

ABSTRACT

Agribank POS Support system is a system that is used to manage and support the use of all Agribank POS machines that is from when the branch requests POS machines for their clients to the issuance of the POS machines. This system targeted the various departments in the bank (Branch, E-banking, E-channels and Audit) and production of reports for all the levels of management. The purpose of this project was to come up with an efficient and effective Agribank POS system that would meet the user's needs timelessly. This project was done in five main phases, which are Introduction, Planning, Analysis, Design and Implementation Phases. The introduction phase is an introduction of the research study and a historical background of the organization. The planning phase details the scheduling of the study and a feasibility study which was conducted to evaluate viability of the system. From the feasibility study, the project proved to be feasible. During the analysis phase, the researcher analyzed the weaknesses and strengths of the current or existing system and evaluated whether to develop, improve or outsource the software. User requirements were gathered using questionnaires, interviews and observations. After analysis phase, the design phase followed. A database was designed using MSSQL Database management system, input forms, menus and output forms using diagrams to illustrate the major functionalities of the Agribank POS system. The last phase was implementation, where the implementation of the proposed system, testing and maintenance were carried out continuously identifying and rectifying any errors. Parallel conversion was recommended when the project was implemented.

DECLARATION

I, Chikwana Keith P. do hereby declare that I am the sole author of this project. I authorize the Midlands State University to lend this project to other institutions or individuals for the purpose of scholarly research.

Signature.....

Date

APPROVAL

This project entitled Agribank POS support system by Chikwana Keith P. meets the regulations governing the award of the BSc Honours Information Systems of the Midlands State University, and is approved for its contribution to knowledge and literary presentation.

Supervisor: Dr. T. Tsokota

Signature..... Date

ACKNOWLEDGEMENTS

Firstly, I would like to thank the almighty God for the source of strength that he has always given me throughout my research. The developer is grateful to the management of Agribank for awarding the opportunity to carry out this project, thank you for tireless support and giving me the information and chance to learn. Thank you to Dr. T. Tsokota who contributed immensely throughout the entire project development process. I would also like to extend my sincere gratitude to my friends Gurajena Prince, Mangena Nobukhosi, Marangwanda Tanaka, Chigodora Kundai and Nyandiya Farai for their support during the research study. My girlfriend Rumbidzai Muyendesesi helped me throughout the project giving me support, encouragement and motivation. Lastly, to my family who contributed immensely in my every step, I say, the best is yet to come, with special thanks to my uncle and big brother Obey Manyenga for always providing resources to use during my research, **I THANK YOU** so much!!

DEDICATION

I dedicate this piece of work to my parents, Mr and Mrs Chikwana who have supported me all my life and they have believed in my abilities. Their love and inspiration brings out the best in me.

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LISTS OF ACRONYMS AND ABBREVIATIONS

ANSI-SPARC- American National Standards Institute Standards Planning and Requirements Committee

CASE- Computer-Aided Software Engineering

DBMS- Database Management System

DFD- Dataflow Diagram

ER- Entity Relationship

GB- Gigabyte

IT-Information Technology

JAD-Joint Application Development

LAN- Local Area Network

NPV- Net Present Value

PBP- Payback period

POS- Point of Sale

RAD- Rapid Application Development

RAM- Random Access Memory

ROI-Return on Investment

SDLC- Software Development Lifecycle

SQL-Structured Query Language

WAN-Wide Area Network

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CHAPTER 1: INTRODUCTION

1.1 Introduction

Businesses now operate in a very economical atmosphere influenced by the ever evolving information technology Somerville I (2015). Somerville goes on to say that, to remain in business and survive under these conditions, there is need to be innovative, at the same time providing quality service to the stakeholders . However, Zimbabwe's economy has shifted from cash transactions to plastic money which involves the use of point of sale (POS) machines. POS machine or terminal is an electronic device used to process card payments at retail locations. A POS terminal generally reads the information off a customer's credit card or debit card. With the increased number of POS machines deployed in the field, the Agribank point of sale support system would go a long way in supporting and managing of the machines remotely.

1.2 Background of the Study

During the one year experience gained as an attaché at Agribank, according to the student, there are some problems faced by the use of a manual system to manage POS machines. An increase in the number of POS machines with clients belonging to Agribank has further brought more problems to the ailing manual system. Inefficiency has been the order of the day as all the 48 branches have to send any machine facing some challenges to one Information Technology (IT) department at the headquarters. Agribank POS support system will provide a platform for all common problems to be resolved at branch level. To log any IT related query the bank uses one helpdesk system and this delays the resolving rate of POS issues. By using the proposed system there will be eradication of this problem by offering a separate helpdesk specifically for POS machine issues. This helpdesk will be a ticketing system for requests specifically from the branches. Since the use of plastic money gained popularity, there have been many reports of fraud cases involving POS machines. The current manual system does not offer any secure and sufficient audit trail in the event of any fraud investigations involving POS transactions.

The next section will briefly give the background of the organization.

1.2.1 Background of the Organization

The Agricultural Bank of Zimbabwe, trading as Agribank, evolved from the Land and Agricultural Bank (LAB) of 1924 of the then Government of Southern Rhodesia and through the Agricultural Finance Corporation (AFC) which was established in 1971 by various Acts of Parliament

Agribank currently operates under a legal framework whereby the Government of Zimbabwe owns 100% of the Bank. The Ministries of Finance and Agriculture maintain 50% shareholding apiece in the institution. The Bank is a loan granting and deposit taking development financial institution, subject to the supervision of the Reserve Bank of Zimbabwe. The bank is registered and operates in terms of the Banking Act of Zimbabwe (Chapter 24:20).

In line with its mandate the Bank's main business is as follows:

- Agricultural Financing & Development
- Domestic Money and Capital Markets
- Treasury and International Banking services
- Retail Banking services
- Executive Banking
- Corporate Banking
- Microfinance
- Corporate Finance and Advisory services

The Bank delivers its products and services through ICT channels such as:

- Instant banking and instant issuance
- POS Machines
- Mobile Banking
- Internet Banking
- Agency Banking
- Utility Payments like ZESA, Airtime, ZINARA and many more

1.2.2 Organizational Structure

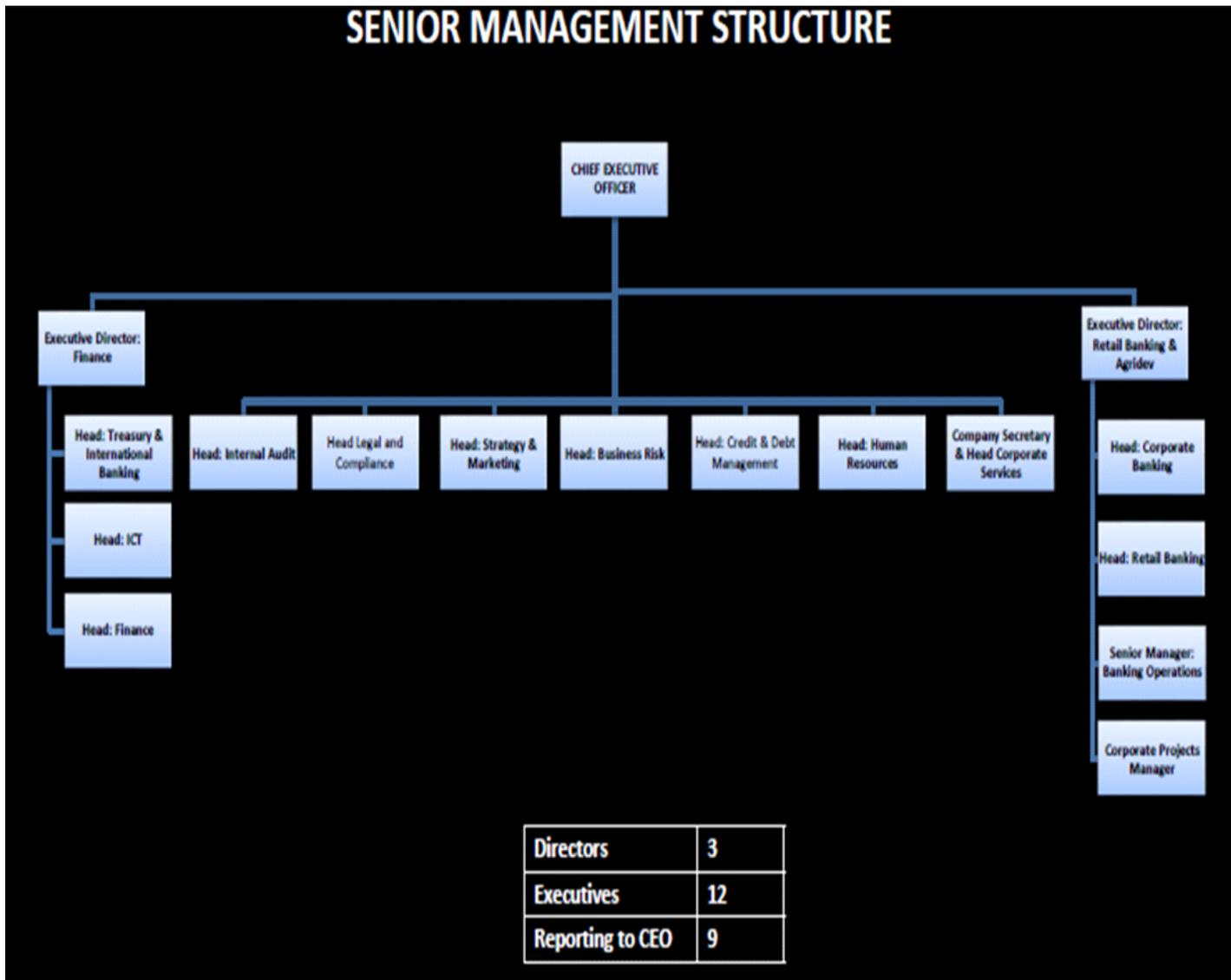


Fig 1.1

1.2.3 Vision

Our vision is to be a leading provider of financial services in Zimbabwe and beyond

1.2.4 Mission Statement

Our Mission is to provide competitive financial services for the prosperity of the Bank, customers and other stakeholders through a committed, motivated and well-resourced work force

1.3 Problem Definition

The current system of managing and supporting the use of POS machines is no longer reliable due to the popularity of plastic money. When POS machines were being deployed to bank clients it was regarded as a temporary measure to address the shortages of cash, so no proper system was deemed necessary. Agribank now has more than 5666 terminals being used in the field. These machines include merchant POS, Agency POS, Branch POS and MPOS machines. Currently, the manual system cannot keep up with other banks that bring stiff competition to Agribank. Zimswitch has provided monthly reports showing a huge drop in the volume of transactions being done on Agribank POS machines as compared to other banks. One major reason for the drop is inefficiency, the bank is failing to support and manage POS machines effectively. An online POS support system will go a long way to automate the whole process from acquiring a POS machine to support and resolve any issues that affect the POS machine. It goes on to include the monitoring of transactions on a POS machine and putting resources where they are most utilized that is, to offer more POS machines to clients that have more transaction volumes. Therefore, the problem is that without a POS support system in place, the bank is failing to manage, monitor, track and support the operation of POS machines so as to maximize revenue as well as making analytical decisions. So eventually the Agribank will lose its valuable corporate clients as they run to other competing banks where they offer better services.

1.4 Aim

To design and implement a POS support system to better manage and support the operation of Agribank POS machines.

1.5 Objectives

- To provide a ticketing system for requests from branches on POS machines with multilevel authorization.
- To create and update customer details for POS machines.
- To generate new terminal IDs in a sequence for the POS machines and update all postilion tables.
- To provide all POS machine reports that include majoring on transactions reports.
- To track the POS machine movements and providing an audit trail for fraud investigations.

1.6 Instruments

- Laravel framework is a web application framework with expressive, elegant syntax. Programming language PHP (front end), hypertext preprocessor, according to Wellington and Thompson (2009:9) PHP is a general purpose scripting language that is especially suited for web development and it can be embedded into HTML. It is also a server side web development tool.
- PHPStorm an editor for PHP, HTML and Java Script
- According to Welling and Thompson (2009) they are various benefits associated with PHP and they include database integration, it can be linked with various databases but in this case it will be linked with MySQL.
- MSSQL Database, this is a relational database management system developed by Microsoft and that's database main storage which stores information like terminals.
- Postilion Database which is the database used by the bank for transactions and so on and it uses the MSSQL which is an SQL Server from Microsoft
- Redis Database which is used to store sessions, storage and cache
- Elastic Database for transactions because of the volume of transactions is high, elastic is best to use as it very fast when pulling information from the database and it uses ADSL language.

1.7 Justification and Rationale

By using the Agribank POS support system, requests coming from all the 48 branches pertaining POS machines are easily resolved timelessly since this system provides a separate helpdesk. Currently, the bank uses one helpdesk for all IT related issues from all branches and the helpdesk receives at least one thousand queries per week. For instance, taking long to resolve the POS related queries means that the POS will be inactive thus, low revenue generation. Agribank receives its revenue only when the POS machine is transacting. When it comes to the process of creating or updating customer details, it takes a long time to complete as it involves accessing different servers to update different postilion tables. Thus, as a result, Agribank POS support system will provide a clear integration of all the postilion tables on one platform. It also goes on to provide a detailed audit trail to any changes on POS details especially in cases of fraud

involving the credited accounts. Detailed reports are readily available to be used by management for decision making.

1.8 Conclusion

POS machines are a core feature in the current economy of Zimbabwe and it is necessary for Agribank to maximize its market share by providing efficient service delivery pertaining a POS. After having drawn the draft of the POS machines analysis call system, and with the above considerations taken into cognizance, the first chapter of this documentation is complete. Although it will be initially costly to create and implement, it will have long term benefits in performance of AGRIBANK as a whole.

CHAPTER 2: PLANNING PHASE

2.1 Introduction

The chapter provides the platform to test the economical, technical and organizational feasibility of incorporating the proposed system. This is done for the purpose of determining the best way forward, given the project constraints. The main objective of the planning phase is to ascertain the value that the new system would add to the organization. More specifically, the following aspects are going to be canvassed that is business value, risk analysis, feasibility study and work plan.

2.2 Reasons for Developing the new System

The current system of managing and supporting the use of POS machines is no longer reliable due to the popularity of plastic money. When POS machines were being deployed to bank clients it was regarded as a temporary measure to address the shortages of cash, so no proper system was deemed necessary. Agribank now has more than 5666 terminals being used in the field. These machines include merchant POS, Agency POS, Branch POS and MPOS machines. Currently, the manual system cannot keep up with other banks that bring stiff competition to Agribank. Zimswitch has provided monthly reports showing a huge drop in the volume of transactions being done on Agribank POS machines as compared to other banks. One major reason for the drop is inefficiency, the bank is failing to support and manage POS machines effectively. An online POS support system will go a long way to automate the whole process from acquiring a POS machine to support and resolve any issues that affect the POS machine. It goes on to include the monitoring of transactions on a POS machine and putting resources where they are most utilized that is, to offer more POS machines to clients that have more transaction volumes. Therefore, the problem is that without a POS support system in place, the bank is failing to manage, monitor, track and support the operation of POS machines so as to maximize revenue as well as making analytical decisions. So eventually the Agribank will lose its valuable corporate clients as they run to other competing banks where they offer better services.

2.3 Business Value

The main drive for developing any system is for that system to add value to the organization (Cashman, 2012). It involves deriving how the proposed system is going to be of benefit to the business and different stakeholders of the business. Business value of the proposed system can

be branched into three main categories, these are, the value the system it will bring to the employees of the system, value to the management and lastly the system value to the business itself.

It reduces the workload of the employees of Agribank and refocuses them towards other things that bring value to the bank. Agribank POS system will also reduce delays when working on a client's problems related to the POS machines for instance, reallocation of POS machines, repair of POS machines and also accounting for all the POS machines.

To the management, the system aids in decision making especially when trying to make a decision on who deserves more machines thereby putting resources where they are most utilized. Agribank POS system provides a detailed audit trail in the event that there is any misconduct or fraud involving POS machines. Decisions are reached faster with a centralized system. Management can also be assisted by the reports generated by this system to make any decision pertaining the operation of POS machines.

This system is crucial to the bank itself in the sense that the economy has fully adapted the plastic money and efficiency is required in the use of POS machines as competition is stiff.

2.4 Feasibility Analysis

Feasibility Study is a standardized process and procedures of problem identification, objective identification, explaining situations and outcomes together with costs evaluation and problem solving technique which gives maximum costs elimination, (Thompson, 2003). This explains the viability and workability of the system to be developed if it can meet the requirements of the users within an organisation. Feasibility analysis has the major sub elements which it assesses, namely:

- Operational feasibility
- Economic feasibility
- Technical feasibility
- Social feasibility

2.4.1 Technical Feasibility

According to Dennis et al (2012), technical feasibility is an assessment level where a project would be implemented, installed and monitored by the IT experts. This feasibility also takes into account the availability of the resources to be used in developing the proposed system. Specifically, such resources could be either software or hardware.

Table 2.1 Hardware requirements

No	Description	Specifications	Required	Available
1	Main Server	4G RAM, 1TB HD Sata, core i5 Processor	1	1
2	Personal Computer	Intel® Core™ i7-8550U CPU @ 1.80GHz 1.99GHz 16G RAM, 1TB HDD	2	1
3	Database Server	4G RAM, processor core i5	1	1
4	Network Switch	CISCO Switch 24 port	2	2
5	HP LaserJet Printers	LaserJet	2	3
6	Ethernet Cables	100 m	1	1

Table 2.2 Software requirements

No	Description	Specification	Required	Available
1	Operating system	Windows 10	YES	On PC
2	PhpStorm	2018.1	YES	On PC
3	Antivirus	Eset Node	Eset	Eset
4	MS Office	Office 2013	2013	2013
5	Redis Database			
6	Elastic Database	ADSL language		

2.4.1.1 Technical Expertise

Valacich (2012) defined technical expertise feasibility as the direct or indirect abilities and capabilities of the available personnel to work with the developed system successfully without any challenges. Therefore, the developer has observed and is fully acquainted with the Agribank personnel's ability to use and operate the system. Agribank staff are all computer literate which an advantage is when it comes to operating the proposed system and the IT department has personnel who are good in the software and hardware part.

2.4.2 Economic Feasibility

According to Thompson (2009), economic feasibility is the measurement of the cost effectiveness of the system to be developed. This gives a better understanding of the system's worthiness of being built against its costs. For every organisation before developing or coming up with a new project there is need for the viability of the project economically. This is done through several techniques which include:

- Return on Investment
- Payback Period
- Net Present Value

2.4.2.1 Development Costs

Development costs are referred to as those costs that any institution or organisation pay for during the development and implementation of its new system (Cashman, 2012). Therefore, the system to be developed would incur some development costs which include the purchase of hardware/software and the implementation of the system as shown below.

Table 2.3 Development costs

ITEM NUMBER	ITEM	ITEM DESCRIPTION	COSTS \$ZWL
2	PERSONAL COMPUTER	16Gig RAM, 1.99Ghz processor, 1TB	20000
1	500 Gig HD	Sata	500
2	Development workforce		4000
1000	RJ45 cables	Network cables	2000
1	Printer	LaserJet	6500
TOTAL COSTS			33000

2.4.2.2 Operational Costs

These are expenses which are related to the operation of a business or the operation of a device, component, and piece of equipment or facility. They are the cost of resources used by an organization just to maintain its existence. The table below shows some of them that would be met.

Table 2.4 Project Schedule

Cost (year)	Year 1	Year 2	Year 3
PC Usage		13000	15000
Software subscription		5000	4500
Cost of stationery	10000	15000	20000
Maintenance		9000	12000
System analyst programmer	24000	36000	60000
Total	<u>34000</u>	<u>78000</u>	<u>111500</u>

2.5 Benefits

As the system will be in use within an organisation, there are several benefits classified as tangible and intangible which would be foreseen by an organisation.

2.5.1 Tangible Benefits

According to Barnes & Xu (2001) tangible benefits refers to the benefits that are effortlessly quantifiable as far as dollars and cents are concerned.

Table 2.5 Tangible benefits

	Item Description	Year 1	Year 2	Year 3	Total
1	Reduction in transport costs	95500	98500	99500	293500
2	Reduction in printing and postage costs	50500	60500	63500	174500

3	Reduction in telephone bills	90500	95500	97000	283000
	Total	<u>236500</u>	<u>254500</u>	<u>260000</u>	<u>751000</u>

2.5.2 Intangible Benefits

Dittman (2004) says intangible profits are the ones understood to be challenging or impossible to put a figure for instance goodwill. Goodwill will bring about the client reliability and accordingly, there will be increment in benefits by having a larger market share.

2.6 Cost Benefit Analysis

According to Zikmund (2010) cost benefit analysis refers to the determination and comparing the costs the organisation incur during the development and implementation of the project and the benefits realised when the project will be in full use. This may also mean the ability of the system to cover its costs within a stipulated time and cost benefit analysis uses various techniques or methods which include the following the developer highlighted.

Table 2.6 Cost benefit analysis

Item Description	Year 1	Year 2	Year 3
Total Benefits	236500	254500	260000
Total Costs	67000	78000	111000
Net Benefits	<u>169500</u>	<u>176500</u>	<u>148000</u>

2.6.1 Return On Investment

Return on investment is a ratio between net profit and cost of investment. A high ROI means the investment's gains compare favourably to its cost.

$$\text{Return on investment} = \frac{\text{Average Net Benefits}}{\text{Development Costs}}$$

164667

33000

=49.8%

Therefore having a positive value of 49.8% it implies that the project is economically feasible.

2.7 Social Feasibility

Social feasibility assesses the extent to which the new system will relate with the users and other stakeholders. A project is only deemed socially feasible when it does not threaten the conduct of the stakeholders in any way. Any computer system has to put into consideration the values and norms of the stakeholders or society at large. Furthermore any system that violates the societal values is not socially feasible. In conclusion, the system that supports or protects the community's values and norms is socially feasible.

2.8 Operational Feasibility

System users have various user operability and their effectiveness in operating the new system is referred to as operational feasibility. It is also defined by Cotterrel and Hughes (1999) as a thorough study and scrutiny after system has been implemented to check whether or not the new system is usable by the intended users without any difficulty. At Agribank the following would aid to the alignment of the operational feasibility with the goals and objectives.

- The organisation's personnel are all computer literate since it's their first entry requirement and the staff to operate the new system are highly skilled which reduces faults when using the system.
- Due to the highly skilled IT personnel, there would be reduced/no costs to incur in training the users since they are already experts.
- It is the company's policy to use windows 10 OS and because of its user-friendly interface, there would be no challenges in using the system.

