

ZESA EXPENSE REIMBURSEMENT CENTRE

MIDLANDS STATE UNIVERSITY



JOHANES MAKWARI

[R152005Z]

ZESA EXPENSE REIMBURSEMENT CENTRE
MIDLANDS STATE UNIVERSITY



BY

JOHANES MAKWARI

Submitted in partial fulfilment of the requirement for the degree of

BSc Information Systems

Department of Computer Science and Information Systems in the

Faculty of Science and Technology at the

Midlands State University

GWERU

December, 2018

Supervisor: MS MUGONIWA

ABSTRACT

Zesa Holdings employees are following long-winded expense approval processes which are delaying reimbursements. Reimbursement cycles are running into quite a lot of weeks, and sometimes even months before approvals and there is absence of proper feedback to claimants during approval workflows. The current paper-based solution for expense claim approvals has problems doing with missing claim forms and signature forgery. At the same time some employees are exaggerating field trip expenses, falsifying number of claims, submission of fraudulent bills, and misuse of company funds all of which are depriving Zesa Holdings' financial status.

DECLARATION

I JOHANES MAKWARI do hereby pronounce that I am the writer of this dissertation. I allow Midlands State University to offer my hypothesis to other institutions for academic research purposes.

Signature_____ Date_____

APPROVAL

This project entitled **Zesa Expense Reimbursement Centre** by **JOHANES MAKWARI** meets the regulations governing the award of the degree of Bsc Information Systems Honours of the Midlands State University, and is approved for its contribution to knowledge and literary presentation.

Supervisor _____ **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. I also want to thank and emphasize love to my **Family** for motivation, support and being proud of me, which always makes my dreams come true. Special thanks **Mrs Mugoniwa** who contributed immensely throughout the entire project. Lastly to my **colleagues** who are playing vital roles in my studies, **I THANK YOU** so much!!

DEDICATION

I dedicate this dissertation to my mother and father for they are the ones who laid the foundation I stand on now, my colleagues for the support and motivation throughout the project. May the dear Lord bless you and bless you always.

TABLE OF CONTENTS

| | |
|---|------|
| ABSTRACT..... | i |
| APPROVAL | vi |
| ACKNOWLEDGEMENTS | vii |
| DEDICATION | viii |
| LIST OF ACCRONYMS..... | xiii |
| LIST OF FIGURES | xiv |
| LIST OF TABLES | xv |
| CHAPTER 1: INTRODUCTION | 1 |
| 1.1 INTRODUCTION OF THE STUDY..... | 1 |
| 1.2.1 BACKGROUND OF THE ORGANISATION | 1 |
| 1.2.2 ZESA ORGANISATIONAL STRUCTURE..... | 2 |
| 1.2.3 VISION OF THE ORGANIZATION..... | 3 |
| 1.3 PROBLEM DEFINITION OF THE STUDY | 3 |
| 1.4 AIM OF THE STUDY | 4 |
| 1.5 OBJECTIVES OF THE STUDY | 4 |
| 1.6 INSTRUMENTS AND METHODS..... | 5 |
| METHODS FOR ZERC DEVELOPMENT | 6 |
| 1.7 JUSTIFICATION AND RATIONALE OF THE SYSTEM | 6 |
| 1.8 CONCLUSION | 6 |
| CHAPTER 2: PLANNING PHASE | 7 |
| 2.1 INTRODUCTION..... | 7 |
| 2.2 BUSINESS VALUE OF THE PROPOSED SYSTEM | 7 |
| I, MANAGERIAL VALUE | 7 |
| II. SHAREHOLDER VALUE..... | 7 |
| 2.3 ANALYSE FEASIBILITY | 8 |
| 2.3.1 TECHNICAL FEASIBILITY | 8 |
| 2.3.2 ECONOMIC FEASIBILITY..... | 9 |
| COST-BENEFIT ANALYSIS | 11 |
| OPERATIONAL COSTS..... | 12 |
| TANGIBLE BENEFITS TO BE BROUGHT BY ZERC | 12 |
| INTANGIBLE BENEFITS | 13 |
| 2.3.3 SOCIAL FEASIBILITY OF ZERC | 14 |

