectives:

Organizational strategy: The basis for the IT infrastructure, the functional capability requirement for a CBS and it also enables the bank to have an IT strategy aligned with the business strategy; so it is important for banks to have clear organizational objectives.

The following guidelines will help the banks in identifying the Organizational requirements clearly:

a. At the first organizational objectives, goals, and business models should be identified based on the business strategy of the bank.

b. Convert above identified organizational objectives and goals into operational business goals and targets, which could be useful in developing the IT Strategy.

c. Developed and document IT strategy based on the operational business goals, and should take in consideration Current and
anticipated technological developments, IT infrastructure requirements, sizing and capability requirements of systems based on the business strategy, regulatory requirements, requirements to integrate with other systems and the service delivery channels bank intends to put into operation within the planned window etc in IT strategy development step.

4- Developing Clear Business Requirements

Developing clear business requirements is an important activity in the identifying a suitable CBS process; documented business requirements enable the bank to identify a CBS, which closely matches with its requirement, and avoiding possible issues such as loss of flexibility, bugs, and future upgrade issues.

The following Points will assist the banks developing the business requirements:

a- Developing the business requirements based on the current business requirements, operational business goals and objectives, delivery channels and integration required with other systems.

b- Involving Cross-functional experts from business and business analysts from the IT department in preparing the requirements.

c- All business areas and functionalities, and requirements with which the bank thinks critical should be documented by details as much as possible.

d- Based on the documented requirement and on the capabilities of the current CBS, bank may decide whether to upgrade the existing CBS or replace it with a new one.
5- **Vendor Selection**

Selecting an appropriate CBS, which can satisfy the requirements of the bank, is a main factor in any CBS project. Capability of the vendor of the selected CBS in System implementing is equally important to make the implementation a success.

Guidelines which assist the banks in selecting the appropriate vendor for a CBS are:

a- CBS selection process gives the primary consideration to the closeness of the proposed system to the requirements. This could primarily be done on the responses of the vendors to the RFP. A certain mechanism could be developed to ensure the closest-fit to the requirement out of the proposed solutions.

b- Once the vendors are chosen based on the above, it is preferable to inform the vendor to perform a **Proof of Concept** (POC). POC could be done either by installing a model system within the bank premises for a specified period or through vendor arranged visits to live sites, or both.

c- Bank should take care in pricing and conditions of the contracts; to avoid strained relationships with the vendor and subsequent abandoning of the project in extreme cases.

d- Banks should evaluate CBS proposals based on the total project cost(CBS reasonability, and the technology used by the CBS may require expensive hardware, software, databases, communication and even live-ware, which in the long run could be relatively expensive), and the cost of ownership instead of only looking at the cost of the CBS.
6. **Vendor Relationship Management**

Banks should maintain a cordial relationship with the selected vendor throughout the project to ensure that the project is completed as expected by following the below guidelines:

a- Banks should make background check; ensure that the vendor sends an adequately experienced project manager and an implementation team.

b- Project Managers and implementation team members of the banks should be adequately flexible during the implementation step and shall be practical and reasonable in assessing the situations.

c- Banks shall maintain communication channels open with the vendor at different levels.

d- Regular intervals of meetings between the Bank and the vendor to solve all issues and problems without any delays and without leading to strained relationships.

e- Vendor support is extremely important within the first days.

7. **Professional Project Manager**

The selected vendor is responsible for CORE Banking Solution, and needs bank staff support for this purpose. Project manager is very important to coordinate activities such as aligning the banks business processes with the CBS (Gap Analysis), User Acceptance Testing (UAT) and Data Migrations from existing Systems require participation of the Bank staff, and those activities are extremely important for the successful completion of the project.

Following guidelines will assist the banks in selecting an appropriate project manager for implementation:

a- Banks should identify experienced, professional Project Manager whom has a professional qualification in Project Management and preferably have experience in CBS implementation projects.

b- The project manager should have adequate authority in making decisions and he/she is independent of any influences of either from the bank staff or from the vendor.
c- Performance of the project manager shall be evaluated based on the success of the project measured against the predefined project success measurement criteria.