2.9 Risk Analysis

Somerville (2011) defined risk analysis as anything, factors, facts or opinions that has an adverse effect during the ongoing project and its maintenance. It is of paramount importance to note, identify risks of the project and rectify such risks in the most possible manner.

The following are technical risks identified within the organisation.

2.9.1 Technical Risks

In any organisation when a new system is developed to be implemented, the personnel or the intended users should be trained so as to operate as expected otherwise there would be technical problems. Somerville (2011) stipulated that technical risks are risks which emanate from ignorance of expertise on how to operate the system in play. Since the developed system for Agribank would be user friendly it would aid if the users quickly get familiarisation with the system thus reducing technical risks. Lack of knowledge on how to use the system can cause grave danger as it can increase maintenance costs.

2.10 Stakeholder Analysis

The development of the Agribank was regarded as the best investment done by the financial institution. Stakeholders refers to those people who are positively or negatively affected by the business operations. The analyst interviewed all the stakeholders of the organization which are as follows:

- **CEO and the board of directors:** The management supports and promised to fully fund the project as well as organizing the subordinates who will motivate others to support the system.
- **IT Management:** The IT management regarded the Agribank POS support system to be the best innovative product to be in the organization and they are self-confident that they will be able to implement and maintain the system well.
- **Finance Management:** The major objective of the finance department is to understand what the organization earns from the project that is they are more concerned with what is required to complete the system. This includes the financial resources required and at the same time the benefits which the organization will realize after the implementation of the system. After analyzing the cost benefit analysis, the finance management realized that the project benefits the organization.

- **Administrators (E-Channels Section):** These were the initiators of the project since they were tired of the traditional way of the banking processes which led them to clerical paper work as well as many errors during capturing clients' data. The administrators fully supported the system since they were looking forward for a new innovative system which will thereby reduce their workload.
- **Branch Users:** These people are the reason why this system was proposed. They fully supported the project since it will reduce their transport and communication costs by just visiting the organization headquarters. Once the system is implemented and the bankers accepted it the clients will easily get used to it.

2.11 Project Workplan

Hogan (2002) defined it as the notion of creating documentation which aims to provide and list the activities to be carried out from the alpha and omega of the project in terms of time but using charts. The time can be in days, weeks months or years.

2.11.1 Project Schedule

Timothy (1998) defined project scheduling as the planned dated for performing project activities and meeting project milestones.

Table 2.7 Project Schedule

Activity	Start Date	End Date	Duration (Weeks)
Proposal	10 May 2019	24 May 2019	2
Introduction	29 August 2019	12 September 2019	2
Planning	13 September 2019	27 September 2019	2
Analysis	28 September 2019	11 September 2019	2
Design	12 October 2019	25 October 2019	2
Implementation	26 October 2019	01 November 2019	2

Maintenance	ONGOING
Documentation	ONGOING

2.11.2 Gantt Chart

A Gantt chart illustrates the project's time interval of each activities to be done. Gantt chart is viewed as a time-scaled graphical representation of various tasks of any project, (Popescu 1995).

Table 2.8 the Gantt chart

Activity Period(weeks)	2	4	6	8	10	12	14	16	18
Proposal	■								
Planning		■	■						
Analysis				■					
Design					■	■			
Implementation							■	■	
Maintenance									■
Documentation	■	■	■	■	■	■	■	■	■

2.12 Conclusion

The chapter highlighted the reasons for building the proposed system. It has been viewed that the system to be developed is feasible and that the benefits outweighed the costs with the minimum risks identified which would be rectified through economical and technical expertise. The project

was well planned with each activity time-framed through the project schedule and Gantt chart. This concludes the planning phase and the next chapter is the analysis stage which gives the in-depth of the existence of the current system.

CHAPTER THREE: ANALYSIS PHASE

3.1 Introduction

According to Baine (2014) system analysis is a phase that outlines who is currently using the system, what data, how and where the data is being handled in the current system through the use of different gathering methodologies. Activities such as process modelling are taken into consideration that is the prevailing way of modelling the current processes. Systems analysis phase's major objective is to stress out the system specification and needs that need to be developed so as to meet end users' requirements. System analysis was used by the analyst to interpret facts from the gathered information, and at the same time using that same information to design the system effectively guided by the recommendations from the gathered information.

Banking systems are usually complex since it comprises of many modules that is to make system changes to it requires one to notice the effects of the implementation to the prevailing subsystems since it may lead to many problems rising thereby affecting the business operations. The following factors will be identified when undertaking systems analysis:

- Migration of data from the old system
- Cost of implementing the system
- Processes and roles to be undertaken by individuals
- Data processing and output needed

3.2 Information Gathering and Methodologies

According to Walters et al. (2015) information gathering is an art and a science and the approach and manner in which information is gathered require persons with sensitivity, common sense, and knowledge of what and when to gather and what channels to use in securing information. Interviews, questionnaires and observations were undertaken by the analysts and these information gathering techniques were conducted to the people who are directly affected by the system within the organization that is the users of the system.

3.2.1 Interviews

According to Kendall et al. (2014) an interview is a face to face interpersonal situation in which a person called the interviewer asks a person being interviewed, questions designed to gather information about a problem. This is a traditional information gathering technique which is used to gather opinions, informal procedures, facts and goals. An interview between the analyst and the users of the system was conducted.

Before conducting the interview, the analyst came up with a list of the targeted people to be interviewed so as the order in which the people are going to be interviewed. The analyst planned and noted a number of questions which he was supposed to ask the users of the system. A number of individuals were interviewed independently that is the top and senior management that include head of banking operations, branch managers, head of IT and all the users of the proposed system. The analyst used semi-structured way of interviewing such that the respondents will be able to express their point of view. During the interview the respondents had guided topics of the subject under consideration which will determine the Agribank POS support system acceptance, but however there were some issues such as security features and control regulation of the system which were raised during the interview. The interviewee was free to discuss any issues concerning the proposed system. The interview took 20 minutes to 50 minutes and it was conducted using English Language.

Advantages of interviews

- **Development of relationship:** an interview develops a good relationship between the interviewer and the interviewee thereby improving both parties' co-operation and mutual understanding. In this case of POS support research in which accurate and reliable information was gathered at the same time correct responses given increasing our system success rate. It was achieved after the researcher and the interviewees build a mutual relationship and trust.
- **Collection of required primary information:** through conducting an interview new, primary and fresh information was collected which was greatly needed for the

POS support system so as to come up with a system which is required by the bank's clients.

- **Captures behaviour, emotions and thoughts of the users:** due to face to face interviews the interviewer will be able to capture the interviewee's behaviour and emotions towards the proposed system that is the individuals affected by the implementation of that system. Those who are negatively affected by the proposed system will have a negative attitude towards the implementation of the system in this case the researcher communicated the benefits of the proposed system with the interviewees before contacting the interview.
- **Gathers vital facts about the prevailing problem:** through conducting an interview the analyst will be able to gather information about what is expected by the users, the problems which the users are facing by using the current system and how they want these problem to be presented on the proposed system. The researcher gathered the problems that were affecting the clients and the management before conducting the interview so he or she had a guide of the questions to be asked.

Disadvantages of interviews

- **Time consuming:** in this situation there was misunderstanding and interpretation of response need to be done, interviews can be time consuming that is it may delay the implementation of the proposed system but however the researcher minimized the delays by setting a minimum time with each interviewee.
- **Interviewee biases:** bias responses are given by the interviewees if an adverse response is expected the interviewee will give a positive response in case they might be in fear of losing their jobs due to the implementation of the proposed system. However the researcher explained how the system will work in the prevailing work environment without affecting their jobs.

3.2.2 Questionnaires

According to Kendall et al. (2014) questionnaire refers to a tool that has a number of questions which individuals respond with the main objective to gather information of factors affecting the users. These questionnaires are sent to a number of individuals that is this document will be containing series of standard questions pertaining the system and are designed for statistical analysis.

To have a general picture of aspects affecting customers and employees' decisions whether to make use of the POS support system the analyst used the questionnaires. It is believed that the analyst should design a large number of unbiased questionnaires which will cover a large sample size thereby increasing the chance of gathering accurate information. The analysis targeted the group between 17 to 50 years which are able to use the advanced system to be implemented by the bank. The researcher designed and used the following questionnaires:

- **Branch Workers:** These questionnaires were designed for the transaction controller, personal bankers, e-banking and IT employees who are responsible for the operation of the new system and they should express the changes they expect to be in the proposed system which will give the analyst a clear understanding to the user requirements.
- **Management:** This questionnaire was designed for the managers (cooperate, retail, e-banking and ICT managers) and the top management as a whole to understand is expected from the management about Agribank POS system in relation to the departments they are heading.

The analyst designed questionnaires which are brief, easy to understand and answer as well as user friendly. The questions asked were clear and arranged in a chronological order with clear instructions on the beginning of the questionnaires. Simple English and words were used in the questionnaires to avoid misunderstanding by the respondents.

Advantages of questionnaires:

- It is useful and easy to gather information on a large population sample that was used to capture different users' views towards the system.
- It is a cheap method as compared to the interview method taking into consideration the available funds to be employed on the system.
- It is comfortable on the part of the respondents since they are guaranteed that their responses were going to be kept private and confidential
- Questionnaires gathers accurate information as compared to interviews since the respondents will be having plenty of time to answer the question asked.

Disadvantages of questionnaires:

- There can be different interpretation of the question therefore the respondent will answer on their own interpretation of the question thus wrongly answering the question.

3.2.3 Observations

According to Thayer (2013) observation refers to the systematic description of events, behaviours, and artefacts in the social setting chosen for study. This method enabled the researcher to study the people's actions through participating and observing in the activities under study this will allow the researcher to learn and be aware of the things that the participants failed or unwilling to discuss or answer in interviews and questionnaires.

During observation the researcher gained a clear understanding of the traditional banking operations that were carried out by the users. The researcher mastered all the steps involved in the acquisition of POS machine to the point where it is dispatched to the branches for clients. By engaging on a direct observation to the traditional banking processes, activities and operations the researcher developed a holistic point of view on how the Agribank should be operating.

Advantages of observations

- Observations gave the researcher a chance to gather information of what the informants were unwilling to share or discuss with the researcher thereby increasing the accuracy of the information gathered.

- It also provided access to the researcher check the time taken by different people to undertake a process for example to allocate a client a POS machine, or reallocation of one or even trying to write queries which provides POS transaction reports

Disadvantages of observations

- Opinions cannot be studied or gathered using observations
- It is difficult to know or understand why people behave in a certain way as they do
- It causes a Hawthorne Effect that is people work more efficiently during the day when they know they are being observed as compared to other normal working days.

3.2.4 Document Review Analysis

The analyst collected Agribank magazines, annual reports, journals and policies to better understand the research findings in this analysis. In order to get relevant information from the collected documents which involves service brochures and banks' publications the researcher made personal visits and sometimes made telephone calls to the branch. Financial services and banking industry books were gathered to have an overview of the impact of technology and the financial industry. The analyst used information from the reports for argument supporting to come up with the system. FAQ (Frequently Asked Questions) web page of the bank was accessed to see various questions which were asked by the clients and at the same time to see services which are expected by the clients.

Advantages of document review analysis

- Easy to analyse and quantify the information obtained.
- Information gathered is a little bit biased.
- Does not interrupt organization and clients' business operations.

Disadvantages of document review analysis

- It is time consuming to go through all these documents.
- The data is restricted to what is already existing.
- It is difficult to get the right and required information.

3.3 Analysis of the Current System

Agribank currently is using a manual system to manage, monitor and support the operation of POS machines. At the present moment Agribank uses one help desk for all its requests from all staff members and branches. This helpdesk receives more than one thousand requests per day and it works at first come first serve basis in resolving the queries. With the mostly used plastic money this system cannot offer the best services to the corporate clients using POS machines. To create and update customer details the current system involves too much paper work from one department to another. This takes a lot of time to complete the whole process and for the customer to start using the POS machine. Currently to change or update details, one has to work with postilion database and the risk of doing that is that, it can never be traced if someone changes the account details without authorization. It also affects non-technical staff to work with the customer details as it requires one to write a query for it. The current system find it very difficult to track where the POS is at in the event that the POS has been reallocated several times. For the sake of decision making, the current system does not provide any reports that include transaction reports, active and inactive terminals, POS machine uptime and also requests from the branches.

3.4 Process Analysis

According to Davis et al. (2014) process analysis is a step-by-step breakdown of the phases of a process, used to convey the inputs, outputs, and operations that take place during each phase. To understand how the process are done and operates the analyst used the process analysis that is this analysis' major concern is to improve the processes by efficiency improvement and waste removal. To present the traditional banking practiced by Agribank the analyst used the activity diagram that is it represented inputs, processes and output of the prevailing system.

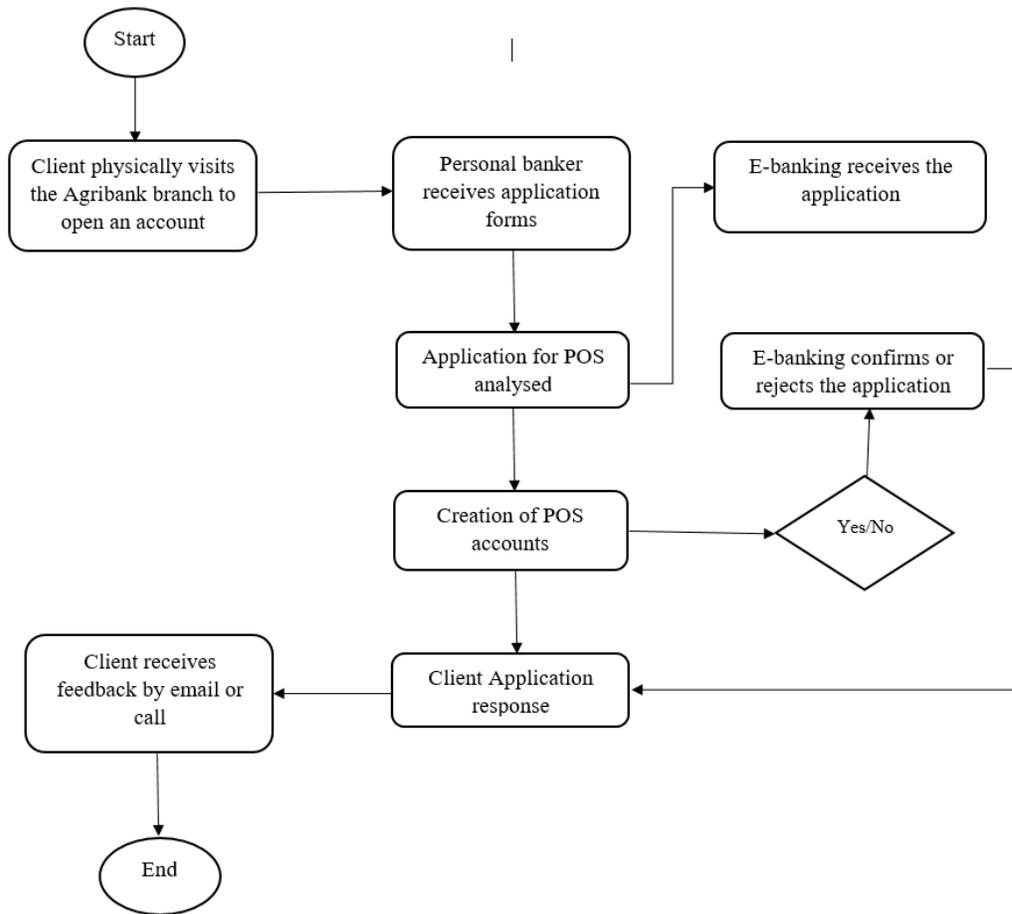


Fig 3.1: Process Analysis

3.5 Data Analysis

It models, cleans and transforms the data of any system as its goal so presentably that it is visually analysed for the purpose of decision making. The major two diagrams used here are the context diagram the data flow diagram.

3.5.1 Context Diagram

According to Clements (2004), context diagram is a visual representation showing the system inputs, outputs and processes with the external entities interacting with it.

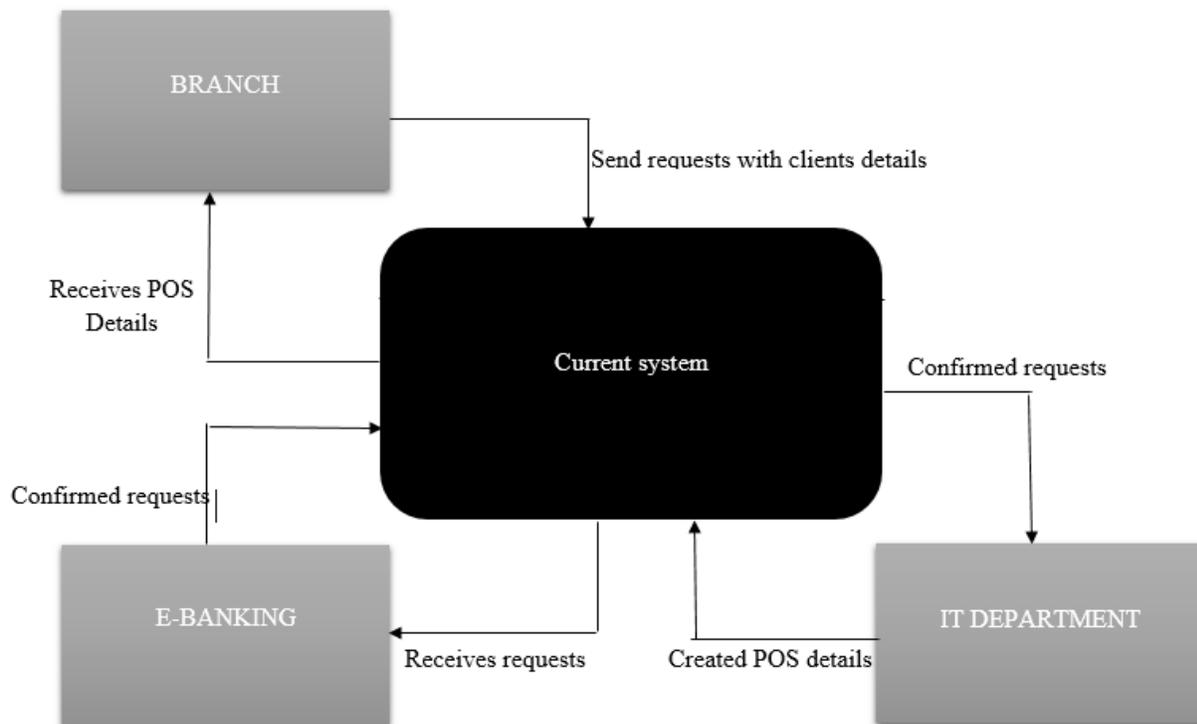


Fig 3.2 current system context diagram

3.5.2 Current System Data Flow Diagram

Kumar (2010) defined a data flow diagram as a detailed graphical representation of data being modelled clearly for a business organisation's functions. It connects various entities with their respective processes of a system.

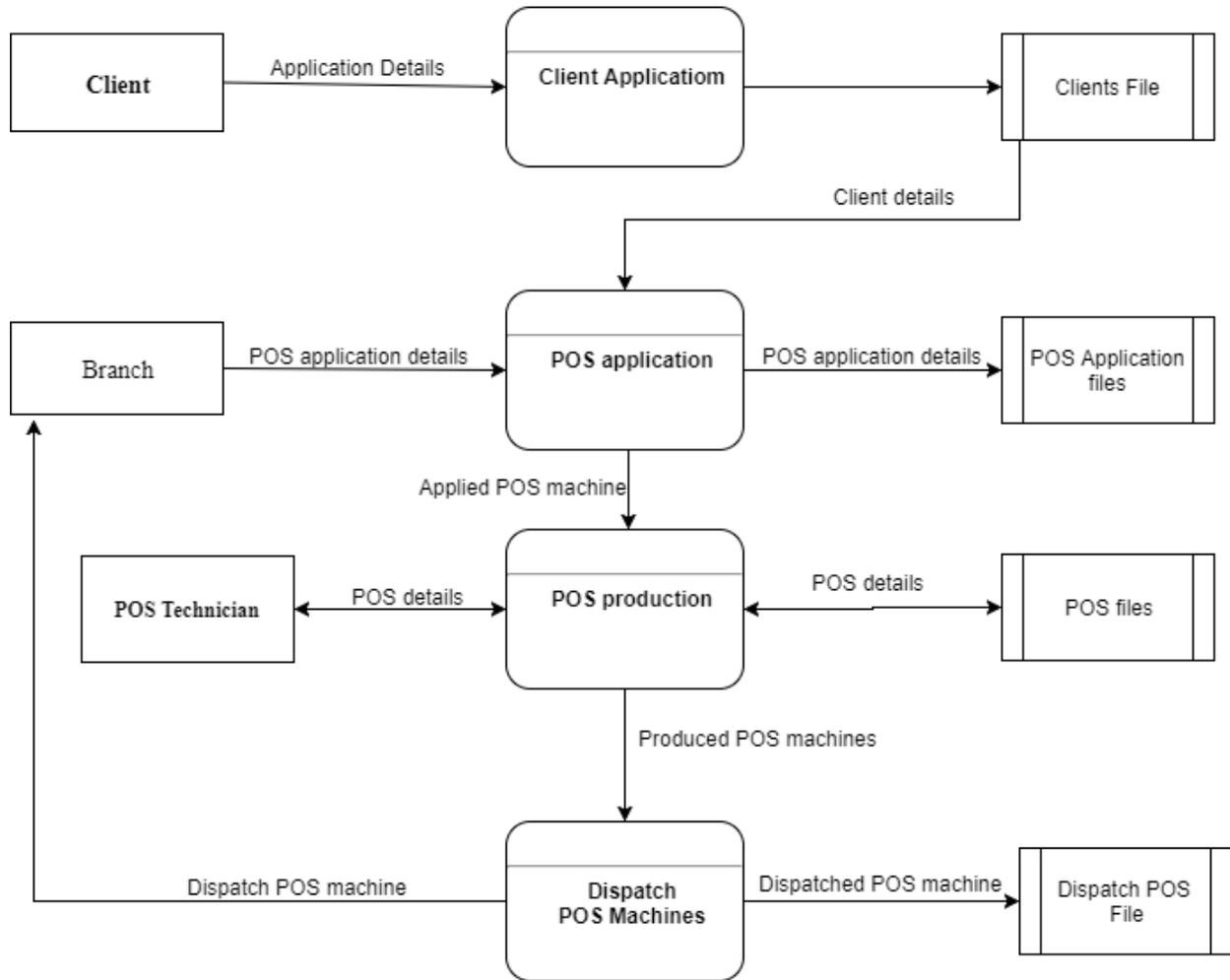


Fig 3.3 Current system data-flow

3.6 Weakness of the Current System

The prevailing system comprised of weaknesses and are as follows:

- **Inaccuracy of data:** during capturing of data and filling of forms inaccuracy may occur that is information entered on forms cannot be validated. Also there might be the case that the wrong or invalid information was discovered later the client should physically visit the banking hall to rectify the errors.