| | |
|---|----|
| 2.3.4 OPERATIONAL FEASIBILITY | 15 |
| 2.4 RISK ANALYSIS | 15 |
| 2.4.1 TECHNICAL RISKS | 15 |
| 2.4.2 ECONOMIC RISKS..... | 16 |
| 2.4.3 OPERATIONAL RISK | 16 |
| 4.3.4 SOCIAL RISK ANALYSIS | 17 |
| 2.5 STAKEHOLDER ANALYSIS | 17 |
| 2.5.1 MANAGERS..... | 17 |
| 2.5.2 EMPLOYEES OR CLAIMANTS..... | 17 |
| 2.5.3 INVESTORS AND SHAREHOLDERS | 18 |
| 2.4 WORK PLAN FOR ZERC DEVELOPMENT..... | 18 |
| 2.4 CONCLUSION..... | 19 |
| 3.1 INTRODUCTION..... | 20 |
| 3.2 INFORMATION GATHERING | 20 |
| 3.2.1 INTERVIEWS..... | 20 |
| 3.2.2 OBSERVATIONS..... | 21 |
| 3.3 ANALYSIS OF EXISTING SYSTEM..... | 22 |
| 3.4 PROCESS ANALYSIS | 22 |
| 3.5 DATA ANALYSIS | 23 |
| 3.6 WEAKNESSES OF CURRENT SYSTEM..... | 25 |
| 3.7 EVALUATE ALTERNATIVES..... | 26 |
| 3.7.1 OUTSOURCE | 26 |
| 3.7.2 IMPROVEMENT | 27 |
| 3.7.3 DEVELOPMENT..... | 27 |
| 3.8 REQUIREMENTS ANALYSIS | 28 |
| 3.8.1 FUNCTIONAL REQUIREMENTS | 28 |
| 3.8.2 NON-FUNCTIONAL REQUIREMENTS..... | 29 |
| 3.9 CONCLUSION | 30 |
| CHAPTER 4: DESIGN PHASE..... | 31 |
| 4.1 INTRODUCTION..... | 31 |
| 4.2 SYSTEM DESIGN | 31 |
| 4.2.1 CONTEXT DIAGRAM | 31 |
| 4.3 ARCHITECTURAL DESIGN..... | 34 |

| | |
|--|----|
| 4.3.1 HOW SOFTWARE AND HARDWARE INTERACT..... | 35 |
| 4.4 PHYSICAL DESIGN..... | 35 |
| 4.5. DATABASE DESIGN..... | 36 |
| 4.6 PROGRAM DESIGN..... | 40 |
| 4.7 INTERFACE DESIGN..... | 41 |
| 4.7.1 MENU DESIGN..... | 41 |
| 4.7.1.1 MENU DESIGNS..... | 41 |
| 4.7.3. OUTPUT DESIGN..... | 45 |
| 4.8 PSEUDO CODE..... | 47 |
| 4.9 SECURITY DESIGN..... | 49 |
| 4.9.1 PHYSICAL SECURITY..... | 49 |
| 4.9.2 NETWORK SECURITY..... | 49 |
| 4.9.3 OPERATIONAL SECURITY..... | 49 |
| 4.10 CONCLUSION..... | 50 |
| CHAPTER 5: IMPLEMENTATION PHASE..... | 51 |
| 5.1 INTRODUCTION..... | 51 |
| 5.2 CODING..... | 51 |
| 5.3 SYSTEM TESTING..... | 51 |
| 5.3.1 SYSTEM UNIT TESTING..... | 52 |
| 5.3.5: SYSTEM TESTING..... | 54 |
| 5.3.6 SYSTEM SECURITY TESTING..... | 54 |
| 5.3.7 SYSTEM MODULE TESTING..... | 54 |
| 5.3.8. SYSTEM ACCEPTANCE TESTING..... | 56 |
| 5.3.9. SYSTEM VERSUS OBJECTIVES..... | 56 |
| 5.4 INSTALLATION..... | 62 |
| 5.4.1 USER TRAINING FOR ZESA EXPENSE REIMBURSEMENT CENTRE..... | 63 |
| 5.4.2 DATA MIGRATION..... | 64 |
| 5.4.3 CHANGEOVER STRATEGIES FOR ZERC IMPLEMENTATION..... | 65 |
| 5.5 SYSTEM MAINTENANCE..... | 66 |
| 5.5.1 SYSTEM CORRECTIVE MAINTENANCE..... | 66 |
| 5.5.2 SOFTWARE ADAPTIVE MAINTENANCE..... | 66 |
| 5.5.3 SOFTWARE PREVENTIVE MAINTENANCE..... | 67 |
| 5.6 RECOMMENDATIONS FOR FURTHER DEVELOPMENT..... | 67 |