8- Competent Project Team

Similar to having a competent project manager, having a competent project team is also an important factor. The project team is a key resource required from the bank during CBS implementation.

The following points will help banks in selecting a suitable project team:

a- The project team members shall be include experienced senior staff members related to business and service areas, which are related to CBS under implementation and who are capable of making decisions related to areas they represent. Staff members having an open mind, and with positive thinking and who are capable of voluntarily working long hours shall be preferred over the others in selecting the project team.

b- Number of team members shall be allocated to the project based on the size of the project and on the expected period.

9- Effective Project Management

Effective project management is a mandatory requirement for any project to be successful. A professional Project Manager manages project risk which is often ignored by Project Managers who are not professional project management.

The following below guidelines assist banks to have effective project management:

a- Project should be managed according to the acceptable project management guidelines, and appropriate project management tools.

b- The project manager must maintain a project risk profile on regular basis and take necessary steps to mitigate the project risks.

c- Make the Schedule based on practical and realistic estimates, the project budgets.

d- Effective follow-up actions on decisions are required to ensure that decisions are implemented as agreed and on time.
Appendix:

User questionnaire:

University of Khartoum

Faculty of Mathematical Science

INVESTIGATION OF CORE BANKING SYSTEM IN SUDAN

Introduction:

This study aims to realize a number of results concerns banking systems especially choose and change. Thus, can be obtained through assessment of applied system to cover business requirement. In order to achieve the study's goal we would like you to support us with an appropriate answer so as to achieve the desired goal.

This Investigation is consisting of three sections as follow:-

1. System uses.
2. The Reflection of technical development over Business
3. Training and knowledge transfer
Section (1)

System Uses

1. Ease of user interface:
   - Bad.
   - Good.
   - Very good.

2. Ease of change:
   - Bad.
   - Good.
   - Very good.

3. Scalability of the system:
   - Bad.
   - Good.
   - Very good.

4. The response speed of the system in conservation and input processes:
   - Bad.
   - Good.
   - Very good.

5. The continuity of the system and availability around the clock:
   - Bad.
   - Good.
   - Very good.

6. The response speed of the system to query data and information:
   - Bad.
7. Technical support and its responsiveness to the issues:
   - Bad.
   - Good.
   - Very good.

8. Flexibility of the system:
   - Bad.
   - Good.
   - Very good.

9. The percentage that covered by applications of the systems in your department compared with the overall work of the Department:
   - Bad.
   - Good.
   - Very good.
Section (2)

The Reflection of technical development over Business

1. Is the current system led to reduce the cost of banking operations?
   - YES.
   - NO.
   - May be.

2. Is the current system led to reduce the managerial cost?
   - YES.
   - NO.
   - May be.

3. Does system contribute to provide better mechanisms for decision-making?
   - YES.
   - NO.
   - May be.

4. Is the current system led to the liberation of human energies from handwork routine?
   - YES.
   - NO.
   - May be.

5. Is the current system led to the variety of banking products and services?
   - YES.
   - NO.
   - May be.

6. Do current Systems create a qualitative shift to keep pace with economic development, integration into the regional, global economy and increase the chances of success to keep up with rapidly growing technology transitions?
   - YES.
7. Does current System contribute to the Bank's change management process?
   - YES.
   - NO.
   - May be.

8. Is the formulation of a system's technical specifications document for each system always meets the conditions and requirements of users?
   - YES.
   - NO.
   - May be.

9. Are there enough controls to ensure the implementation of the standards and procedures of security?
   - YES.
   - NO.
   - May be.
Section (3)

Training and knowledge transfer

1. Is user training during implementation of system considered sufficient?
   - YES.
   - NO.
   - May be.

2. Is systems guidelines caused a real addition to your abilities?
   - YES.
   - NO.
   - May be.

"Thank you"
Manager questionnaire:

University of Khartoum

Faculty of Mathematical
Science

Introduction:

This study aims to realize a number of results concerns banking systems especially choose and change. Thus, can be obtained through assessment of applied system to cover business requirement. In order to achieve the study’s goal we would like you to tick an appropriate answer.