- **Lack of prioritizing POS requests:** Currently the bank uses one helpdesk to cater for all the queries that are requested by the branches and this does not take into account the importance of a working POS machine.
- **Time consuming:** For one to just make a reallocation from client to another it involves a long process that is moving from one server to another so as to update the different Postilion tables like card acceptor, Hypercom and so on. This process takes a lot of time to complete and requires booting each other from the server since it only allows a limited number of people to access it at time.
- **Increase in costs:** No detailed reports are provided by this system and it makes it difficult for the management to make decisions since they also require reports like active and inactive terminals, transaction volumes and so on.
- **Huge security risk:** The current manual system does not offer proper security for sensitive information, for instance the information concerning POS machines to be repaired, or to be dispatched it just recorded in a book which anyone can manipulate.

3.7 Evaluation of Alternative Solutions

The current system for Agribank was analysed and presented diagrammatically its inputs, processes, and outputs, entities involved through the context and data flow diagrams, highlighting the current system's weaknesses. Therefore in a bid to reduce costs of developing the proposed system there was evaluation of the alternative solutions. This mainly would be of a need for the proposed system to be economically feasible under development costs.

3.7.1 Improving the Current System

From the problem definition in chapter one of this thesis, the bottlenecks of the current system can be rectified by improving the current system. Therefore an advisory system would be ideal and some features of the current system would be added. Lewis (2006) emphasized that improving the current system involves increasing its efficiency and trying to rebuild it through adding or changing some modules.

Advantages of improving the current system

- There is reduced costs of development and even the time of developing.

- There is no difficulty in implementing since the developers would be within the organisation.
- There is higher security since the improvement would be done within the organisation.

Disadvantages of improving the current system

- There is high possibility of some problems from the current system being inherited to the improved system unnoticed.
- Can be a short term rectification whereby some problems of the current system would be showing up
- The system might not be relevant enough to cope up with the ever revolving business environment.

3.7.2 Outsourcing

According to Griffiths (2001), outsourcing is defined as an organized way of using resources acquired externally in order to carry out some fundamental business tasks once done by business employees using company's resources.

Advantages of outsourcing

- Its development does not interfere with business activities hence the organisation concentrates on its operations.
- In most cases the software would be of high quality and of high class.
- Most outsourcing products or services normally come in with some new features which enables internal staff to gain new skills.
- Employees are usually interested in using a new system.

Disadvantages of outsourcing

- It can be costly in terms of purchase price, training of staff and maintenance.
- There is high risk of information security being breached.
- Might need employment of highly skilled personnel to operate.

3.7.3 Developing an In-house system

According to Lewis (2006), in-house development refers to the development of a new system that meets specific organizational objectives and goals of the systems requirements. Developing

a software within an organization has some merits and demerits which when weighed against one another, one is able to make a sound decision.

Advantages of in-house development

- Tailor making of the system would result in user satisfaction
- There is total control of the system and high security, privacy and confidentiality
- Maintenance costs are relatively low since the developers are internal

Disadvantages of in-house development

- More time is consumed in developing as compared to outsourcing
- Risk analysis is to be thoroughly studied since all the risk are directed to the organization and all its costs
- Can be more expensive if most of the resources require to be purchased

3.7.4 Preferred Alternative

From the above evaluation, taking into consideration all merits and demerits of each alternative, in-house is preferred most. Considering costs and other qualitative factors like less or no resistance of users to the new system. It motivates the internal IT personnel and increase their morale since they would have developed it.

3.8 Requirements Analysis

According to Thayer (2013) requirements analysis refers to the process of determining user expectations for a modified or new product. The requirements under consideration must be detailed, relevant and quantified. This analysis greatly involves the users of the system such that expectations and conflict resolution required by the users are meet before implementing the system to avoid delays. The major aim should be to implement a system that conforms to the client's needs and wants

3.8.1 Functional Requirements

According to Thayer (2013) functional requirements refers to things such as data manipulation, data processing, system calculations, user interaction with the system, user interface and other system functionalities that show the level of requirement satisfaction of the system. The following functions will be provided by Agribank POS support system:

- System security that is to restrict unauthorized users to access the system which is beyond their levels
- Generation of new terminal ids
- Updating of POS details
- Hiring of POS terminals
- Generation of reports
- Privacy of data
- Validation and verification
- Replacement of POS machines
- Reallocation of POS terminals

Use Case Diagram

The set of scenarios that describes interaction between the system and the user is referred to as the use case. According to Garmus et al. (2015) defined use case diagram as a diagram that is used to identify the primary elements and processes that forms the system. Processes are referred to as “use cases” while primary elements are referred to as “actors” that is use case diagrams shows the relationship between the use cases and the actors.

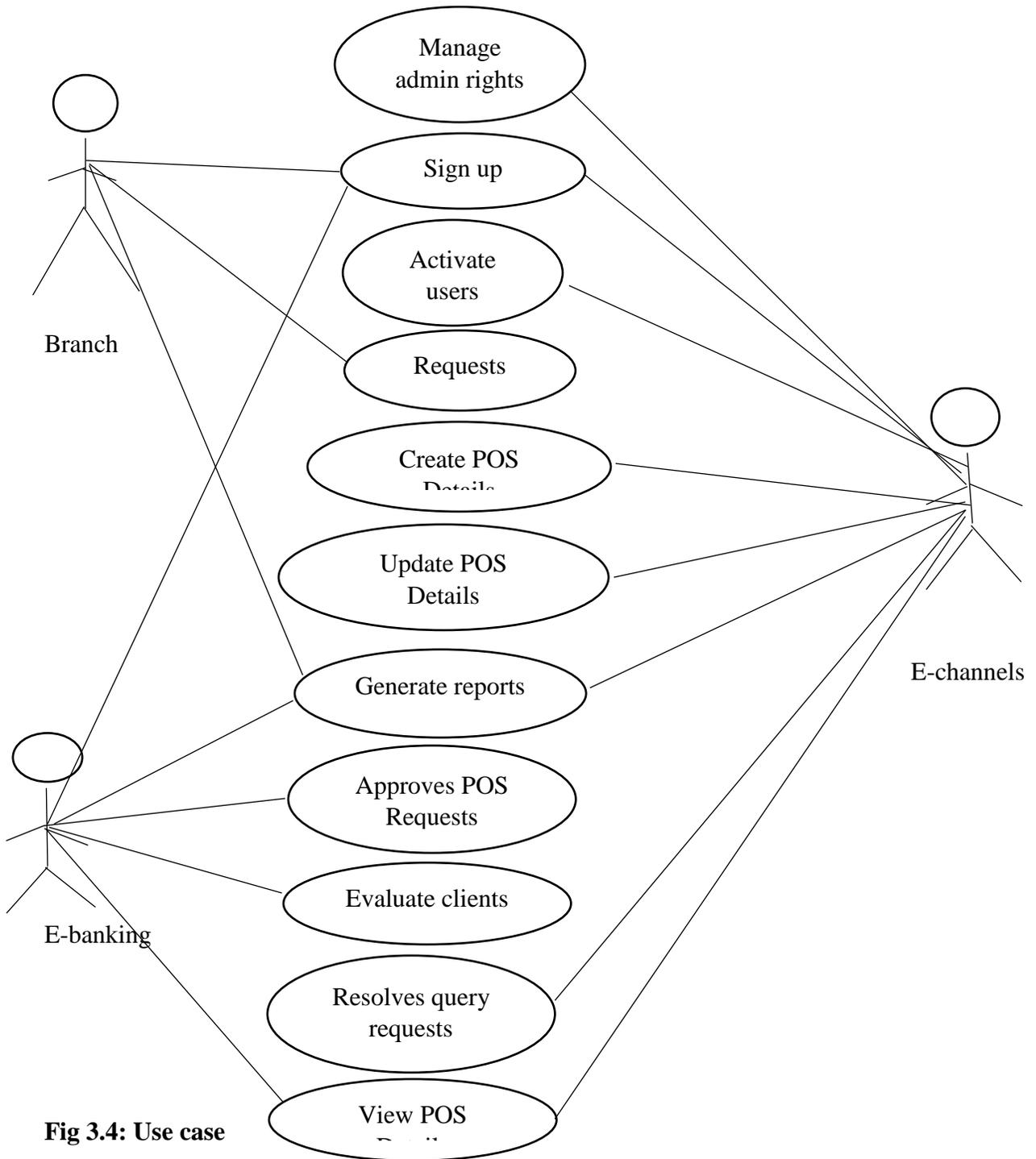


Fig 3.4: Use case

Key

-  Use Case
-  Communicator between actor and use case
-  Actor

3.8.2 Non-Functional Requirements

Thayer (2013) defined non- functional requirements as requirements indirectly concerned with functions that are delivered by the system. These requirements include the system properties that makes an efficient use of the system such as performance, security, response time and reliability however failure for the system to meet these non-functional requirements it means the system will be difficult to use or even unusable. Below are non-functional requirements that are needed on ZB Bank Digital Channels identified as security and performance requirements:

Security Requirements

- **Protection of account username and password:** user authentication is the first level to access the Agribank POS support system that is the user should enter correct username and password to have access with the system and at the same time the user should protect these credentials. Special types of characters should be used on the password to ensure high level of security.
- **Encryption:** server authentication is ensured by the system to protect the user passwords that is the password will be translated into an unreadable format.
- **Logout Tab:** the user should logout when he or she is done with using the system to avoid someone from accessing their accounts that is the session of the system will be end once the client logout.

Performance Requirements

- **Employee satisfaction increases:** the employees can now do all the processes with ease and timelessness, and this will help refocus the employees to other tasks to be done.

Overall cost reduction: the system will reduce the bank's overall costs that is it will reduce costs and improve accuracy in dealing with different scenarios like fraud investigations through the use of audit trails provided by the system

3. 9 Conclusion

In this chapter the analyst was provided with an understanding of what is supposed to be done in this analysis phase. It is a clear understanding of the current system works and how it is fostered also at the same time it stresses out the issues and problems which must be addressed and overcome by the proposed system for it to be regarded as successful. The next stage is concerned on how the above problems can be tackled by the proposed system thus we proceed to the proposed system design phase in the following chapter 4.

CHAPTER 4: DESIGN PHASE

4.1 Introduction

Ulrich et al. (2014) defined design as an application process of various principles and techniques for the purpose of defining a system in sufficient details to allow its physical realization. In the development phase of a system design is regarded as the first step to come up with a system. As in the case of any systematic approach, this software too has undergone the best possible design phase fine tuning all efficiency, performance and accuracy levels.

4.2 System Design

According to Schach et al. (2015) system design refers to the process of defining the system architecture, modules, components, data and interfaces for specified requirements to be meet. This phase is much concerned on the conversion of the user oriented functional design into technical and computer oriented system design specifications in detail. This is the phase in which the system designer come up with a physical architecture of the system that is this where he or she translate the specifications produced during the requirements analysis of the system.

4.2.1 Overview of the Proposed System

Basically the following users will be making use of the proposed system management and staff of the bank at the same time the proposed system should perform the following functions:

- System security that is to restrict unauthorized users to access the system which is beyond their levels
- Generation of new terminal ids
- Updating of POS details
- Hiring of POS terminals
- Generation of reports

- Privacy of data
- Validation and verification
- Replacement of POS machines
- Reallocation of POS terminals

The use of a postilion database is facilitated thus allowing real time transactions and data capturing so as to allow the users to access the POS information and details from any branch or department. The system will be validated such that there will be verification of data before saved to the database that is POS details are verified first.

4.2.2 Context Diagram for the Proposed System

According to Pierce (2015) a context diagram is a data flow diagram that shows data flows between a generalized application within the domain and the other entities and abstractions with which it communicates. It focuses on the external entities relationships and the information exchanged between the entities and the system under consideration. The major goal of a context diagram is to identify the relationship between the users and the system so as the information which will be passed between the two parts.

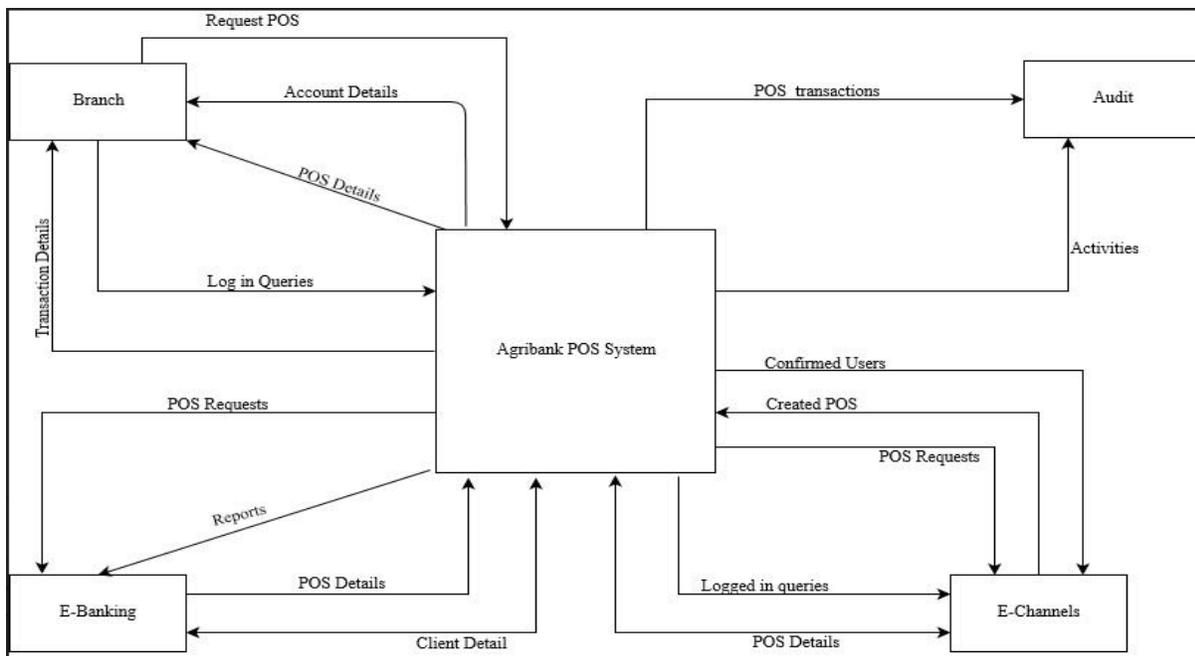


Fig 4.1 Context diagram of proposed system

4.2.3 Data Flow Diagram for the Proposed System

Pierce (2015) defined a data flow diagram as drawing that shows how a system environment is interconnected that is, the connection of the data, entities and processes. Data flows links the primary processes, sources, destinations and data stores. These are reflected by the data flow diagram. The elements of a data flow diagram lead directly into physical design, with processes suggesting programs and procedures, data flows suggesting composites, and data stores suggesting data entities, files, and databases. The data flow diagram of the proposed system is shown in the fig 4.2 below:

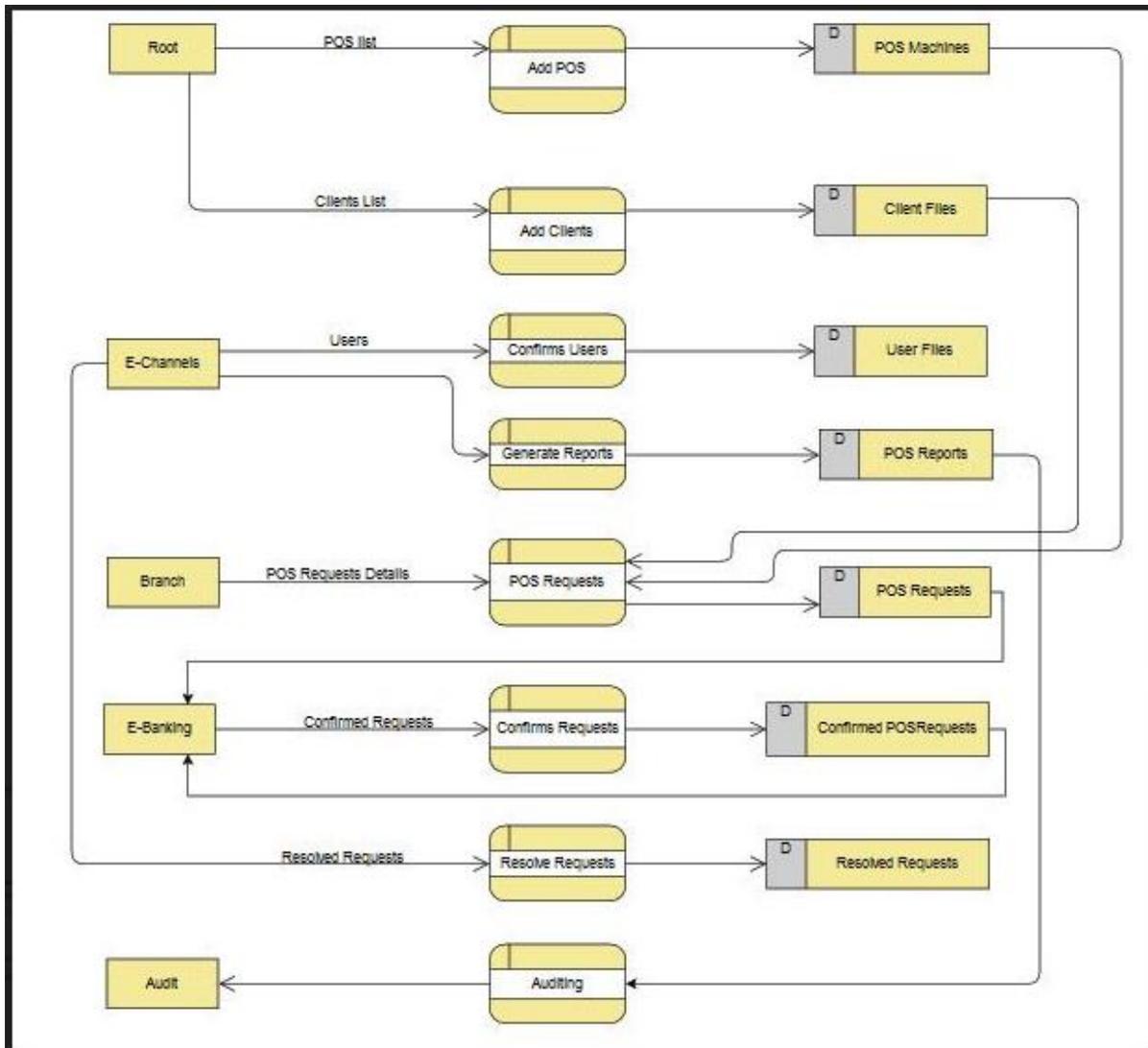


Fig 4.2 DFD of proposed system

4.3 Architecture Design

According to Ulrich (2014) architecture refers to the set of significant decisions about the organization of a software system, structural elements selection and required system interfaces so as the behaviour of the system. Communication between major systems components are also identified on the architecture design. Architecture design's major objective is the development of a modular program structure. In addition, it melds program structure and the database structure, defining interfaces that enable data to flow through the system.

In this system, three tier is going to be used for our architecture. The first three tier component is known as the presentation tier which is responsible for displaying information that is related to the services that are on the system that is where the user interface is. On this type of a tier that is where the employees are able to interact with the system through Agribank POS support system user interfaces. The employees are enabled to interact with the second tier in an intuitive and secure manner through the client component that is the first tier. For several types of employees to be supported Web Sphere Application Server must be used but however the clients cannot access the third tier services directly.

Application tier or layer which is the second tier process that is responsible for managing the system business logic and it has an access to the third tier services. It also known as the middle tier, it is pulled from the presentation tier that is its major responsibility is to control the system functionality. This is the layer where detailed processing is performed since employees' component will be accessing this layer simultaneously that is Apache Friend Server will handle these processes done on this layer.

Data tier which is the third tier in this case the data is kept separately of business logic or application servers. It is also known as the database server tier which persistently manages data and executes transactions services of the database. Fig 4.3 below shows the Agribank POS support system three tier client server application.

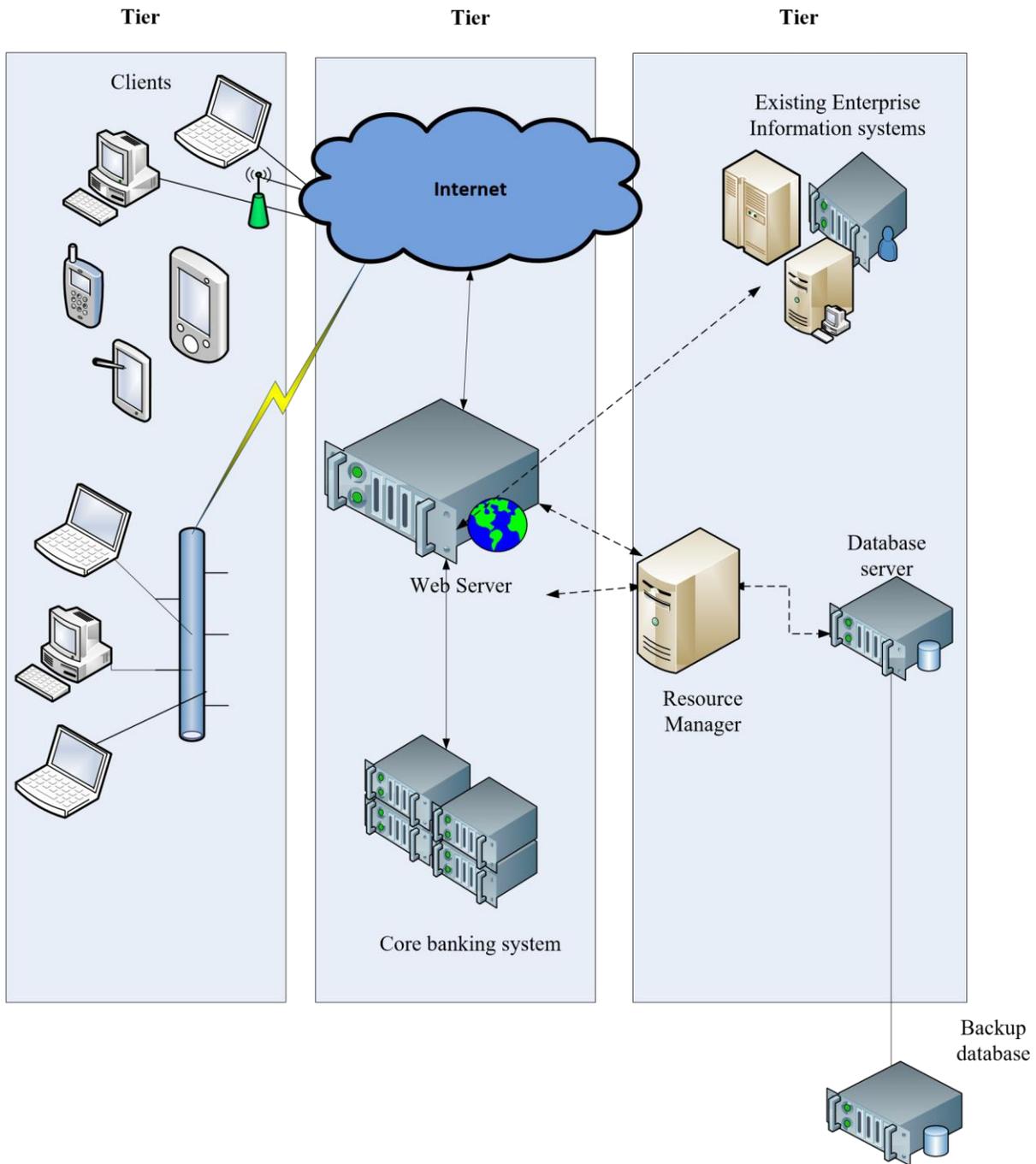


Fig 4.3: Agribank POS support system Three Tier Client Server Architecture

4.4 Physical Design

According to Schach (2013) physical design is concerned with the design of how the hardware and software components of the proposed system are going to be laid out and how

are they going to be interacting. The actual processes of the system are related in this physical design that is the processes under consideration are input and output processes. The major emphasis will be on verifying on how data is captured up until it is produced as output. Hardware and software required have been met and available as stated earlier by the feasibility study above this means that that for the proposed system to work well we should use the required hardware and software without incurring other extra cost. Shown below in table 4.1 is the hardware and software specified and required for smooth running of the new system.