| | |
|-----------------------------------|----|
| 5.7 CONCLUSION | 68 |
| REFERENCES | 69 |
| APPENDICES | 71 |
| APPENDIX A: USER MANUAL | 71 |
| APPENDIX B: SNIPPET OF CODE | 79 |

LIST OF ACCRONYMS

| | |
|--------|--|
| C# | C sharp programming Language |
| CBA | Cost Benefit Analysis |
| DFD | Data flow diagram |
| NPV | Net Present Value |
| POTRAZ | Postal and Telecommunications Regulatory Authority of Zimbabwe |
| ROI | Return on Investment |
| SQL | Structured Query Language |
| ZERC | Zesa Expense Reimbursement Centre |

LIST OF FIGURES

| | |
|---|----|
| Figure 1.2 Organizational Structure Zesa Holdings | 3 |
| Figure 2.1 gantt chart for ZERC work plan | 19 |
| Figure 3.1 Activity Diagram of current system | 23 |
| Figure 3.2 Current ZESA Expense Reimbursement System Context Diagram..... | 24 |
| Figure 3.3 DFD of the current system | 25 |
| Figure 3.4 use case diagram..... | 28 |
| Figure 4.1 ZERC context diagram | 32 |
| Figure 4.2 ZERC data flow diagram..... | 33 |
| Figure 4.3 Physical design | 35 |
| Figure 4.4 ZERC database schema | 36 |
| Figure 4.5 ZERC enhanced entity relationship..... | 39 |
| Figure 4.7 Employee Main menu design | 41 |
| Figure 4.12 Expense claim input form..... | 44 |
| Figure 4.13 travel requisition input form..... | 44 |
| Figure 4.14 Expense report input form | 45 |
| Figure 4.16 Monthly and annual expenses review..... | 46 |
| Figure 4.17 Expense report per departments | 47 |
| Figure 5.1 Types of software testing..... | 52 |
| Figure 5.2 unit test | 52 |
| Figure 5.4 user authentication..... | 54 |
| Figure 5.5 Processing employee mid-month overtime expense claim | 55 |
| Figure 5.6 trying or testing bank reconciliation module..... | 55 |
| Figure 5.7 ZERC data output testing for submitted requests..... | 56 |
| Figure 5.8 Submit expense claims | 57 |
| Figure 5.9 Submitting expense requests to finance department for payment authorization..... | 58 |
| Figure 5.11 Short message service (SMS)..... | 59 |
| Figure 5.14 Zesa Holdings reimbursement trends | 62 |
| Figure 5.16 Direct changeover strategy | 65 |
| Figure 5.17 Parallel changeover | 65 |

LIST OF TABLES

| | |
|--|----|
| Table 2.1 hardware requirements..... | 8 |
| Table 2.2 software requirements for ZERC..... | 9 |
| Table 2.2 other requirements | 9 |
| Table 2.4 cost of hardware requirements | 10 |
| Table 5.5 cost of other requirements..... | 10 |
| Table 2.6 development expense..... | 11 |
| Table 2.7 Anticipated operational costs for ZERC..... | 12 |
| Table 2.8 tangible benefit | 13 |
| Table 2.9 cost benefit analysis table | 14 |
| Table 2.10 work schedule | 18 |
| Table 3.1 interview discoveries | 21 |
| Table 3.2 comparison of in-house versus outsourcing..... | 27 |
| Table 3.3 functional requirement..... | 30 |
| Table 4.9 Expense claims | 45 |
| Table 5.1 Data migration | 64 |
| Table 5.3 Storage migration..... | 64 |

CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION OF THE STUDY

As noted by Freedman (2012), introduction is initial area which gives a special delivery of the reasons and objectives of the accompanying composition. This is the most part pursued by the body and this section delivers a brief argument of what the researcher has planned to come up with, reasons why system development for ZESA Holdings has to be done as well as providing a clear justification of the research problem. Justified programming and software development technologies and methods will be included in this chapter. So the entire section will be summarising objective, aim and proposed system hypothesis.

1.2.1 BACKGROUND OF THE ORGANISATION

After the enforcement of the Electricity act (13:19), 5 prosperous companies were born which are the Zimbabwe Power Company (ZPC), Zimbabwe Electricity Distribution Company (ZEDC), ZESA enterprises (Zent) and Powertel communication.

The organisation bases in Zimbabwe and is responsible for electricity generation and distribution in Zimbabwe

The 5 companies under ZESA

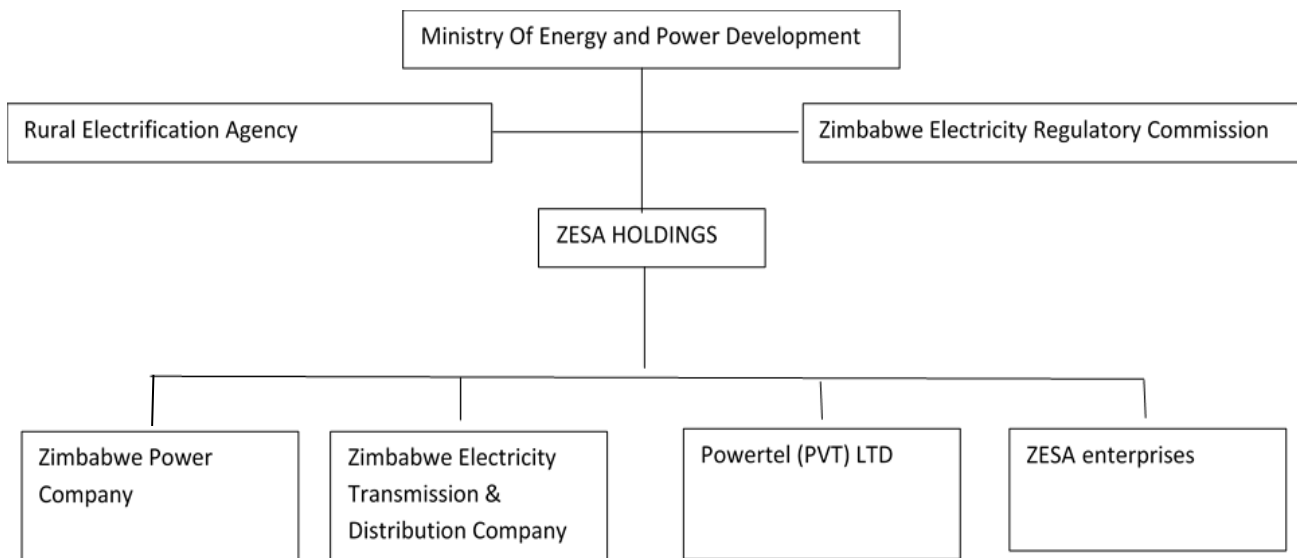
The Zimbabwe Power Company (ZPC) consolidates all age plants of Hwange, Kariba and the little warm power stations specifically Harare Power Station, Bulawayo and Munyati Power Stations. The organization's order is to produce power for the residential market.

The Distribution and supply of company services is monitored and maintained by the ZEDC, while ZESA enterprises host 4 major Technology Centre, Production and Services, Transport Logistics and Projects.

PowerTel Communications (Pvt) ltd is a completely claimed backup of ZESA Holdings, it an authorized with a Class An Internet Access Provider permit for activity in Zimbabwe. Powertel has more than 3000 kilometers of optical fiber link in activity countrywide, having a prepared spine limit of STM 64. PowerTel likewise has a Broadband Wireless system covering real parts of the nation offering 3G administrations to versatile web clients..