This Questioner is consisting of three sections as follow:-

5. How to conduct Replacement.
6. Resources of replacement process.
Section (I)

General Questions

What is the Sector/Bank name?

Write the current CORE Banking System used:

1. Another integrated system has the used CORE Banking System:
   - SRAG (RTGS).
   - Automated Clearing House.
   - Others.

2. Have you ever changed your system?
   - YES.
   - NO.

   (If YES go to section (III) otherwise answer the next question)

3. Do you plan to change the system by new one?
   - YES.
   - NO.

   (If YES go to section (II) otherwise go to next question)

4. Evaluation of the current CORE Banking System is:
   - Excellent.
   - Very Good.
   - Good.
Section (II)
How to Conduct Replacement

1. The problem occurs in the current used system are:
   - Attributed to the system did not achieve bank goals.
   - Because the bank extended and became with large number of branches.
   - Scale down in functional capabilities and architecture.
   - Attributed to incorrect results.
   - Others.

2. Did you begin to select new system?
   - YES.
   - NO.
   (If yes go to next question otherwise Thank you)

3. Which Vendor you choose?
Section (III)

Reasons of Replacement Process

1. What is the type of the previous system?
   - PENTABANK.
   - TEMONOUS.
   - OTHERS.

2. The replacement took place as a result of:
   - Increase competitiveness and region lost market.
   - Have better understanding of customers.
   - Bring new products to market.
   - Enable product factory.
   - Other failure causes.

3. The Failure causes represent in the following:
   - Flexibility.
   - Cost.
   - Integration.
   - Simplification.
   - Technology.
   - Pressing time.
   - Scalability.
   - Reliability
   - Availability.
   - Weak validation.
   - Errors in Operations.
   - Others.

4. The key considerations for system replacement?
   - Cost.
   - Short product time to market.
   - Ease of integration.
   - Functionality.
   - Scalability.
   - Reliability stability.
5. Used Platform is:
   - UNIX.
   - MAINFRAME.

6. Did you develop business objectives and establish the vision and justification for the future?
   - YES.
   - NO.

7. Which of the following represent key considerations you follow to select your system?
   - Business Goal.
   - Market Share.
   - Scale and complexity operation.
   - Product Feature.
   - Financial Impact.
   - Business culture process.
   - Human resources.
   - Existing System Technical Capacity.
   - Others.

8. The main factor to select your vendor is as follow:
   - Track record.
   - Product functionality.
   - Functional Impact.
   - Reliability.
   - Commitment Viability.
   - Ongoing Support.

9. What are the challenges you face during implementation?
   - Integrating with an ageing existing system with limited information on the system code.
   - Data migration.
   - User training and coping with resistance to change in processes and work culture.
   - Localization and customization of solution to suit unique requirement.
   - Matching expectations and deliverables.
11. How long will the replacement of project take?
   - 12-16 months
   - 18-24 months

12. What is your strategy approach to core banking deployment?
   - Big bang approach.
   - Phased approach.

13. Do you need to change the Organization architecture of the bank to suit the new system?
   - YES.
   - NO.

14. What is your evaluation concerns the current system in terms of business requirement management?
   - Excellent.
   - Very Good.
   - Good.

15. What is your evaluation concerns the current system in terms of integrated tooling?
   - Excellent.
   - Very Good.
   - Good.

16. What is your evaluation concerns the current system in terms of Design Process?
   - Excellent.
   - Very Good.
17. What is your evaluation concerns the current systems in terms of Build versus buy?
   ○ Excellent.
   ○ Very Good.
   ○ Good.

18. What is your evaluation concerns the current system in terms of Legacy deposit?
   ○ Excellent.
   ○ Very Good.
   ○ Good.

19. What is your evaluation concerns the current system in terms of testing and data migration?
   ○ Excellent.
   ○ Very Good.
   ○ Good.

20. What is your evaluation concerns the current system in terms of Managing Changes?
   ○ Excellent.
   ○ Very Good.
   ○ Good.

THANK YOU
References

1. "ProjectManager.com All right reserved", "10 Steps for effective Core Banking System Selection", 2011.
4. "Core Banking System Selection Services Scope Sheet".
5. How to be great project manager.