Table 4.1: Specified Hardware and Software

Quantity	Description	Availability
1	Patch Panel-24 Port	Yes
4	HP Probook 2305(Client Computer)	Yes
40	Tape drives	Yes
1	Dell PowerEdge (Database and Web Optimized Server)	Yes
7	30 meters UTP Cat 35 Fly Leads Patch Codes(RJ45)	Yes
3	3 Meg Ded Internet Link	Yes

1	Visual Studio 2013	Yes
1	MySQL 5.5 community	Yes

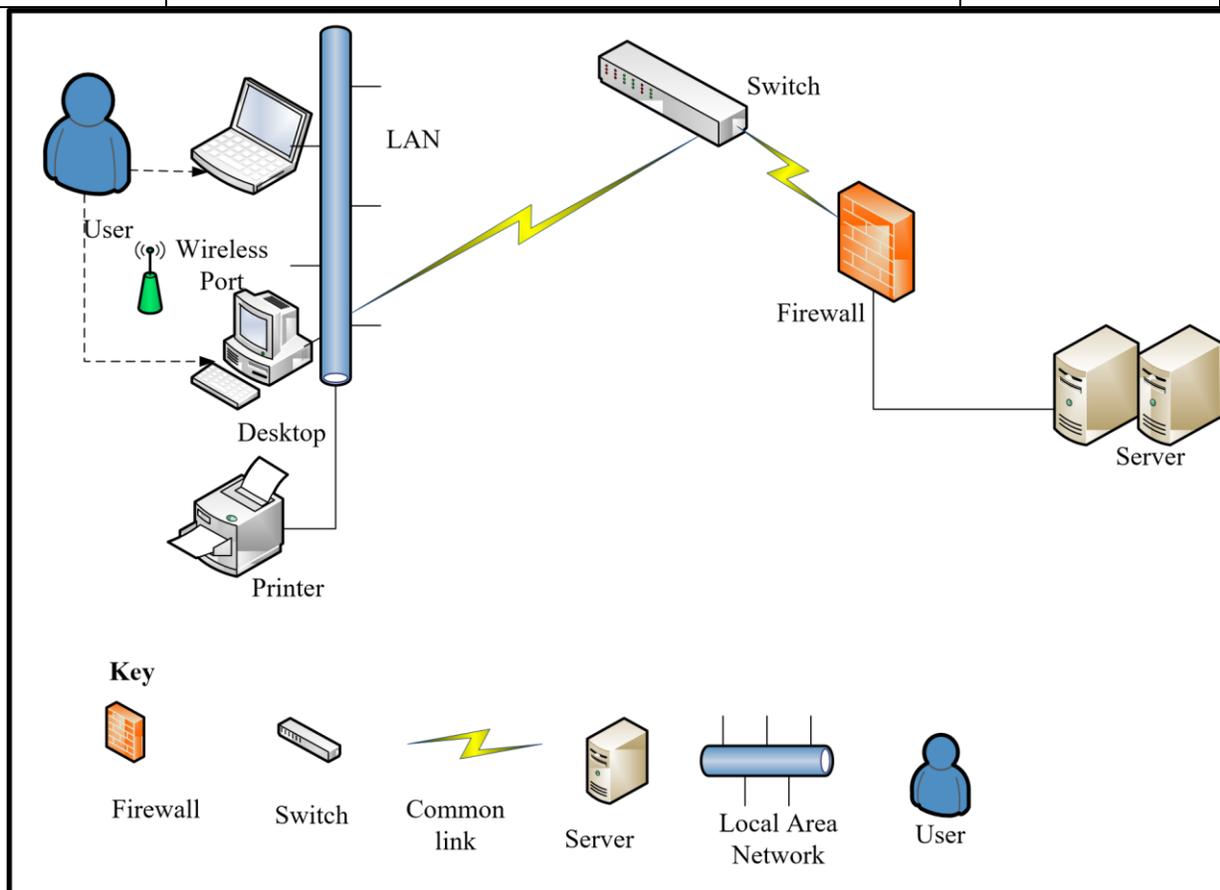


Fig 4.4: Proposed System Physical Design

Shown on the fig 4.4 above is the new system overall setup and physical design. One machine will be the application server in which the clients will be accessing this server through the LAN of the bank thus users' workstations. This application server will be there to communicate with the database that is where all requirements and data manipulation takes place. To allow geographical dispersed clients to have access to the system the database is connected to the WAN making it easy for them to transact at any place and point in time.

4.5 Database Design

According to Wesley A (2005), database design is the process of creating a design that will support the enterprise's mission statement and mission objectives for the required database system. A database is a collection of interrelated data designed to meet the varied information needs of an organization.

4.5.1 Entity Relationship Diagrams

According to Conger (2014), entity relationship diagram refers to entities graphical representations and their associated relationships and it is used in computing. An entity relationship diagram is the preferred logical data model to model the proposed system because of its pictorial approach and that it is an accurate depiction of the entities and their relationships.

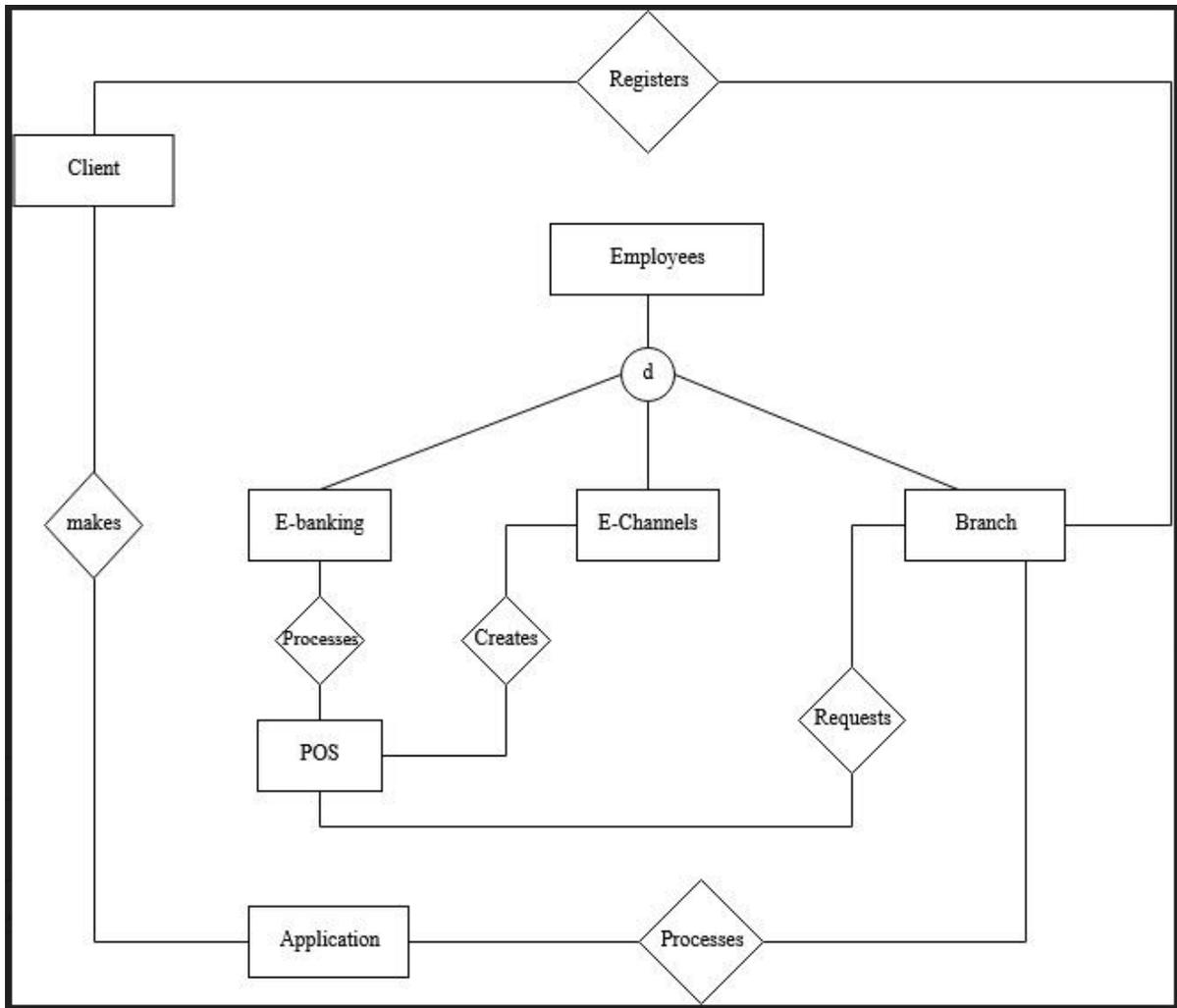


Fig 4.5 ERD diagram

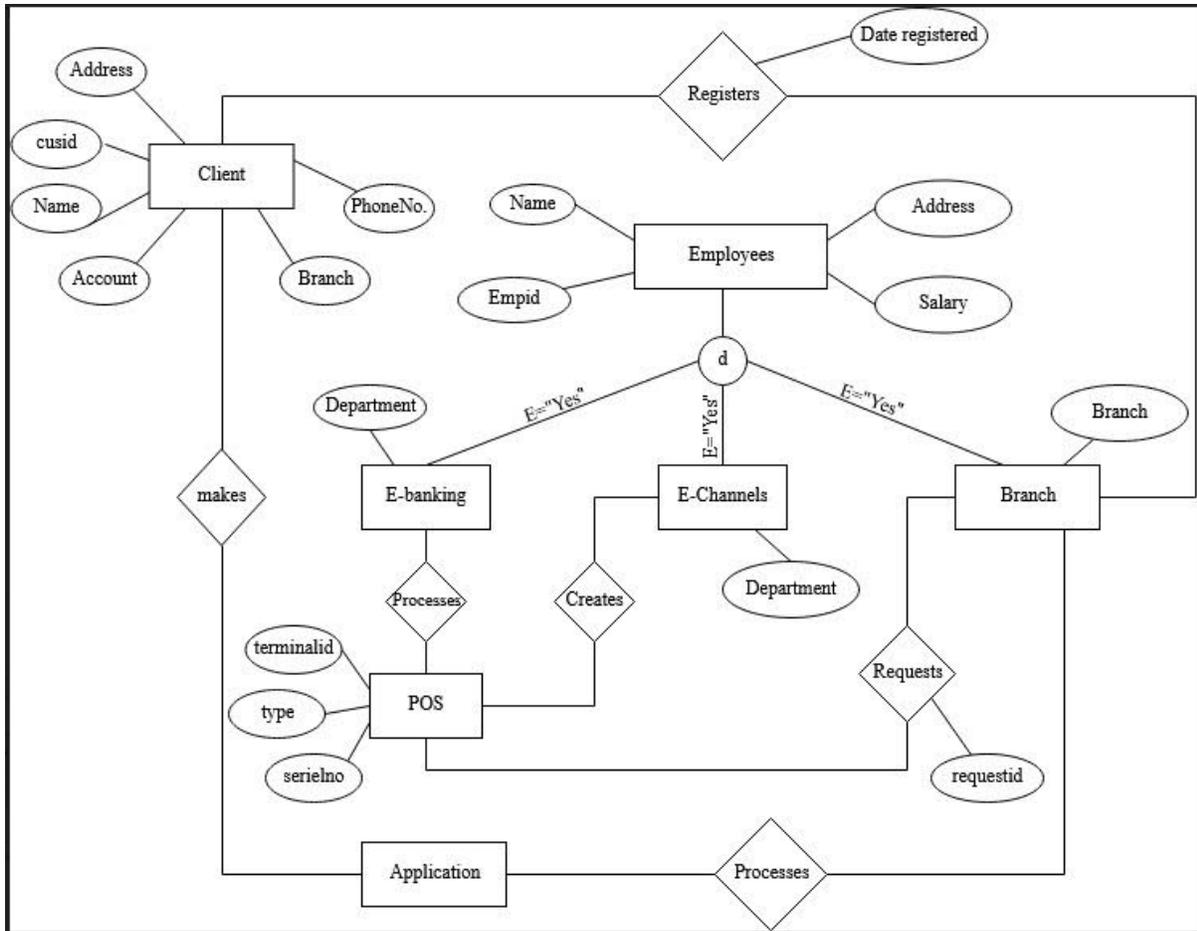


Fig 4.6 EERD diagram

4.6 Program Design

The designing of classes, functions and modules of the proposed system is involved in program design Ulrich et al (2014). In this phase functions, modules and classes design of the system proposed is taken into consideration. During the system design a structured methodology is adopted. This methodology is focused on the system break down into subsystem. Three diagrams are used to illustrate program design that is package diagram, class diagram and sequence diagram.

4.6.1 Package Diagram

Conger (2014), defined a package diagram as a system modular structure that shows the system modules breakdown and the modules interaction. To reduce complexity within Agribank POS support system classes are grouped into packages thus enabling an easy user understanding of the system proposed. Using the Agribank POS support system there is an online facility which will allow the users to have access to the POS reports and to achieve this the users should input the user credentials which will be verified before the user access the system. Once the user gain access to the system he or she will be able to make requests, generate reports and implement the requests. Shown below in fig 4.7 is a proposed system package diagram.

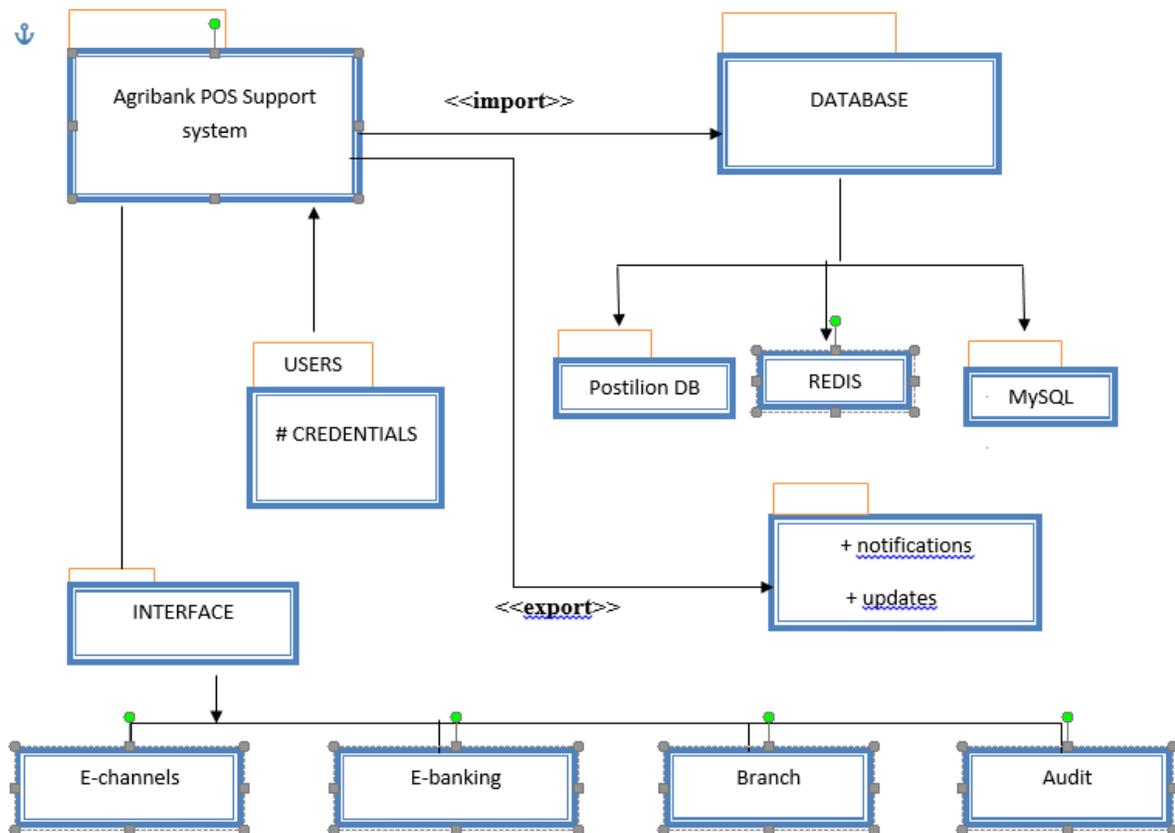
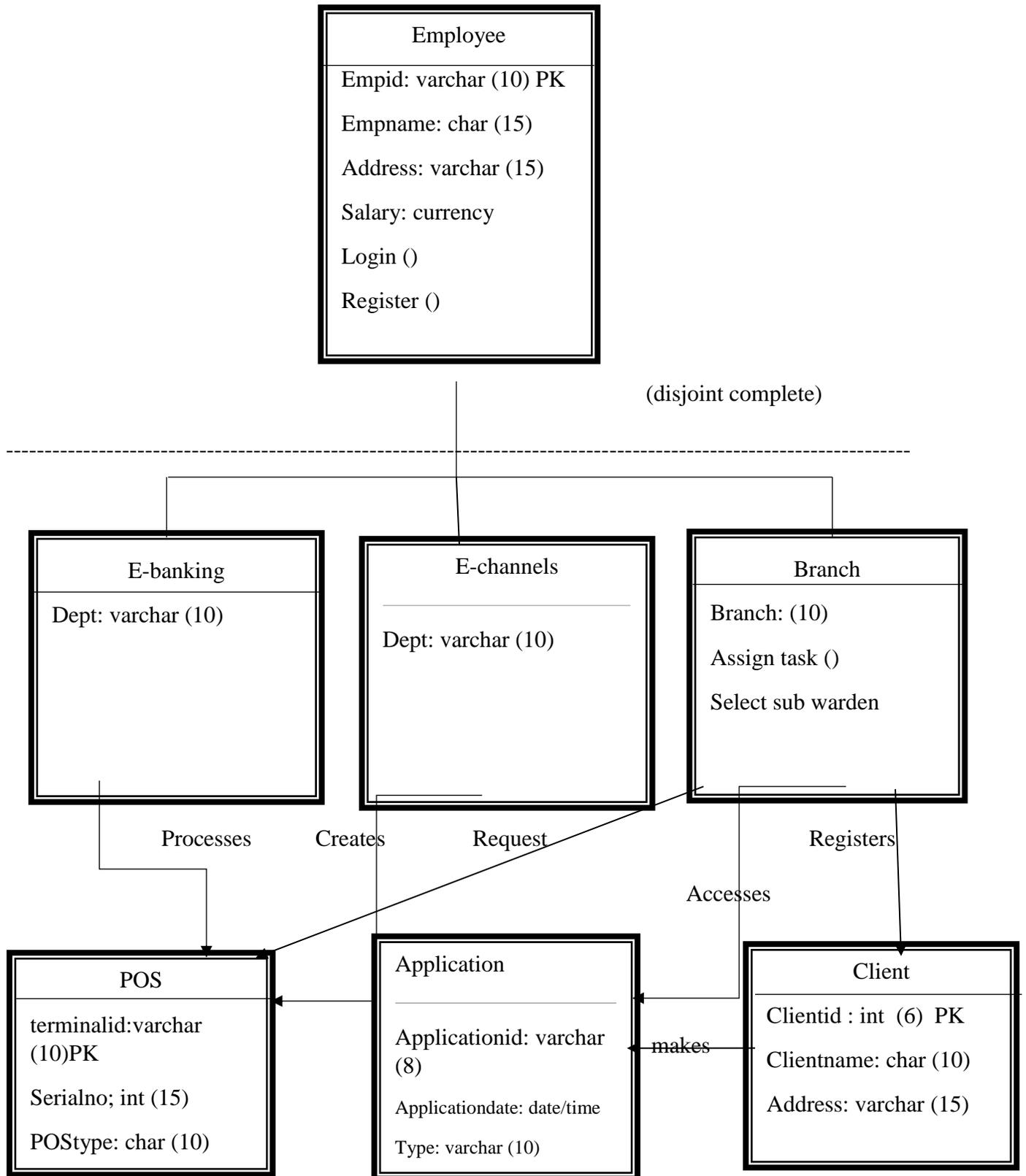


Fig 4.7 Package diagram

4.6.2 Class Diagram

According to Conger (2014), class diagrams refers to a static structure diagram type that describes the system structure by showing the classes of the system, attributes and the classes relationships. Class comprises of two main relationships that can exist between them that is association and inheritance. Relationship instances of each class are represented by an association that is, a member of a second class is used by one class. Generalizations is another term used for inheritance that is it describes the major relationship of super class and subclass. Class diagram demonstrates the interaction of proposed system classes that is, in terms of its behaviour and expected states this can be illustrated as show in **fig 4.8** on the next page:



4.6.3 Sequence Diagram

Conger (2014) defined sequence diagram as a model of the flow of system logic in a visual manner which will enable one to validate and document logic. Analysis and design phases commonly uses the sequence diagram. The sequence diagram proposed system is shown in the fig 4.9 below:

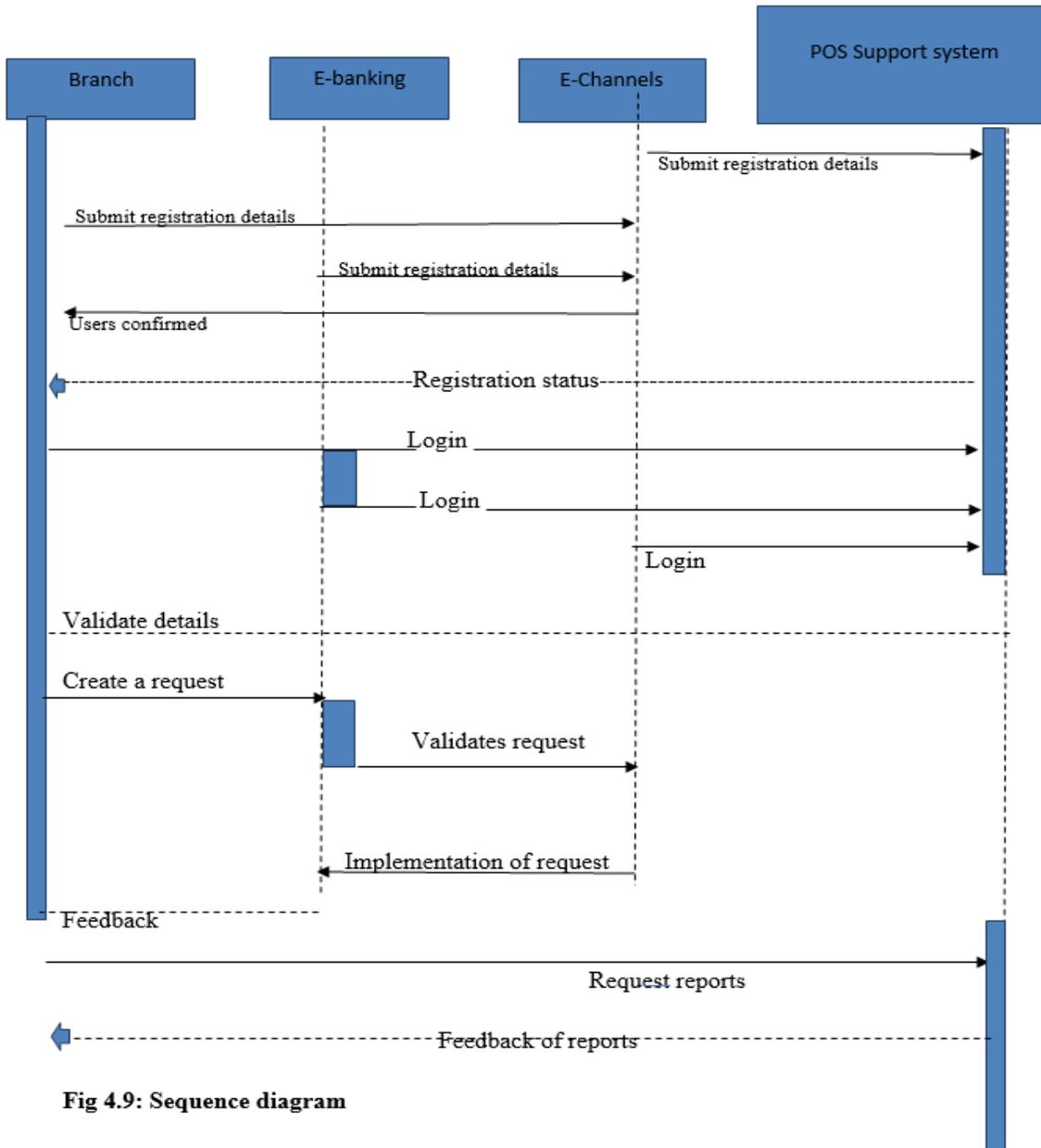


Fig 4.9: Sequence diagram

KEY



4.7 Interface Design

Maier et al (2000) defined interface design as the computer designs, machines, software applications, websites and mobile communication devices focusing on the user interaction and experience. This is where the interfaces design of Agribank POS support system is done

thus forms and menus for data input into the system. In this case the input and output structure is outlined in this interface design.

4.7.1 Menu Design

The Agribank POS support system menu consist of user login interface in which the user should input the credentials to access the system. When the user credentials are verified the user will be redirected to a page where he or she proceed in doing his or her tasks and other activities.

4.7.1.1 Main Menu

The Agribank POS support system main menu comprises of the menu of the system and services that it offers to the users depending on the type of user, how they have logged in and that is, when it is the administrator his or her menu will be comprising the menu of supporting and implementing requests from other users

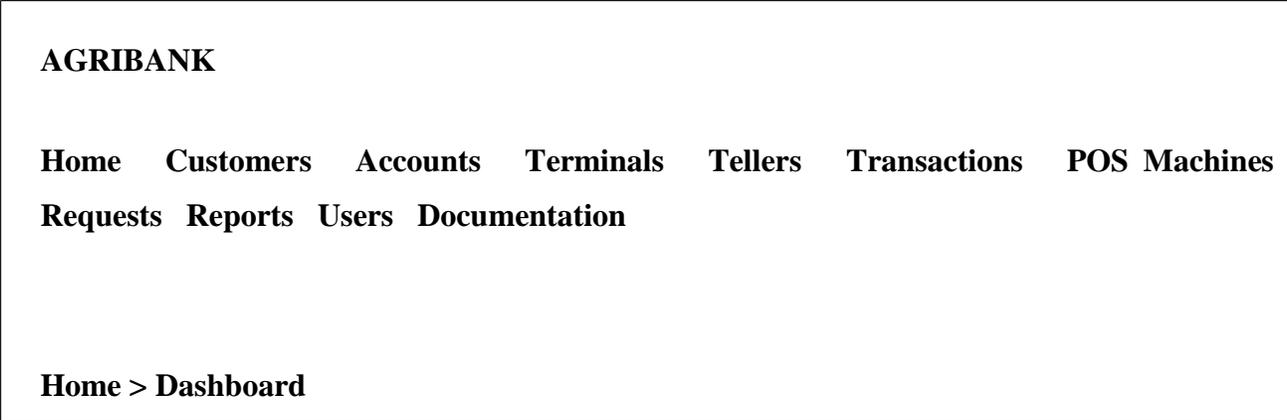


Fig 4.10: Echannels Main Menu

4.7.1.2 Sub-Menus

This refers to secondary menu that appears while one is holding the cursor over a main menu that is in this case say requests is the main menu while the several requests that can be done are the secondary menu which falls under Requests menu. This is shown as below in fig 4.11.

AGRIBANK

**Home Customers Accounts Terminals Tellers Transactions POS Machines
Requests Reports Users Documentation .**

All requests

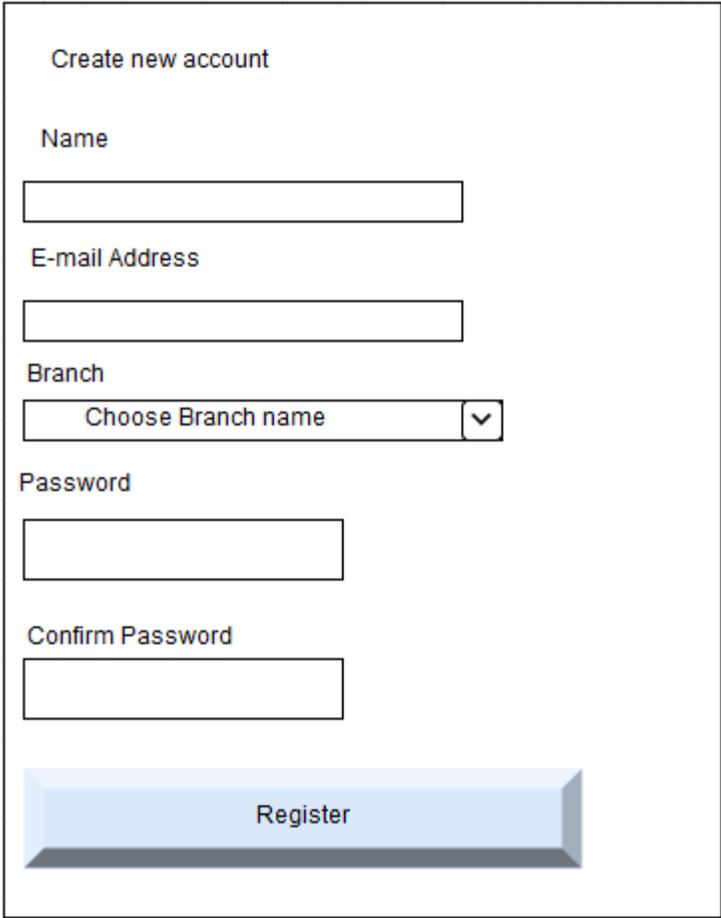
Dashboard>Requests

**New Terminal Reallocation Change Details POS Repair Terminal testing POS Hire
Change Account Change Customer**

Fig 4.11: Request Sub-Menu

4.7.2 Input Design

According to Maier et al. (2000) input design refers to the conversion process of a user oriented description of input into a system. Validation of inputs, error avoidance and making the process simple is the major of the input design. The more the quality the system input have is the more the quality of system output. The major goal of the input design is creating input forms that are easy to fill the details and easy to follow. Shown below in fig 4.12 is a form that shows an input of creating new user.



The image shows a user registration form titled "Create new account". It contains the following fields and elements:

- Name:** A text input field.
- E-mail Address:** A text input field.
- Branch:** A dropdown menu with the text "Choose Branch name" and a downward arrow icon.
- Password:** A text input field.
- Confirm Password:** A text input field.
- Register:** A blue, 3D-style button with the text "Register" centered on it.

Fig 4.12: User Registration Form

Login Form

This is the form which is used by the users to access the system once they are confirmed into the system by the administrator that is the user should provide his or her username and password. The login form is shown in fig 4.16 as below.

Login to your account

E-mail Address

Password

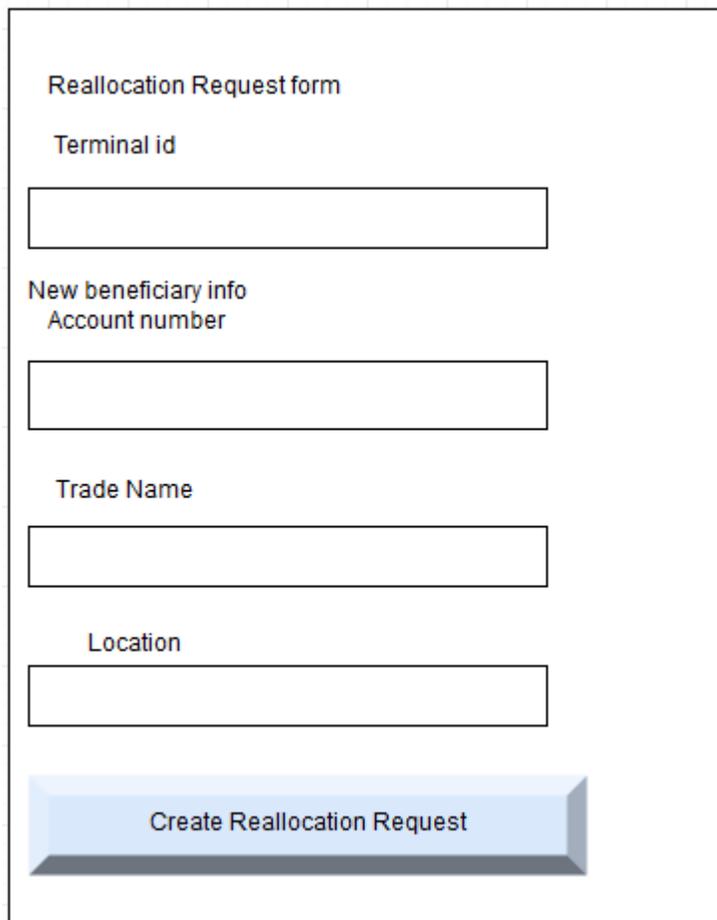
Remember Me

[Forgot password?](#)

Fig 4.13: User Login Form

Reallocation Request Form

The user should fill in the details to log a request for a reallocation from one beneficiary to another and this will be implemented by e-channels as shown on the fig 4.14 below.



The image shows a web form titled "Reallocation Request form". It contains four text input fields and a submit button. The fields are labeled "Terminal id", "New beneficiary info Account number", "Trade Name", and "Location". The submit button is labeled "Create Reallocation Request".

Reallocation Request form

Terminal id

New beneficiary info
Account number

Trade Name

Location

Create Reallocation Request

Fig 4.14 Reallocation request form

4.7.2 Output Design

Information should be clearly presented to meet end users' requirements and this is regarded high quality output. Maier et al. (2000) regarded this as the important source of information to be used by the users. A clear and intelligent design of output helps the management and the clients in decision making. Output design is much focused on how the

information is displayed and also how the hard copy of the output is produced. Shown below in fig 4.15 is a report of the transactions.

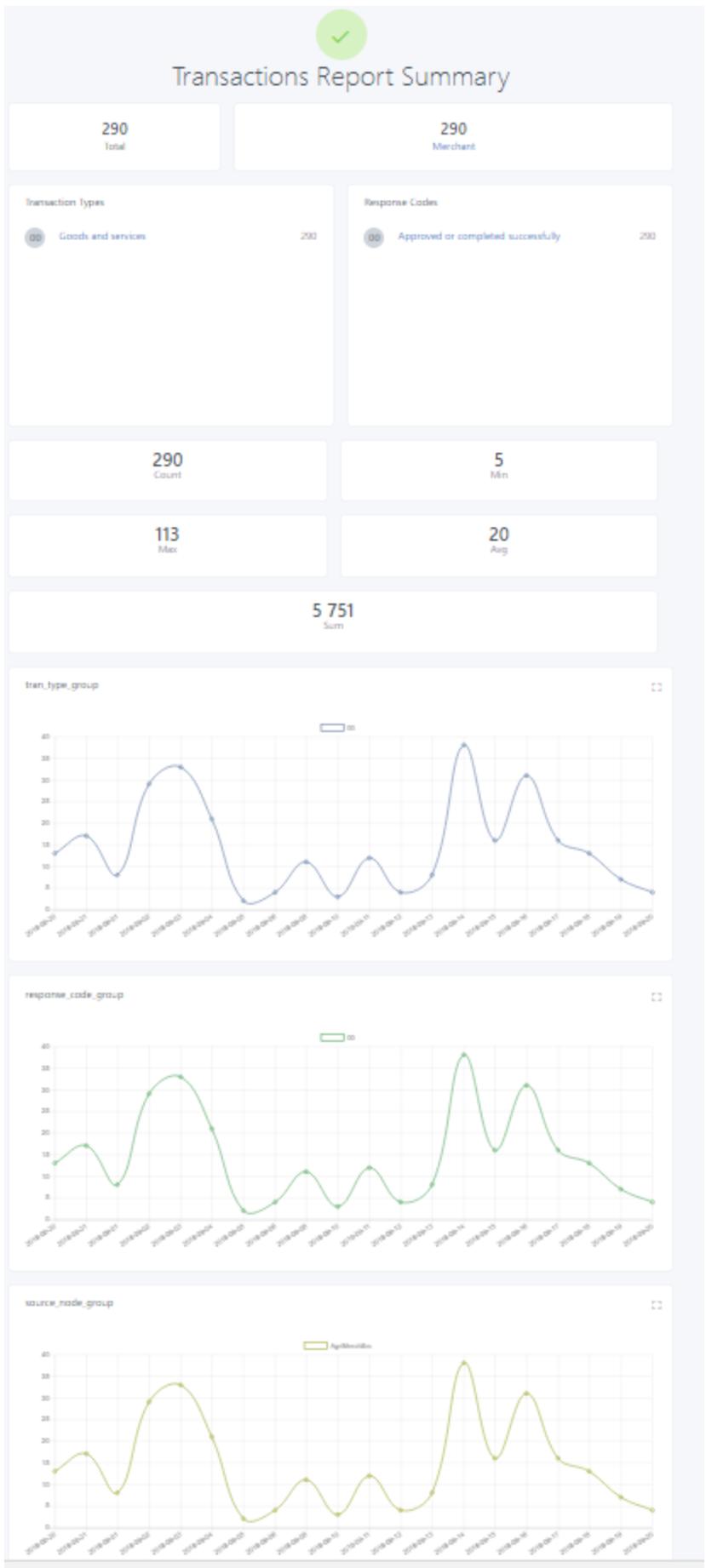


Fig 4.15

4.8 Pseudo Code

Stephen et al (2013) defined pseudo code as a description of a computer programming algorithm that uses the structural conventions of programming languages, but omits detailed subroutines or language-specific syntax and the code cannot be compiled into an executable program. This is a rough draft of the code which must be inserted and converted into real system using a specific language of programming. The major purpose of this program is to make people easily understand the procedures which will be undertaken to come up with a real code of the system.

User Login Module

```
// Responsible for authenticating user details and thus controlling access to the
system {
  Accept Username, Password

  Repeat

  {

  Select username and password from users table.

  Where username and password match those entered.

  }

  If a match is found, Then

  {

  Direct user to Home Page

  }

  Else

  {
```

Display error message notifying user of failure during login process

}

} // Close User Login Module

4.9 Security design

Security design is the idea of engineering software so that it continues to function correctly under malicious attack. Most technologists acknowledge this undertaking's importance, but they need some help in how to overcome it. The researcher will make use of the username and passwords that will prevent anyone from accessing the system at any given time and period. There is also mac address logging of every machine that accesses and manipulate data in the system and also multilevel authorization of requests before implementation to improve accuracy and security.

4.9.1 Physical Security

According to the Field (2001) on physical security it defines physical security as the measures that an organization takes to make sure that no unauthorized access to system facilities, resources and hardware are granted through the use of physical barriers.

In terms of Agribank system, the ICT department and all other departments and branches have proper security which include cctv and biometric.

4.9.2 Network Security

DeCapite, (2013) defines network security as the process through which an organization takes preventive intrusion measures through the use of networking infrastructure. For the proposed system to effectively secure itself from network hackers or tapping of data they can make use of encryption during transmission. The system will automatically cipher data into an unreadable format during transmission so help protect it. Network security will also be achieved through the use of passwords when gaining access to the system.

4.9.3 Operational Security

According to the United States Defense department, Operations Security also known by its acronym OPSEC, is defined as the procedure through which an organization or individual protect their confidential information from intrusion. Many authors point out that in order to come up with an effective operation security policy one has to think like the enemy.

The researcher will make use of various operation security techniques in the relaying system to make sure the customer information is not being misused and open to those who should not have access to it. These will include for example validations to make sure in the event of a misconfiguration or wrong server credentials the system should not allow any relaying of results until proper authentication is established.

4.10 Conclusion

In this design phase, all the required designing was carried out that is it was major focusing on the designing of inputs, processes and outputs of the system modules and functionality. The design phase helps in the coding of the system as well as the designing of activities flow of the system proposed. The next chapter will be the implementation phase that is this phase will be making reference from the design phase since this is where most of the design of the system is done

CHAPTER 5: IMPLEMENTATION PHASE

5.1 Introduction

Watts et al. (2015) defined implementation phase as a process of addressing personal, administration and personnel issues. This is the last phase which follows after the design phase of the system. This phase involves training all personnel within the organization, the physical system installation and procedure documentation. The major implementation phase purpose is to enable the users to make use of the new information system that is introduced within the organization so as to deploy it in all the organization.

5.2 Coding

Stephen et al. (2013) defined coding as a phase in which the source code is input by the developers into the computer after that it is compiled to produce the final software product. PHP programming language and MySQL database were used by the developer to come up with the Agribank POS support system. All the data in the database dictionary was mapped, and conceptualized and attributes were put in tables they fall into. A code that is written well reduces maintenance and testing effort thus the developer commented the code on each and every module improving the clarity and making the code easy to understand.

5.3 Testing

Somerville (2015) defined testing as an evaluation process of an application or a system in order to check if the user requirements are met so as to check if there are errors within the system. Errors and defects of the system are identified during the testing phase and they are rectified to come up with an error free system. For a business to understand and appreciate a system implementation risk an independent view of the software should be provided. The testing methodology is undertaken in different ways depending on the software application but however the following aspects should be covered:

- Exception handling evaluation
- Design specification deviation detection
- Validation of the system forms and modules

- Insecure programming practices identification

5.3.1 Testing Model

The V-model is a SDLC model on which processes execution takes place in V shaped and sequential manner and it is also referred to as the validation and verification model. Unit testing is used to test module implementation, integration testing is used to test the system design, system testing is used to test the system specification and the requirements are verified using the acceptance testing. The V-model is shown on the fig 5.1 below

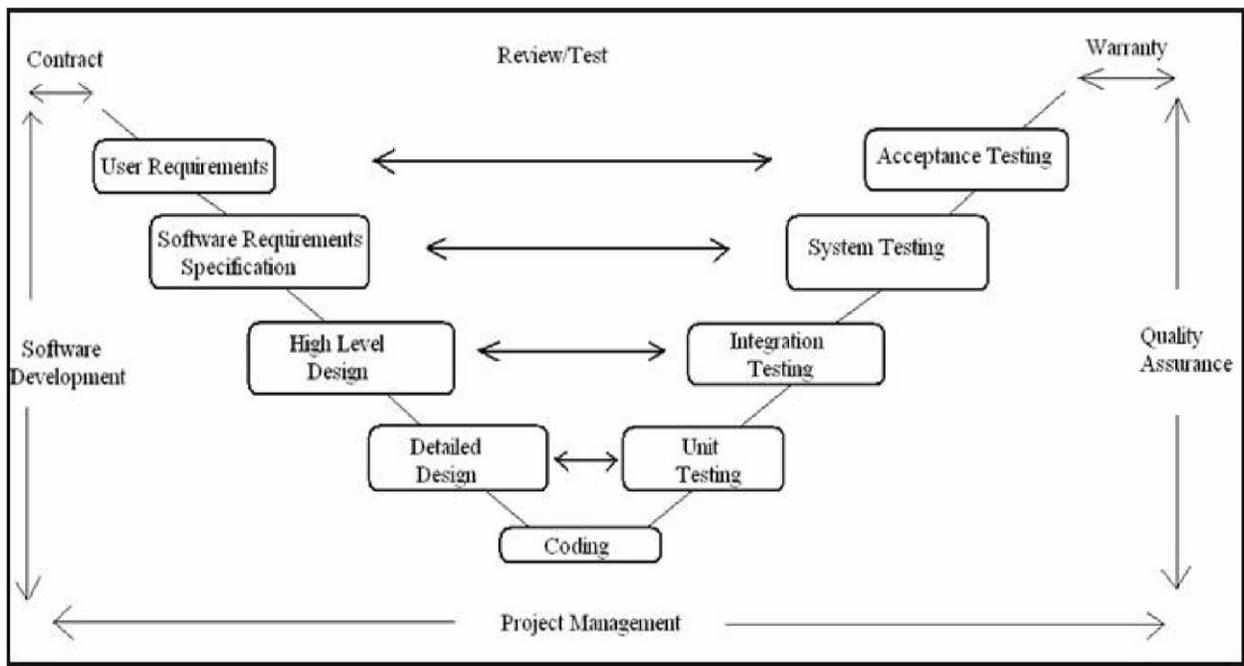


Fig 5.1: V-model

5.3.2 Testing Methods

Three methods of testing were used by the developer namely black box, white box and defect testing.

a. Black Box Testing

Glenford et al. (2013) defined black box testing as a testing that neglects the system's internal mechanism and it focuses greatly on the generated outputs after an

input and conditions have been executed that is it can also be referred to as the functional testing.