1.2.2 ZESA ORGANISATIONAL STRUCTURE

As noted by Butt (2012), a structure for chain command expression within an organization is the one which is referred to as an organisational structure. Its purpose is for the identification of jobs or tasks, and where each taskforce reports business issues inside the company. Figure 1.1 is portraying the position of Zesa under Zimbabwe Ministry of Energy and Power Development.



Zesa Holdings internal IT department hierarchical structure

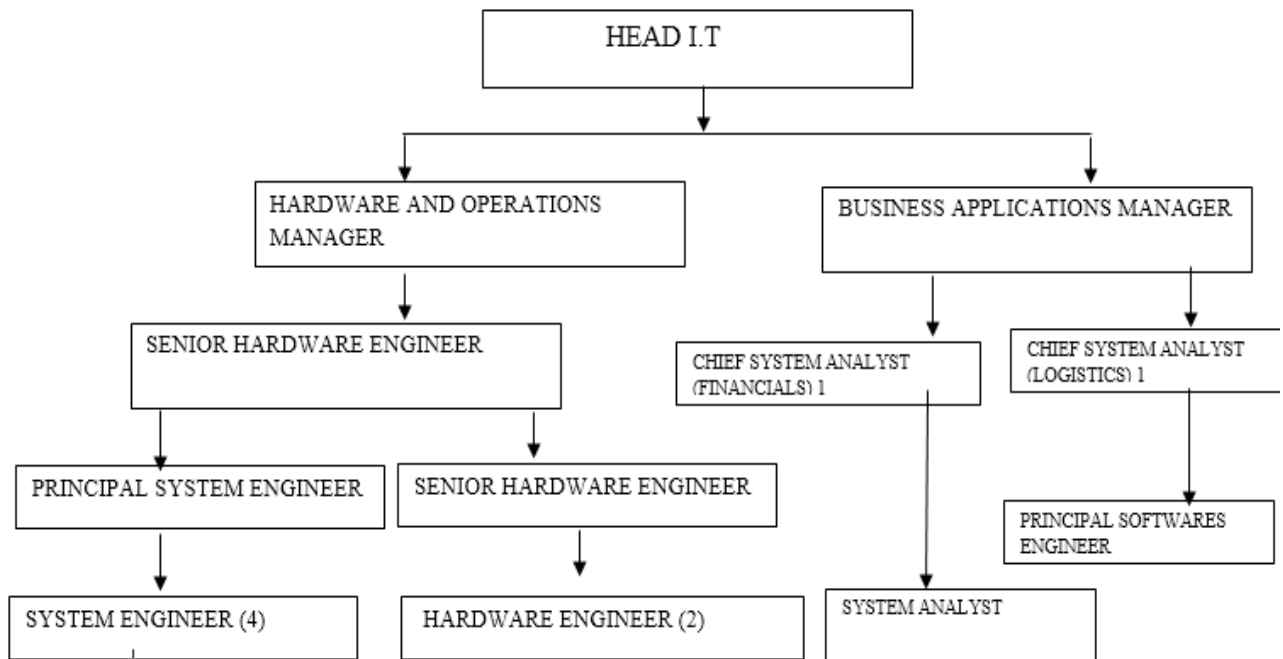


Figure 1.2 Organizational Structure Zesa Holdings

The administrative board of ZESA is set up with High Board of Directors, CEO, Directors, and Heads of corresponding sectors, the broad-spectrum Managerial Control then further workforces.

1.2.3 VISION OF THE ORGANIZATION

ZESA has the vision of valuing its clients all over Zimbabwe and globally, competitively at the same time valuing its investors.

1.3 PROBLEM DEFINITION OF THE STUDY

Meanwhile, Zesa Holdings employees are following long-winded expense approval processes which are delaying reimbursements. Reimbursement cycles are running into quite a lot of weeks, and sometimes even months before approvals and there is absence of proper feedback to claimants during approval workflows. The current paper-based solution for expense claim approvals has problems doing with missing claim forms and signature forgery. At the same time some employees are exaggerating field trip expenses, falsifying number of claims, submission of fraudulent bills, and misuse of company funds all of which are depriving Zesa Holdings' financial status.