Using the black box testing method the source code is not accessed by the software tester that is the source code is regarded as the black box which the tester cannot view what is inside that box. The application functionality is the one which is performed and considered using this method of testing thus end users are the ones who performs these actions. The major objective of the developer when using the black box testing is to check if there are interfaces which have errors, initialization errors and performance error on the Agribank POS support system.

b. White Box Testing

Glenford et al. (2013) defined white box testing as testing method that takes into consideration the internal components of the system that is this method is a technique used to verify the developer's code by the engineers that is white box is used to examine whether the code is working as expected. The code is keep running with foreordained input and checks to ensure that the code produces foreordained output. Unit testing, integration testing and system testing are three types of white box testing utilized by the developer.

c. Defect Testing

To identify the defects within the system the developer used defect testing and this exercise was done before the implementation of the system so that the defects will be uncovered and sorted before delivering the final software product. It is involved with four processes that is test case, test data, test results and test reports.

5.3.3 Testing Levels

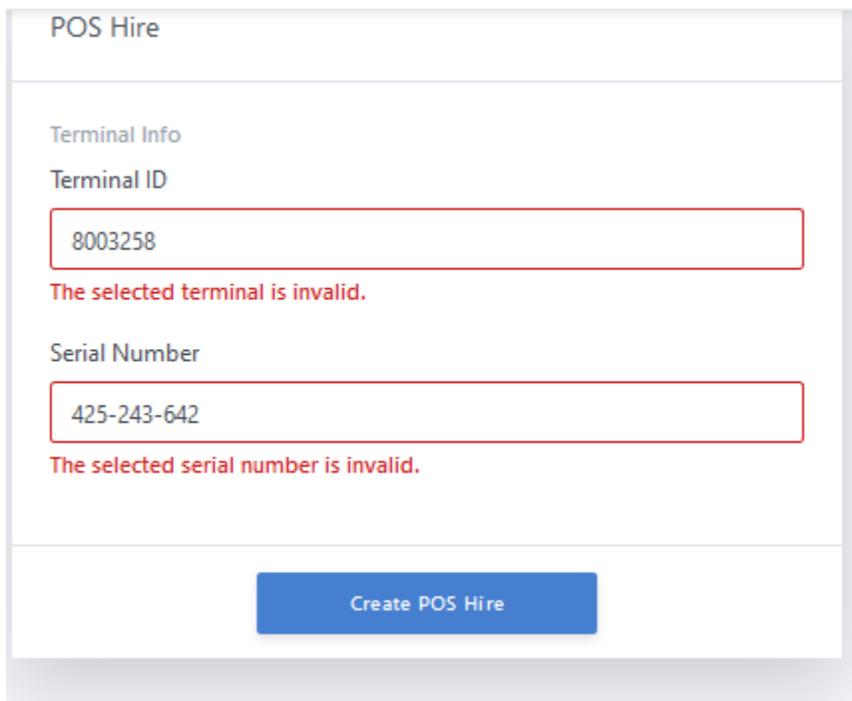
To improve the quality of programming testing, and to deliver a more incorporated testing approach relevant over many different projects, the testing procedure is abstracted to various levels. These levels are most appropriate for the V-model and the Waterfall Model since the levels relate directly to the distinctive stages in the Waterfall model. The developer adopted the following testing levels:

- Unit testing

- Integration testing
- System testing
- Acceptance testing

a. Unit Testing

According to Whitten (2015) unit testing centers on verification exertion on the littlest unit of the software module segment. This testing level is white box oriented and multiple components can be tested in parallel. The Agribank POS support system developer did the unit testing using POS hire request module. The results are as follows, the system produced an error if the POS terminal id is not in the system and also the POS serial number which is a unit identifier of the POS machine.



The screenshot shows a web form titled "POS Hire". Under the heading "Terminal Info", there are two input fields. The first is labeled "Terminal ID" and contains the value "8003258". Below this field is a red error message: "The selected terminal is invalid." The second field is labeled "Serial Number" and contains the value "425-243-642". Below this field is another red error message: "The selected serial number is invalid." At the bottom of the form is a blue button labeled "Create POS Hire".

Fig 5.2: Unit Testing

b. Integration Testing

According to Shelly et al. (2005) integration testing refers to a process of individually testing the system modules. It is a precise method for developing the system structure

while in the meantime leading tests to reveal errors related with interfacing. A complete and reliable unit tests set was assumed at the commencement of integration testing. Utilizing both white and black box testing methods, when the code is integrated to become a large code base the developer of the system verifies units working together. The system developer of Agribank POS system did unit testing and the tried parts of the unit and were then combined to assess if the segments collaborated well. The request and implementation modules were tested if they interact with each other that is if the user at the branch level creates a request and it goes to the e-banking for evaluation and authorization of the request for implementation by e-channels.

c. System Testing

System testing starts after finishing of integration testing that is after every one of the interfaces have been tested between numerous modules and the entire system is tested to be sure that all modules together effectively as one system, Whitten (2015). There is a number of sub types of system testing that the developer may or may not use depending on tested application which are as follows:

- Usability testing
- Compatibility testing
- Configuration testing
- Security testing

Executable files were created for the developer to test and see if the Agribank POS support system is performing the expected functions. The following functions was facilitated by the system that is request for new terminal, reallocation, terminal testing and report generating among other things

d. Acceptance Testing

Whitten (2015) defined acceptance testing as a formal testing that is carried out to verify if the developed product meets the specifications, requirements and stipulated standards of the users. Acceptance testing falls under the black box testing

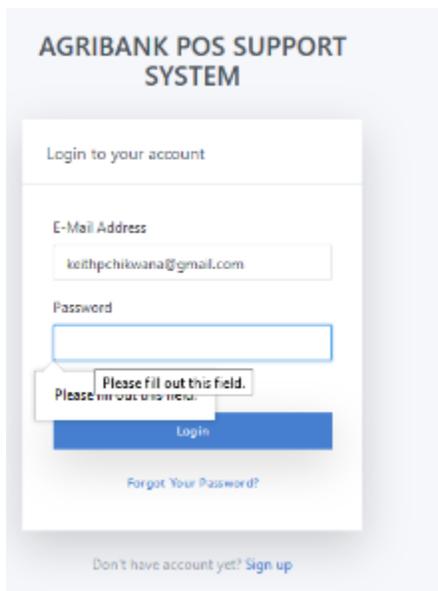
methodology where the system's internal coding is of less interest to the system users but however the major worry of the user will be their specified requirements and the system functionality. The acceptance testing comprises of:

- Alpha and beta testing □ Operational testing.

The users ran tests on the system that was delivered to them and the tests were based on the functionality which they expected hence the conclusion of the tests was that the Agribank POS support system was accepted.

5.3.4 Validation and Verification

Validation is intended to ensure a system results in a system that meets the operational needs of the user. For a new development flow or verification flow, validation procedures may involve modelling either flow and using simulations to predict faults or gaps that might lead to invalid or incomplete verification or development of a system. A set of validation requirements as defined by the user, specifications, and regulations may then be used as a basis for qualifying a development flow or verification flow for a system. The login form in fig 5.3 shows the login form validation.



The image shows a login form for the 'AGRIBANK POS SUPPORT SYSTEM'. The form has a title 'Login to your account' and two input fields: 'E-Mail Address' (containing 'keithpchikwana@gmail.com') and 'Password' (which is empty). A blue 'Login' button is at the bottom. A red error message box is overlaid on the password field, stating 'Please fill out this field. Please fill out this field.' Below the button, there is a link for 'Forgot Your Password?' and a link at the bottom for 'Don't have account yet? Sign up'.

Fig 5.3: Validation

Verification is intended to check that a system meets a set of design specifications. In the development phase, verification procedures involve performing special tests to model or

simulate a portion, or the entirety, of a system then performing a review or analysis of the modelling results. In the post-development phase, verification procedures involve regularly repeating tests devised specifically to ensure that the system continues to meet the initial design requirements, specifications, and regulations as time progresses. It is a process that is used to evaluate whether a system complies with regulations as shown in fig 5.4.

Change Account

✓ Role Assigned : branch-manager
Branch Requested : 003
Request Type : change-account

Old Account Info
Account

New Account Info
Account Branch

Update Account

Fig 5.4: Verification

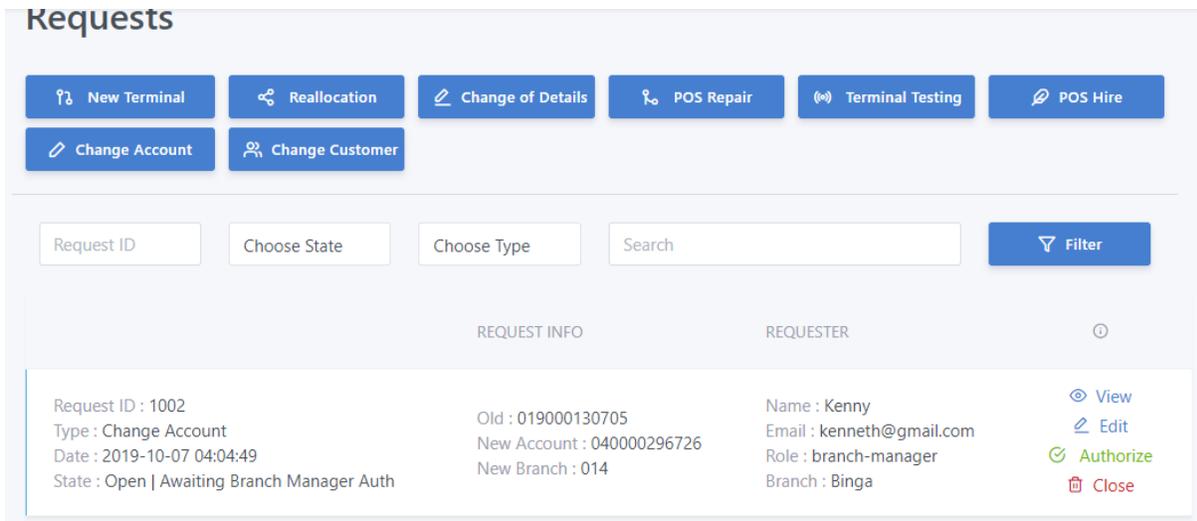


Fig 5.5: Verification

Defect Testing

The system defects were discovered by the developer using the defect testing. This activity was undertaken to make sure that the errors were uncovered before going any further with the system implementation. Below is a fig that shows the defect testing process:

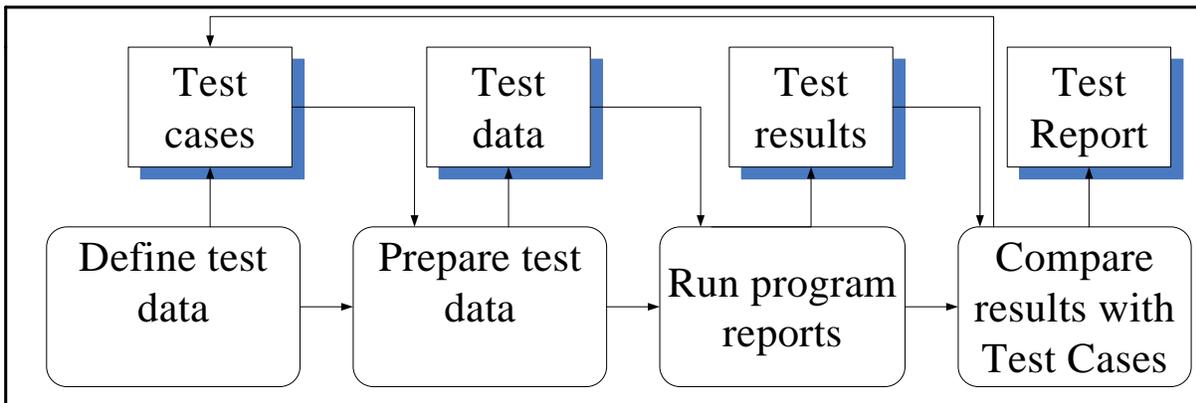


Fig 5.6: Defect Testing Process

5.3.4 Performance and Objective Evaluation

The entire system was tested against the objectives to make sure that the system meets the users' objectives that were offered on the proposal phase. To show the effectiveness of the

testing the system screenshots and the results messages displayed were attached on the figs below:

Objective1: Ticketing and multi-level authorization

New Terminal Request

Account Info
Account Number
019000130705

Terminal Info
Trade Name
General

Location
Harare

Terminal Type
Merchant POS

Number of Terminals required
2

Justification
There is need for more machines as the business is expanding

Proof Of Payment (If MPOS Request)
Choose file Browse

Request Terminal (s)

Fig 5.7 New terminal request

New Terminal Request

✓ Role Assigned : branch-manager
Branch Requested : 003
Request Type : new-terminal

Fig 5.8 Role assign

POS Management Kenny branch-manager

Home Customers Accounts Terminals Tellers Transactions POS Machines Requests Reports

Documentation

Requests

[New Terminal](#)
[Reallocation](#)
[Change of Details](#)
[POS Repair](#)
[Terminal Testing](#)
[POS Hire](#)

[Change Account](#)
[Change Customer](#)

[Filter](#)

REQUEST INFO	REQUESTER	
<p>Request ID : 1003</p> <p>Type : New Terminal</p> <p>Date : 2019-10-07 04:30:18</p> <p>State : Open Awaiting Branch Manager Auth</p>	<p>Number of Terminals : 2</p> <p>Account : 019000130705</p> <p>Location : Harare</p> <p>Trade Name : General</p> <p>POS Type : merchant</p>	<p>Name : Kenny</p> <p>Email : kenneth@gmail.com</p> <p>Role : branch-manager</p> <p>Branch : Binga</p> <p> View Edit Authorize Close </p>

Fig 5.9: Ticketing and multi-level authorization

Objective 2: To create and update customer details for POS terminal and linked accounts

Request Info	View	Resolution								
<p>ID : 1003</p> <p>Branch : 003</p> <p>Role Assigned : e-channels</p> <p>State : Open Awaiting E-channels Implementation</p> <p>Request Type : new-terminal</p> <p>Created : 2019-10-07 04:30:18</p> <p>Updated : 9 seconds ago</p>		<p>Request Not Implemented</p> <p>History</p> <table border="1"> <thead> <tr> <th>OLD</th> <th>NEW</th> </tr> </thead> <tbody> <tr> <td> <p>Role_assigned merchant-services-manager</p> <p>State 109</p> </td> <td> <p>Role_assigned e-channels</p> <p>State 110</p> </td> </tr> <tr> <td> <p>Role_assigned merchant-services</p> <p>State 108</p> </td> <td> <p>Role_assigned merchant-services-manager</p> <p>State 109</p> </td> </tr> <tr> <td> <p>Role_assigned branch-manager</p> <p>State 107</p> </td> <td> <p>Role_assigned merchant-services</p> <p>State 108</p> </td> </tr> </tbody> </table>	OLD	NEW	<p>Role_assigned merchant-services-manager</p> <p>State 109</p>	<p>Role_assigned e-channels</p> <p>State 110</p>	<p>Role_assigned merchant-services</p> <p>State 108</p>	<p>Role_assigned merchant-services-manager</p> <p>State 109</p>	<p>Role_assigned branch-manager</p> <p>State 107</p>	<p>Role_assigned merchant-services</p> <p>State 108</p>
OLD	NEW									
<p>Role_assigned merchant-services-manager</p> <p>State 109</p>	<p>Role_assigned e-channels</p> <p>State 110</p>									
<p>Role_assigned merchant-services</p> <p>State 108</p>	<p>Role_assigned merchant-services-manager</p> <p>State 109</p>									
<p>Role_assigned branch-manager</p> <p>State 107</p>	<p>Role_assigned merchant-services</p> <p>State 108</p>									
<p>Request Data</p> <p>Trade Name : General</p> <p>Account : 019000130705</p> <p>Location : Harare</p> <p>Terminal Type : merchant</p> <p>Number : 2</p> <p>Reason : There is need for more machines as the business is expanding</p>										

Fig 5.10: Creation of a new terminal

Terminals			
Issue Terminal		Return Terminal	
INFO	INFO	ACCOUNT	
Trade Name : General Location : Harare Serial Number : Last Tran : Un-known	ID : 80015035 Model : Term type : 1003 Created : 2019-10-07 04:52:27	Account : 019000130705 Branch Name : Gwanda Branch Code : 019 Customer Name : Timmy Marvin Gottlieb	View More Reallocation Change Details De-activate
Trade Name : General Location : Harare Serial Number : Last Tran : Un-known	ID : 80015034 Model : Term type : 1003 Created : 2019-10-07 04:52:27	Account : 019000130705 Branch Name : Gwanda Branch Code : 019 Customer Name : Timmy Marvin Gottlieb	View More Reallocation Change Details De-activate

Fig 5.11: Created terminals

Objective 3: To generate new terminal IDs in a sequence for the POS machines and fill in all postilion tables

Terminals			
Issue Terminal		Return Terminal	
INFO	INFO	ACCOUNT	
Trade Name : General Location : Harare Serial Number : Last Tran : Un-known	ID : 80015035 Model : Term type : 1003 Created : 2019-10-07 04:52:27	Account : 019000130705 Branch Name : Gwanda Branch Code : 019 Customer Name : Timmy Marvin Gottlieb	View More Reallocation Change Details De-activate
Trade Name : General Location : Harare Serial Number : Last Tran : Un-known	ID : 80015034 Model : Term type : 1003 Created : 2019-10-07 04:52:27	Account : 019000130705 Branch Name : Gwanda Branch Code : 019 Customer Name : Timmy Marvin Gottlieb	View More Reallocation Change Details De-activate
Trade Name : Startlight Pvt Location : Harare Serial Number : Last Tran : Un-known	ID : 80015033 Model : Term type : 1303 Created : 2019-09-28 10:36:14	Account : 019000130705 Branch Name : Gwanda Branch Code : 019 Customer Name : Timmy Marvin Gottlieb	View More Reallocation Change Details De-activate
Trade Name : Startlight Pvt Location : Harare Serial Number : Last Tran : Un-known	ID : 80015032 Model : Term type : 1303 Created : 2019-09-28 10:36:14	Account : 019000130705 Branch Name : Gwanda Branch Code : 019 Customer Name : Timmy Marvin Gottlieb	View More Reallocation Change Details De-activate

Fig 5.12: Generated new terminal ids

Terminal Info

History

Reallocation

Change details

Deactivate

ID :	6668 - Active
Terminal ID :	80015035
Account :	019000130705
Trade name :	General
Location :	Harare
Term Type :	1003 - merchant
Model :	
Serial Number :	
System Serial Number :	
Branch :	019 - Gwanda
Created :	2019-10-07 04:52:27
Updated :	13 minutes ago

Fig 5.13 Updated tables

Objective 4: To provide an audit report

Audit	
Audit Info	
User Name :	Kenny
User Email:	kenneth@gmail.com
Role:	audit
Branch:	Binga
ID:	18664
Event:	updated
URL:	http://127.0.0.1:8000/request/1003/action
IP:	127.0.0.1
Agent:	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/77.0.3865.90 Safari/537.36
Created:	2019-10-07 04:44:59
Updated:	30 minutes ago
Changes	
OLD	NEW
Role_assigned branch-manager	Role_assigned merchant-services
State 107	State 108

Fig 5.14: Audit report

Objective 5: To provide all POS machine reports that include transaction reports

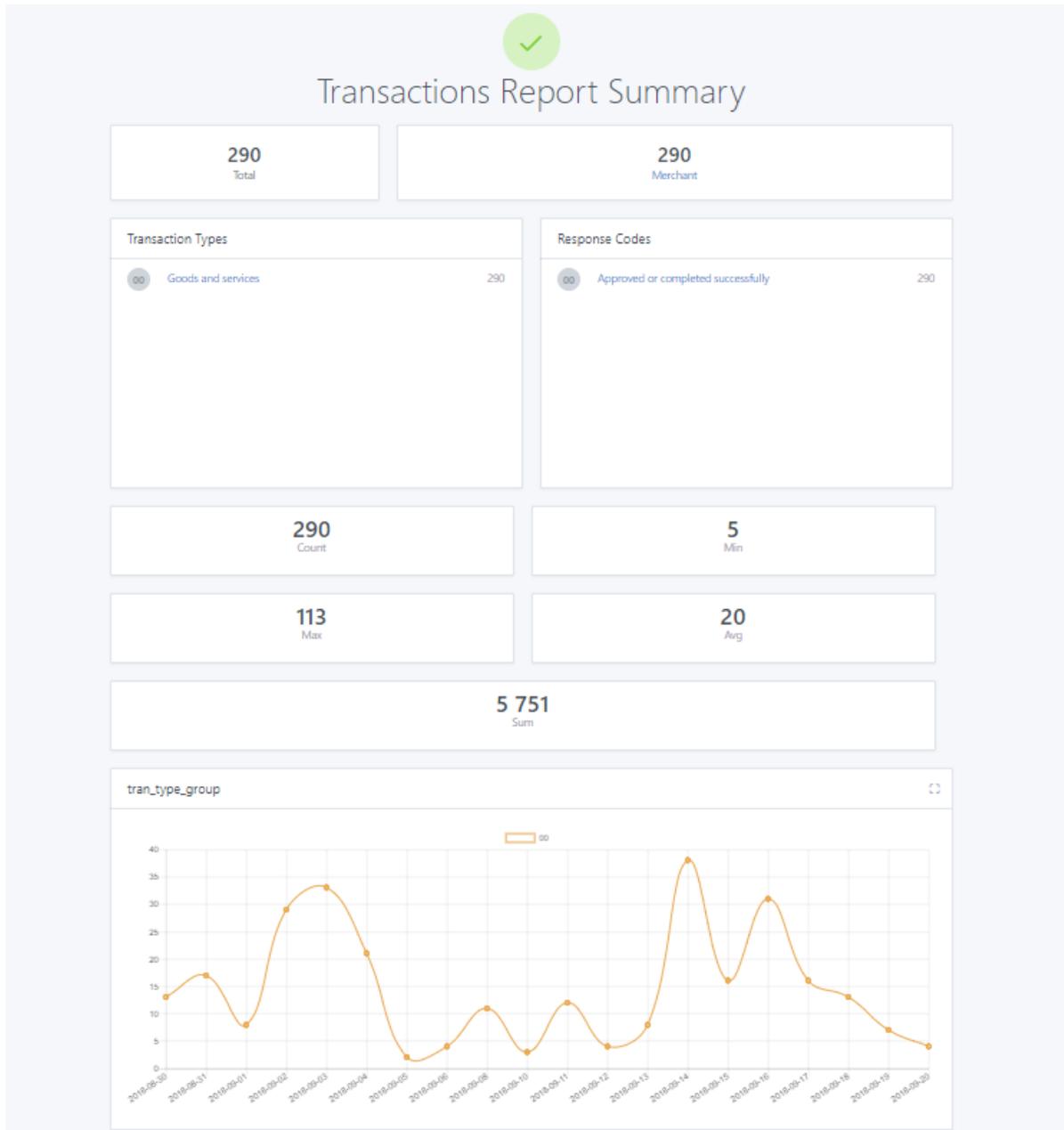


Fig 5.15: Transaction Report

5.4 Installation

Software installation refers to a system installation process and supplemental of required applications to support the developed system. The installation process include configuration testing, development and production configuration. The Agribank POS support system was

installed by the developer as stipulated in the documentation. This process involves software and facility installation where the facility installation involves setting up of the office space, servers and computers at the Agribank Head office in the ICT department. The system will be hosted on a server using Xamp and since everyone accessing it is on the same network that is Agribank network it is accessed using the server's ip address.

5.4.1 Steps for Software Installation

- Install Xamp
- Host in it the server
- Share the URL <http://127.0.0.1:8000>

5.4.2 User Training

According to Laplante et al. (2013) training refers a process of teaching the entire system users on how to use the new system's features and functions. Ongoing and cutover training must be taken into consideration when engaging on a training process. Ongoing training is concerned with the turnover occurrence that is full training is recommended to all the new users of the system while cutover training is much concerned on the mapping old procedures of doing things into the new procedures. Training is of paramount importance to the system success because it heavily depends on the usage and operation rate of the system. Training was conducted to the following users:

- a. E-channels administrators- this was a training conducted to the ICT staff so as to be able to confirm other users and implement the requests from the branches or e-banking so as the overall system operations.
- b. IT administrator- this was a training to show the IT administrators on how to rectify system errors, backup and troubleshooting when there are issues affecting the system as well as report generation.
- c. Managers- Managers were taught how generate reports and how to authorize requests so that they can go to the next level.

- d. Branch staff- They were trained so that they could be able to log request from clients and also create accounts for new clients.
- e. Audit staff- they were trained to access the information necessary to their needs especially in the event of fraud investigations.

5.4.3 Conversion

According to Shelly (2005) conversion refers to a system replacement process in which the old system will be replaced by the new system after user training and operational environment has been established. The major aim of this was gain acceptance by the users of the system. Basically there are four methods of conversion that can be employed for new system installation which are direct, pilot, phase and parallel conversion.

a. Direct Conversion

This refers to a conversion method that totally remove the old system with the new system taking over as a replacement that is the old system will be stopped while the new system will be the one working, Shelly (2005). The new system will be installed across all departments within the organization while the old system will be turned off. Direct changeover is a quick transition that is it is quickly installed into an organization if the old system will be having many problems or if it does not exist at all.

Direct conversion evaluation: Though direct changeover have many advantages, Agribank is not able to employ this conversion method since these two system that is the old and new system are totally different which makes it risk since the users need to learn how to use the new proposed system. Also there is need for data migration from the old to the new system which is impossible if the bank employs this method of conversion since the old system will be turned off once the new system has been implemented.

b. Pilot Conversion

Laplante et al. (2013) defined pilot conversion as a method in which a single location or department that is the pilot site is installed the new system for certain

period of time before it is introduced or installed to other organizational parts. This allows the organization to test the new system in such a way that it won't cause any harm or disturb the organizational business activity. Pilot conversion gives a room for error detection and rectification before the system is introduced to the whole organization as well getting feedback on any area which needs to be sorted to meet the user requirements.

Pilot conversion evaluation: It is difficult to employ pilot conversion in this situation. Confusion is fostered in the pilot site of which system to be used for a certain purpose and normally there are high chances of system failure when pilot method is used since the data is lost in the new system. Pilot conversion delays the implementation of the new system since the system will be under tests in the pilot site and the system will be improved. Finally it gives the IS systems support staff extra burden since they will be support and maintaining two systems that are likely doing the same task.

c. Phased Conversion

According to Laplante et al. (2013) in this phased conversion a new IS (information system) is separated into several modules and the organization will be using the system one module at a time that is all the users will be introduced to that one module at the same period. However this method takes time for the whole system to be implemented but the users will be learning the system step by step thereby helping to overcome the resistance to change by the users.

Phase conversion evaluation: The time required for the implementation of the whole system is the major constrain of Agribank employing this conversion method since a step by step module replacement of the current system implementation needs a long time. This type of conversion method is relatively expensive as compared to other conversion methods such as direct conversion thereby making it difficult to use.

d. Parallel Conversion

Shelly (2005) defined parallel conversion as a method in which the old and the new system will fully operate simultaneously within the organization for a certain period of time. With this method the users will be making use of both systems up until they are fully understanding the new system as well as if the new system is operating properly without facing any challenges then the old system will be terminated. Parallel conversion allows Agribank to compare the effectiveness of both systems so as to fully migrate the user data to the new system. Once the Agribank POS support system fails it will be viable for the bank to continue using the old system since it was kept running in parallel with the new system without any data loss.

Parallel conversion evaluation: Parallel conversion was the ideal method used to implement Agribank POS support system. Both systems were kept running for a certain period of time thus giving the bank a room to make comparisons and viable decision of which system is efficiently and effectively performing well.

5.5 Recommendations for Future Developments

The project was completed successfully and some recommendations were made to the various stakeholders who were involved in the development of this project. Such recommendations included:

- I. To produce a perfect system timelessly it is recommended that there should be more cooperation from the stakeholders.
- II. The IT to provide all necessary technical resources required by the developer to build the system
- III. For the purpose of error minimization, users should be trained properly in the processing of data.
- IV. There is need to adhere to the security procedures as to ensure data confidentiality and integrity.

- V. The maintenance and back-up plan should be seriously taken into action as these play a major role in case of hardware or software failure thus followed as per the designed plan.

5.6 Maintenance

Somerville (2015) defined maintenance as the software product modification to correct the software faults, add other functions and for performance improvement after the product has been delivered this is done to make sure that the software product is adapting to the prevailing dynamic technological environment. Continuously system maintenance should be undertaken such that the software product will continue to satisfy the users of the system. This is an ongoing process that takes into consideration upgrading and updating the Agribank POS support system. There are basically four strategies of maintenance which are as follows:

- Corrective Maintenance
- Adaptive Maintenance
- Perfective Maintenance
- Preventive Maintenance

5.6.1 Perfective Maintenance

According to Shelly et al (2005) perfective maintenance refers to software modification that is done to increase performance. When perfective maintenance is done the changes done might be of new functionality been provided to the users or it can be a reverse engineering which is responsible for maintenance documentation creation that is the document might be existing or might not be previously existing.

5.6.2 Preventive Maintenance

Shelly et al (2005) defined preventive maintenance as the system modification required by identifying possible errors and correct the faults that are in the system before they affect the system as a whole. The system developer will be checking for errors and updating the

system before they come out in other words this is usually done to prevent future problems or errors of the system. Preventive maintenance is important even with all the testing since it may not be possible to test few things before the software can actually be implemented.

5.6.3 Corrective Maintenance

According to Whitten et al (2015) corrective maintenance refers to the changes made because of the software product actual errors which may cause the software product not to meet the user requirements. Incorrect implementation causes coding errors of logic design detailed and source code logic incorrect use. Investigations should be launched once the errors are identified such that the cause of the error will be rectified. A correction is made once the errors are noticed that is it is a damage control activity which waits for the errors to be noticed then corrective measures are taken to fix the errors such errors are documented such that if the same issue happens in the future there will be reference.

5.6.4 Adaptive Maintenance

According to Whitten et al. (2013) adaptive maintenance refers to as the modification of a software product performed after delivery necessary to accommodate a changing environment and dynamic business environment. When using adaptive maintenance the changes made to the system will those say there was change in the client requirements, new interfaces of the system requested and finally there are new requirements of hardware. As the system exist in an ever changing technology and business environment there is need for the system to be changed frequently such that it will meet the user change in requirements. System maintenance overview: The system developer viewed it as it is worthwhile to maintain the Agribank POS support system using all the above maintenance type since each type of maintenance will contribute greatly to the system performance. Even if the hardware is upgraded the Agribank POS support system is usable without facing any challenges.

5.7 Conclusion and Reflection

The new system was successfully implemented and accepted by the user without facing any challenges, they did not face problems of using system since the interfaces are user friendly.

The system project was a success since all the system requirements and objectives were met though there were some problems that the developer came across during the system development the system was well budgeted for and planned. The developer greatly benefited from this project and the organization will be able to realize profits through employing the new system. The parallel conversion recommended and employed so that the users will familiarize with the new system before the old one is terminated while all the maintenance methods were recommended to cover all different circumstances that may occur in the future.

Agribank POS Support system is a system that is used to manage and support the use of all Agribank POS machines that is from when the branch requests POS machines for their clients to the issuance of the POS machines. This system targets the various departments in the bank (Branch, E-banking, E-channels and Audit) and production of reports for all the levels of management. The purpose of this project was to come up with an efficient and effective Agribank POS system that would meet the user's needs timelessly. This project was done in five main phases, which are Introduction, Planning, Analysis, Design and Implementation Phases. The introduction phase is an introduction of the research study and a historical background of the organization. The planning phase details the scheduling of the study and a feasibility study which was conducted to evaluate viability of the system. From the feasibility study, the project proved to be feasible. During the analysis phase, the researcher analyzed the weaknesses and strengths of the current or existing system and evaluated whether to develop, improve or outsource the software. User requirements were gathered using questionnaires, interviews and observations. After analysis phase, the design phase followed. A database was designed using MSSQL Database management system, input forms, menus and output forms using diagrams to illustrate the major functionalities of the Agribank POS system. The last phase was implementation, where the implementation of the proposed system, testing and maintenance were carried out continuously identifying and rectifying any errors. Parallel conversion was recommended when the project was implemented.

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APPENDIX A: USER MANUAL

The user manual is designed to equip the users with the necessary knowledge of the operating system without any problems. Within the user manual step on how to operate the system will be revealed to the user for them not encounter some challenges as they navigate through the system. This is important to the users of the system as it guides him or her on how to use the system. It informs him or her on what to do in cases where the system reacts in an unusual manner.

Main Menu

To gain access to the system every user should be authenticated. When the user types the website's URL in the browser, the login page is displayed. The login page is shown below. Depending on the user access level when adding the user the user is directed to the respective subsystem that is the either echannels or ebaking or branch or audit home. The user should input username and password on the form shown below to access the system.



AGRIBANK

POS Support Systems

[LOGIN](#) [REGISTER](#)

User Home

If the user logs into the system, then the user is directed to the page with the User Home. The user will be able to view a summary of activities that would have taken place 30 days prior to the present and this includes transaction reports, request reports, in-active and active terminal reports like shown below:

POS Support System Keith Chikwana
e-channels

Home Customers Accounts Terminals Tellers Transactions POS Machines Requests Reports Users Documentation

Dashboard

3 250 Customers	3 249 Accounts	5 673 Terminals	837 Tellers	4 642 POS Machines	7 Requests
--------------------	-------------------	--------------------	----------------	-----------------------	---------------

Quick links

New Terminal	Reallocation	Change of Details	POS Repair	Terminal Testing	POS Hire
Change Account	Change Customer	Add Customer	Add Account	Issue Terminal	Return Terminal
Add Teller	Add POS Log	Add POS Batch	Add POS Transfer	Run Reports	

Summary

01/01/2018 Choose Branch

Transactions Report

774 721 Total	627 539 Merchant	133 579 Agency	6 877 Teller	6 726 MPOS
------------------	---------------------	-------------------	-----------------	---------------

Transaction Types	Response Codes	774 721 Count	0 Min
00 Goods and services 561 438	00 Approved or completed successfully 664 438	19 950 Max	25 Avg
31 Balance inquiry 124 207	51 Not sufficient funds 45 077	19 533 776 Sum	
01 Cash withdrawal 72 832	01 Refer to card issuer 17 713		
09 Goods and services with cash back 8 216	55 Incorrect PIN 17 625		
21 Deposit 4 592	91 Issuer or switch inoperative 14 122		

Administration Home - If the user log into the system as an Administrator, the user is directed to the page with the Administrator menu, the Administrator Home shown below:

POS Support System Keith Chikwana
e-channels

Home Customers Accounts Terminals Tellers Transactions POS Machines Requests Reports Users Documentation

Dashboard

3 250 Customers	3 249 Accounts	5 673 Terminals	837 Tellers	4 642 POS Machines	7 Requests
--------------------	-------------------	--------------------	----------------	-----------------------	---------------

Quick links

New Terminal	Reallocation	Change of Details	POS Repair	Terminal Testing	POS Hire
Change Account	Change Customer	Add Customer	Add Account	Issue Terminal	Return Terminal
Add Teller	Add POS Log	Add POS Batch	Add POS Transfer	Run Reports	

Summary

01/01/2018 Choose Branch

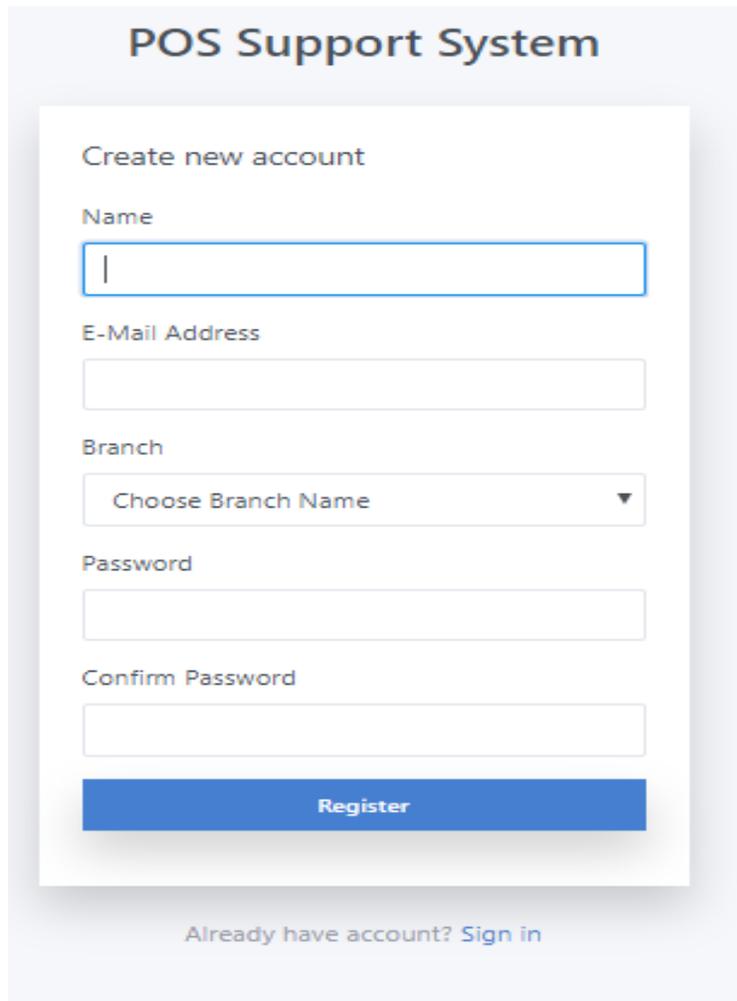
Transactions Report

774 721 Total	627 539 Merchant	133 579 Agency	6 877 Teller	6 726 MPOS
------------------	---------------------	-------------------	-----------------	---------------

Transaction Types	Response Codes	774 721 Count	0 Min
00 Goods and services 561 438	00 Approved or completed successfully 664 438	19 950 Max	25 Avg
31 Balance inquiry 124 207	51 Not sufficient funds 45 077	19 533 776 Sum	
01 Cash withdrawal 72 832	01 Refer to card issuer 17 713		
09 Goods and services with cash back 8 216	55 Incorrect PIN 17 625		
21 Deposit 4 592	91 Issuer or switch inoperative 14 122		

New User Registration

This page allows a client to enter his or her personal details, name, email address, branch and password. Upon clicking the register button, the new user's account is created and the new user becomes a member. The administrator should input the user details to add a user as shown below.



The image shows a registration form titled "POS Support System". The form is titled "Create new account" and contains the following fields:

- Name:** A text input field with a vertical cursor.
- E-Mail Address:** A text input field.
- Branch:** A dropdown menu with the text "Choose Branch Name" and a downward arrow.
- Password:** A text input field.
- Confirm Password:** A text input field.

At the bottom of the form is a blue button labeled "Register". Below the form, there is a link that says "Already have account? Sign in".

Request new terminal- This allows the user to request for a POS terminal and the user is to fill in the client's details for them to request a terminal.

New Terminal Request

Account Info

Account Number

Terminal Info

Trade Name

Location

Terminal Type

Choose Terminal Type

Number of Terminals required

Justification

Proof Of Payment (If MPOS Request)

Choose file

Browse

Request Terminal (s)

Reallocation request- This is to make a reallocation request that is to reallocate a POS terminal from one client to another for various reasons.

Reallocation Request

Terminal Info

Terminal ID

New Beneficiary Info

Account Number

Trade Name

Location

Create Reallocation Request

POS Hire Request-this is where one creates a POS Hire request that is a client hires a POS terminal for instance when one has a wedding they can just hire a POS terminal for the day only.

POS Hire

Info

Customer ID

Terminal ID (request for a valid terminal id from agency banking)

Account

Bank

Choose Bank ▼

Proof Of Payment (Not required)

Choose file

Change Account Details-This form shows how the account can be changed on a POS terminal in the event that a client is changing the account number to credit the POS transactions.

Change Account

Old Account Info

Account

New Account Info

Account

Branch

Terminal testing - This is used when the ICT department is doing some configurations or some tests to be done on the POS machine. The POS terminal is temporarily activated for 20 mins and it automatically deactivates when the time.

POS Testing Request

Terminal Info

Terminal ID

Serial Number

Create POS Testing Request

Report Generating- This is a report generating platform where the user generates any of the reports that are listed depending with the filters used

Reports					Search something... <input type="text"/>
ID	NAME	DESCRIPTION	TYPE	SECTION	
1	Transactions Report	Shows a list of transaction based on given filters	instant	Transactions	View
2	Requests Report	Shows a list of requests based on given filters	instant	requests	View
3	Terminals Report	Shows a list of terminals based on given filters	instant	terminals	View
4	POSMachines Report	Shows a list of pos machines based on given filters	instant	pos-machines	View
5	Customer Report	Shows a list of customer based on given filters	instant	customers	View
6	Accounts Report	Shows a list of accounts based on given filters	instant	accounts	View
7	Tellers Report	Shows a list of teller based on given filters	instant	tellers	View
8	POSLogs Report	Shows a list of POSLogs based on given filters	instant	pos-logs	View
9	POSBatches Report	Shows a list of POSBatches based on given filters	instant	pos-batches	View
10	POSTransfers Report	Shows a list of POSTransfers based on given filters	instant	pos-transfers	View
11	In-active Terminals Report	Show a list of all active terminal but they are not transacting	instant	terminals	View
12	Active Terminals	Show a list of active terminals and transacting	instant	terminals	View
13	Returns	Show a list of terminals Returned to the bank	instant	terminals	View
14	Issues	Show a list of terminals Issues to customers	instant	terminals	View
15	POSHires	Shows the list of POS Hires	instant	terminals	View
16	Users	Shows lists of user based on the filters	instant	users	View

APPENDIX B: INTERVIEW CHECKLIST

Section 1

Name of interviewer.....

Interviewee position and department.....

Section 2: Questions for users of the client system

1. Can you give a brief description of the current system and what are the problems are you currently facing with traditional banking?
2. What are the activities you carry out in your department you consider manual and need to be automated?
3. What do you understand by the term virtual banking?
4. Do you understand the objectives and functionality of virtual banking?
5. What are the key aspects of the proposed system usability or security issues?
6. Will the virtual banking make your work easier and how?
7. Does the current system produce reports? Who requires the reports and what kind of reports?
8. Do you think the introduction of POS system will solve the problems with traditional banking?

Section 3: Questions for the bank's clients'

1. What is the main reason that you typically visit your bank?
2. What are the activities you carry out when you visit the bank you consider manual and need to be automated?

3. What do you understand by the term POS management?
4. Are you willing to have your account details, name and address on a central database accessed by different branches and departments online?
5. Do you think the introduction of virtual banking will solve the problems with traditional banking?

APPENDIX C: QUESTIONNAIRE

I am Chikwana Keith P, a student at the Midlands State University in Zimbabwe pursuing a Degree in Information Systems. One of the requirements for this award is a project report with a running software system. This questionnaire is designed to find out the requirements for the above mentioned system (Agribank POS support system).

I therefore kindly request you to assist me with the required information in this questionnaire. I promise to keep all the given information confidential and highly guard due rights. Thank you for your cooperation.

WORKERS AND MANAGERIAL QUESTIONNAIRE

Name of department.....

Gender male female

Job Title.....

Level of education Degree Diploma Certificate

Other specify

Qsn1. What are the activities you carry out in your department you consider manual and need to be automated?

.....
.....
.....
.....

Qsn2. Can you give a brief description of the current system and what are the problems are you currently facing with traditional banking?

.....
.....

Qsn3. What do you understand by the term POS management?

.....
.....
.....
.....

Qsn4. Do you understand the objectives and functionality of POS management?

.....
.....
.....
.....
.....

.....
.....
Qsn5. What are the key aspects of the proposed system usability or security issues?

.....
.....
Qsn6. Will the system make your work easier and how?

.....
.....
Qsn7. Does the current system produce reports? Who requires the reports and what kind of reports?

.....
.....
Qsn8. Do you think the introduction of POS system will solve the problems with traditional banking?

.....
Thank you for this great contribution.

APPENDIX D: OBSERVATION SCORE SHEET

Name of observant:

Name of observer:

Date:

Time:

Focus of observation:
.....
Brief description of current system:
.....
.....
.....
.....
Areas of strength:
.....
.....
.....
.....


```

<div class="card-body">
  <div class="card-title">Create new account</div>
  <form method="POST" action="{{ route('register') }}">
    @csrf
    <div class="form-group">
      <label for="name" class="">{{ __('Name') }}</label>
      <input id="name" type="text" class="form-control" {{ $errors->has('name') ?
' is-invalid' : " }}" name="name" value="{{ old('name') }}" required autofocus>
      @if ($errors->has('name'))
        <span class="invalid-feedback" role="alert">
          <strong>{{ $errors->first('name') }}</strong>
        </span>
      @endif
    </div>

    <div class="form-group">
      <label for="email" class="">{{ __('E-Mail Address') }}</label>
      <input id="email" type="email" class="form-control" {{ $errors->has('email')
? ' is-invalid' : " }}" name="email" value="{{ old('email') }}" required>
      @if ($errors->has('email'))
        <span class="invalid-feedback" role="alert">
          <strong>{{ $errors->first('email') }}</strong>
        </span>
      @endif
    </div>

    <div class="form-group">
      <label for="branch_code" class="">Branch</label>
      <select id="branch_code" type="branch_code" class="form-control" {{
$errors->has('branch_code') ? ' is-invalid' : " }}" name="branch_code" value="{{
old('branch_code') }}" required>

```

```

        <option value="">Choose Branch Name</option>
        @foreach( $branches as $branch )
            <option value="{{ $branch->branch_code }}" {{ old('branch_code')
=== $branch->branch_code ? 'selected' : " }}>{{ $branch->short_name }} - {{ $branch->name
}}</option>

        @endforeach
    </select>
    @if ($errors->has('branch_code'))
        <span class="invalid-feedback" role="alert">
            <strong>{{ $errors->first('branch_code') }}</strong>
        </span>
    @endif
</div>

<div class="form-group ">
    <label for="password" class="">{{ __( 'Password' ) }}</label>
    <input id="password" type="password" class="form-control {{ $errors-
>has('password') ? ' is-invalid' : " }}" name="password" required>
    @if ($errors->has('password'))
        <span class="invalid-feedback" role="alert">
            <strong>{{ $errors->first('password') }}</strong>
        </span>
    @endif
</div>

<div class="form-group ">
    <label for="password-confirm" class="">{{ __( 'Confirm Password' )
}}</label>
    <input id="password-confirm" type="password" class="form-control"
name="password_confirmation" required>

```

```

        </div>

        <div class="form-group ">
            <button type="submit" class="btn btn-primary btn-block shadow-lg
rounded-0">
                {{ __('Register') }}
            </button>
        </div>
    </form>
</div>
</div>
<div class="text-center text-muted">
    Already have account? <a href="{{ route('login') }}">Sign in</a>
</div>
</div>
</div>
</div>
</div>
@endsection

```

Login to the system

```

@extends('layouts.app')

@section('content')
    <div class="container">
        <div class="row justify-content-center">
            <div class="col col-login mx-auto">
                <div class="text-center mb-6">
                    <h2>POS SUPPORT SYSTEM</h2>
                </div>
                <div class="card rounded-0 shadow-lg border-0">
                    <div class="card-body">

```

```

    <div class="card-title">Login to your account</div>
</div>
@if(session()->has('message'))
    <div class="card-alert alert alert-icon alert-success text-center">
        <i class="fe fe-check mr-2" aria-hidden="true"></i> {!! session()-
>get('message') !!}
    </div>
@endif
<div class="card-body p-6">
    <form method="POST" action="{{ route('login') }}">
        @csrf
        <div class="form-group ">
            <label for="email">{{ __('E-Mail Address') }}</label>
            <input id="email" type="email" class="form-control {{ $errors->has('email')
? 'is-invalid' : " }}" name="email" value="{{ old('email') }}" required autofocus>
            @if ($errors->has('email'))
                <span class="invalid-feedback" role="alert">
                    <strong>{{ $errors->first('email') }}</strong>
                </span>
            @endif
        </div>

        <div class="form-group ">
            <label for="password">{{ __('Password') }}</label>
            <input id="password" type="password" class="form-control {{ $errors-
>has('password') ? 'is-invalid' : " }}" name="password" required>

            @if ($errors->has('password'))
                <span class="invalid-feedback" role="alert">
                    <strong>{{ $errors->first('password') }}</strong>
                </span>
            @endif
        </div>
    </form>
</div>

```

```

    @endif
  </div>

  <div class="form-group">
    <div class="form-check">
      <input class="form-check-input" type="checkbox" name="remember"
id="remember" {{ old('remember') ? 'checked' : '' }}>

      <label class="form-check-label" for="remember">
        {{ __('Remember Me') }}
      </label>
    </div>
  </div>

  <div class="form-group">
    <button type="submit" class="btn btn-primary btn-block shadow-lg
rounded-0">
      {{ __('Login') }}
    </button>
  </div>

  <div class="form-group mb-0 text-center">
    @if (Route::has('password.request'))
      <a class="btn btn-link" href="{{ route('password.request') }}">
        {{ __('Forgot Your Password?') }}
      </a>
    @endif
  </div>
</form>
</div>
</div>

```

```

    <div class="text-center text-muted">
      Don't have account yet? <a href="{{ route('register') }}">Sign up</a>
    </div>
  </div>
</div>
</div>
</div>

```

@endsection

New terminal request

```

@extends('layouts.dashboard' , [ 'title' => 'Requests' , 'active' => 'requests' ])
@section('content')
  <div class="container py-6">
    <div class="row justify-content-center">
      <div class="col-lg-4">
        @include('includes.request-info' , [ 'request' => $request ] )

        <div class="card bg-transparent border-0 rounded-0 shadow-none">
          <div class="card-header">
            <h5 class="card-title">Request Data</h5>
          </div>
          <table class="card-table table bg-white shadow-sm table-hover">
            <tbody>
              <tr>
                <td class="small"><strong> Trade Name :</strong></td>
                <td class="text-right">{{ $request->data['trade_name'] }}</td>
              </tr>
              <tr>
                <td class="small"><strong> Account :</strong></td>
                <td class="text-right">{{ $request->data['account'] }}</td>
              </tr>
            </tbody>
          </table>
        </div>
      </div>
    </div>
  </div>

```

```

        <tr>
            <td class="small"><strong> Location :</strong></td>
            <td class="text-right">{{ $request->data['location'] }}</td>
        </tr>
        <tr>
            <td class="small"><strong> Terminal Type :</strong></td>
            <td class="text-right">{{ $request->data['terminal_type'] }}</td>
        </tr>
        <tr>
            <td class="small"><strong> Number :</strong></td>
            <td class="text-right">{{ $request->data['number'] }}</td>
        </tr>
        <tr>
            <td class="small"><strong> Reason :</strong></td>
            <td class="text-right">{{ $request->data['reason'] }}</td>
        </tr>
        @if (isset($request->data['proof']))
            <tr>
                <td class="small"><strong> Proof :</strong></td>
                <td class="text-right"><a href="/download/proof/{{ $request->id }}"
class="btn btn-secondary btn-sm">Download</a></td>
            </tr>
        @endif
    </tbody>
</table>
</div>
</div>
<div class="col-lg-8">

    <div class="card bg-transparent border-0 rounded-0 shadow-none">
        <div class="card-header">

```

```

    <h5 class="card-title">Resolution</h5>
</div>
@if( $request->resolution )
    <table class="card-table table bg-transparent table-hover">
        <thead>
            <tr>
                <th>Terminal ID</th>
                <th>Trade Name</th>
                <th>Location</th>
                <th>Account</th>
                <th>Type</th>
            </tr>
        </thead>
        <tbody class="bg-white shadow-sm">
            @foreach( $request->resolution['terminals'] as $terminal )
                <tr>
                    <td>{{ $terminal['terminal_id'] }}</td>
                    <td>{{ $terminal['trade_name'] }}</td>
                    <td>{{ $terminal['location'] }}</td>
                    <td>{{ $terminal['account_id'] }}</td>
                    <td>{{ $terminal['terminal_type'] }}</td>
                </tr>
            @endforeach
        </tbody>
    </table>
@else
    <div class="card-body">
        <h4 class="text-center">Request Not Implemented </h4>
    </div>
@endif
</div>

```

```

    @include('includes.request-history-info' , [ 'audits' => $audits ] )
  </div>
</div>
</div>
@endsection

```

Reallocation Request

```

@extends('layouts.dashboard' , [ 'title' => 'Requests' , 'active' => 'requests' ])
@section('content')
  <div class="container py-6">
    <div class="row justify-content-center">
      <div class="col-lg-4">
        @include('includes.request-info' , [ 'request' => $request ] )

        <div class="card bg-transparent border-0 rounded-0 shadow-none">
          <div class="card-header">
            <h5 class="card-title">Request Data</h5>
          </div>
          <table class="card-table table bg-white shadow-sm table-hover">
            <tbody>
              <tr>
                <td class="small"><strong> Terminal :</strong></td>
                <td class="text-right">{{ $request->data['terminal'] }}</td>
              </tr>
              <tr>
                <td class="small"><strong>New Account :</strong></td>
                <td class="text-right">{{ $request->data['new']['account'] }}</td>
              </tr>
              <tr>
                <td class="small"><strong>New Trade Name :</strong></td>
                <td class="text-right">{{ $request->data['new']['trade_name'] }}</td>
              </tr>
            </tbody>
          </table>
        </div>
      </div>
    </div>
  </div>

```

```

        </tr>
        <tr>
            <td class="small"><strong>New Location :</strong></td>
            <td class="text-right">{{ $request->data['new']['location'] }}</td>
        </tr>
    </tbody>
</table>
</div>
</div>
<div class="col-lg-8">

    <div class="card bg-transparent border-0 rounded-0 shadow-none">
        <div class="card-header">
            <h5 class="card-title">Resolution</h5>
        </div>
        @if( $request->resolution )
            <table class="card-table table bg-white shadow-sm table-hover">
                <thead>
                    <tr>
                        <th>OLD</th>
                        <th>NEW</th>
                    </tr>
                </thead>
                <tbody>
                    <tr>
                        @foreach($request->resolution as $item )
                            <td>
                                @foreach( $item as $key => $value )
                                    <div class="small" style="font-weight: bolder">{{ str_replace('_',',',
ucwords($key) ) }}</div>
                                    <div>{{ $value }}</div>
                                </td>
                            </td>
                        </td>
                    </tr>
                </tbody>
            </table>
        @endif
    </div>
</div>

```

```

        @endforeach
    </td>
    @endforeach
</tr>
</tbody>
</table>
@else
<div class="card-body">
    <h4 class="text-center"> Request Not Implemented </h4>
</div>
@endif
</div>
@include('includes.request-history-info' , [ 'audits' => $audits ] )
</div>
</div>
</div>
@endsection

```

Dashboard quick links

```

<!doctype html>
<html lang="{{ str_replace('_', '-', app()->getLocale()) }}">
<head>
    <meta charset="UTF-8">
    <meta name="csrf-token" content="{{ csrf_token() }}">

    <meta name="viewport" content="width=device-width, user-scalable=no, initial-scale=1.0,
maximum-scale=1.0, minimum-scale=1.0">

```

```

<meta http-equiv="X-UA-Compatible" content="ie=edge">
<meta http-equiv="Content-Language" content="en" />
<meta name="msapplication-TileColor" content="#2d89ef">
<meta name="theme-color" content="#4188c9">
<meta name="apple-mobile-web-app-status-bar-style" content="black-translucent"/>
<meta name="apple-mobile-web-app-capable" content="yes">
<meta name="mobile-web-app-capable" content="yes">
<meta name="HandheldFriendly" content="True">
<meta name="MobileOptimized" content="320">
<link rel="icon" href="{{ asset('favicon.ico') }}" type="image/x-icon"/>
<link rel="shortcut icon" type="image/x-icon" href="{{ asset('favicon.ico') }}" />

<title>{{ config('app.name', 'Laravel') .' | '. $title }}</title>

<!-- Dashboard Core -->
<link href="{{ asset('css/argon-dash.css') }}" rel="stylesheet" />
<link href="{{ asset('/assets/css/dashboard.css') }}" rel="stylesheet" />

@yield('css')

<style>
    @media (min-width: 1000px){
        .container {
            max-width: 95%;
        }
    }
</style>

</head>
<body class="">
<div id="app">

```

```

<div class="page">
  <div class="page-main">
    <div class="fixed-top">
      <div class="shadow-sm">
        <div class="header py-4">
          <div class="container">
            <div class="d-flex">
              <a class="header-brand" href="/home">
                 {{ config('app.name', 'Dash') }}
              </a>
              <div class="d-flex order-lg-2 ml-auto">
                <div class="dropdown">
                  <a href="#" class="nav-link pr-0 leading-none" data-
toggle="dropdown">
                    <span class="avatar avatar-green">{{ Auth::user()->short_name
}}</span>
                    <span class="ml-2 d-none d-lg-block">
                      <span class="text-default"> {{ Auth::user()->name }} </span>
                      <small class="text-muted d-block mt-1">{{ Auth::user()->role_name-
>name }}</small>
                    </span>
                  </a>
                  <div class="dropdown-menu dropdown-menu-right dropdown-menu-
arrow">
                    <a class="dropdown-item" href="/users/my-profile">
                      <i class="dropdown-icon fe fe-user"></i> Profile
                    </a>
                    <div class="dropdown-divider"></div>
                    <a class="dropdown-item" href="{{ route('logout') }}"
onclick="event.preventDefault();

```

```

        document.getElementById('logout-form').submit();">
        {{ __( 'Logout' ) }}
    </a>
    <form id="logout-form" action="{{ route('logout') }}"
method="POST" style="display: none;">
        @csrf
    </form>
    </div>
    </div>
    </div>
    <div>
    <a href="#" class="header-toggler d-lg-none ml-3 ml-lg-0" data-
toggle="collapse" data-target="#headerMenuCollapse">
        <span class="header-toggler-icon"></span>
    </a>
    </div>
    </div>
    </div>
    <div class="header collapse d-lg-flex p-0" id="headerMenuCollapse">
    <div class="container">
    <div class="row align-items-center">
    <div class="col-lg order-lg-first">
    <ul class="nav nav-tabs border-0 flex-column flex-lg-row small">
    <li class="nav-item">
    <a href="/home?start_date={{ now()->subMonth(1)->format('Y-m-
d') }}" class="nav-link {{ $active == 'home' ? 'active' : '' }}"><i class="fe fe-bar-chart mr-
3"></i>Home</a>
    </li>
    <li class="nav-item dropdown">
    <a href="javascript:void(0)" class="nav-link {{ $active ==
'customers' || $active == 'customers-create' ? 'active' : '' }}" data-toggle="dropdown"><i
class="fe fe-users mr-3"></i>Customers</a>

```

```

        <div class="dropdown-menu dropdown-menu-arrow">
            <a href="/customers/all" class="dropdown-item {{ $active ==
'customers' ? 'active' : " }}"><i class="fe fe-users mr-3"></i>All Customers</a>
            @can('input', \App\models\system\Input::class )
                <a href="/customers/add" class="dropdown-item {{ $active ==
'customers-create' ? 'active' : " }}"><i class="fe fe-plus-circle mr-3"></i>Add Customer</a>
            @endcan
        </div>
    </li>

    <li class="nav-item dropdown">
        <a href="javascript:void(0)" class="nav-link {{ $active == 'accounts'
|| $active == 'accounts-create' ? 'active' : " }}" data-toggle="dropdown"><i class="fe fe-link mr-
3"></i>Accounts</a>
        <div class="dropdown-menu dropdown-menu-arrow">
            <a href="/accounts/all" class="dropdown-item {{ $active ==
'accounts' ? 'active' : " }}"><i class="fe fe-link mr-3"></i>All Accounts</a>
            @can('input', \App\models\system\Input::class )
                <a href="/accounts/add" class="dropdown-item {{ $active ==
'accounts-create' ? 'active' : " }}"><i class="fe fe-plus-circle mr-3"></i>Add Accounts</a>
            @endcan
        </div>
    </li>

    <li class="nav-item dropdown">
        <a href="javascript:void(0)" class="nav-link {{ $active == 'terminals'
|| $active == 'pos-hire' ? 'active' : " }}" data-toggle="dropdown"><i class="fe fe-git-pull-request
mr-3"></i>Terminals</a>
        <div class="dropdown-menu dropdown-menu-arrow">
            <a href="/terminals/all" class="dropdown-item {{ $active ==
'terminals' ? 'active' : " }}"><i class="fe fe-git-pull-request mr-3"></i>All Terminals</a>

```

```

        <a href="/terminals/issues" class="dropdown-item {{ $active ==
'issues' ? 'active' : " }}"><i class="fe fe-arrow-up mr-3"></i>All Issues</a>
        <a href="/terminals/returns" class="dropdown-item {{ $active ==
'returns' ? 'active' : " }}"><i class="fe fe-arrow-down mr-3"></i>All Returns</a>
        @can('create' , \App\models\POSHire::class )
        <a href="/pos-hire/all" class="dropdown-item {{ $active ==
'pos-hire' ? 'active' : " }}"><i class="fe fe-credit-card mr-3"></i>POS Hire</a>
        @endcan
    </div>
</li>

<li class="nav-item dropdown">
    <a href="javascript:void(0)" class="nav-link {{ $active == 'tellers' ||
$active == 'tellers-create' ? 'active' : " }}" data-toggle="dropdown"><i class="fe fe-smartphone
mr-3"></i>Tellers</a>
    <div class="dropdown-menu dropdown-menu-arrow">
        <a href="/tellers/all" class="dropdown-item {{ $active == 'tellers'
? 'active' : " }}"><i class="fe fe-git-pull-request mr-3"></i>All Tellers</a>
        @can('input' , \App\models\system\Input::class )
        <a href="/tellers/add" class="dropdown-item {{ $active ==
'tellers-create' ? 'active' : " }}"><i class="fe fe-plus-circle mr-3"></i>Add Tellers</a>
        @endcan
    </div>
</li>

<li class="nav-item">
    <a href="/transactions/all" class="nav-link {{ $active ==
'transactions' ? 'active' : " }}"><i class="fe fe-activity"></i>Transactions</a>
</li>

<li class="nav-item dropdown">

```

```

        <a href="javascript:void(0)" class="nav-link {{ $active == 'pos-
machines' || $active == 'pos-logs' || $active === 'pos-batches' || $active === 'pos-transfer' ?
'active' : '' }}" data-toggle="dropdown"><i class="fe fe-git-commit mr-3"></i>POS
Machines</a>

        <div class="dropdown-menu dropdown-menu-arrow">

            <a href="/pos-machines/all" class="dropdown-item {{ $active ==
'pos-machines' ? 'active' : '' }}"><i class="fe fe-git-commit mr-3"></i>POS Machines</a>
            <a href="/pos-logs/all" class="dropdown-item {{ $active ===
'pos-logs' ? 'active' : '' }}"><i class="fe fe-alert-octagon mr-3"></i>Logs</a>
            @can('input', \App\models\system\Input::class )
                @can('all', \App\models\POSTransferBatch::class)
                    <a href="/pos-transfer-batches/all" class="dropdown-
item"><i class="fe fe-layers mr-3"></i>Transfer Batches</a>
                @endcan
                <a href="/pos-transfer-batches/mine" class="dropdown-
item"><i class="fe fe-user mr-3"></i>My Transfer Batches</a>
            @can('all', \App\models\POSTransfer::class)
                <a href="/pos-transfers/all" class="dropdown-item"><i
class="fe fe-bookmark mr-3"></i>POS Transfer</a>
            @endcan
            <!-- <a href="/pos-transfers/mine" class="dropdown-item"><i
class="fe fe-user mr-3"></i>My POS Transfer</a -->
            @endcan
        </div>
    </li>
    <li class="nav-item dropdown">
        <a href="javascript:void(0)" class="nav-link {{ $active == 'requests'
|| $active == 'requests-my-requests' ? 'active' : '' }}" data-toggle="dropdown"><i class="fe fe-
calendar mr-3"></i>Requests</a>
        <div class="dropdown-menu dropdown-menu-arrow">

```

```

        <a href="/requests/all" class="dropdown-item {{ $active ==
'requests' ? 'active' : " }}"><i class="fe fe-calendar mr-3"></i>All Requests</a>
        <a href="/requests/my-requests" class="dropdown-item {{ $active
== 'requests-my-requests' ? 'active' : " }}"><i class="fe fe-user mr-3"></i>My Requests</a>
    </div>
</li>
<li class="nav-item dropdown">
    <a href="javascript:void(0)" class="nav-link {{ $active == 'reports' ?
'active' : " }}" data-toggle="dropdown"><i class="fe fe-file-text mr-3"></i>Reports</a>
    <div class="dropdown-menu dropdown-menu-arrow">
        <a href="/reports/all" class="dropdown-item {{ $active ==
'reports' ? 'active' : " }}"><i class="fe fe-file-text"></i>Run Reports</a>
        <a href="/reports/reports-run/all?user={{ auth()->id() }}"
class="dropdown-item {{ $active == 'reports-my-requests' ? 'active' : " }}"><i class="fe fe-user
mr-3"></i>My Reports</a>
        <a href="/reports/reports-run/all" class="dropdown-item {{
$active == 'reports-all' ? 'active' : " }}"><i class="fe fe-folder mr-3"></i>All Reports</a>
    </div>
</li>
@can('view',\App\User::class)
<li class="nav-item dropdown">
    <a href="javascript:void(0)" class="nav-link {{ $active == 'users' ?
'active' : " }}" data-toggle="dropdown"><i class="fe fe-user mr-3"></i>Users</a>
    <div class="dropdown-menu dropdown-menu-arrow">
        <a href="/users/all" class="dropdown-item {{ $active == 'users'
? 'active' : " }}"><i class="fe fe-users mr-3"></i>All Users</a>
    </div>
</li>
@endcan
<li class="nav-item">
    <a href="/how-to/all" class="nav-link {{ $active == 'Documentation'

```



```
        </div>
    </div>
</div>
</footer>
</div>
</div>
<script src="{{ asset('js/app.js') }}"></script>
<script src="{{ asset('assets/js/core.js') }}"></script>
@yield('scripts')
</body>
</html>
```