1.4 AIM OF THE STUDY

The main drive of the study is for addressing problems associated with the current Zesa Reimbursement System through developing and advanced Expense Reimbursement Centre which has the capability to track expenses, shorten approval cycles, and enforce policies that eliminates fraudulent activities as well as elimination of misuse of company funds by managerial boards. The new computer-based system will help the finance board in analysing expenses and come up with decisions to minimize any foreseen rise in expense trends.

1.5 OBJECTIVES OF THE STUDY

Warkentin(2010) expresses objectives as plans and goals that one put to accomplish. Below are objective that the researcher plans to accomplish during SDLC of Zesa Expense Reimbursement Centre.

- To develop a system that enable claimants to submit expense claims for approval and field trips expense reports
- To design a system that can facilitate managers in preparing, approving and submitting cash advance applications and expense reports to finance branch.
- To develop a system that enables managers to approve and sends cash advances approvals to cash administrators or office
- To develop a system with built-in SMS feedback service for approval reports and provide a consolidated view of the status of every expense approval progress.
- To enable the claimant to create expense feedback to account for the funds when the trip is complete through attaching receipts and other support documentation to the worksheet and forward to the preparer for processing.
- To develop a system that automatically compute and analyse overall company expenses on monthly basis and annually.

1.6 INSTRUMENTS AND METHODS

According to Kumar (2012), technologies which are used for a specific purposes particularly, intended to do watchful and correct assignment are referred to as instruments. So to build up the framework the accompanying technologies will be utilized:

Microsoft Visual-Studio 2015 will be used as the IDE for c# programming during system development it is utilized to create software packages for Microsoft Windows OS

Reasons for choosing Microsoft VS2015 IDE

- ✓ MicroSoft VS 2015 is great for development of .Net programs on windows computers
- ✓ The developer has flexibility of adding various extensions and third part programming tools which BUNIFU and DevExpres

C# (C sharp)- a multi-worldview programming dialect including solid composing, basic, functional, useful, non-exclusive, object-oriented (class-based), and part-arranged programming disciplines.

Reasons for choosing C# amongst other programming languages

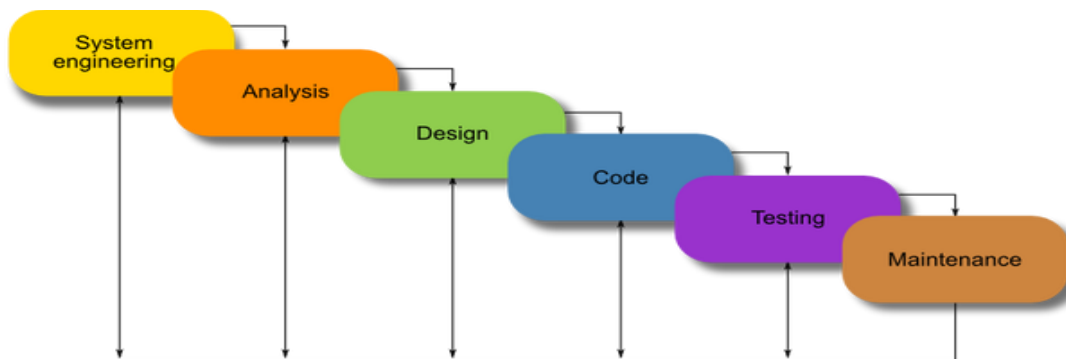
- ✓ It is easy to use and has built in dependency code management that works without a hassle
- ✓ Is more secure as the cypher codes are warehoused on a private-facing server in binary formula, this puts away hackers unlike in PHP where scripting languages can be extracted from the site and it integrates very well with Windows OS.

MySQL will be used as a database server(RDBMS) because it turns virtually in Windows OS.

Crystal Reports-This utility has been chosen because it fits for making and coordinate rich reports into .NET applications with report plan programming that introduces specifically into Microsoft Visual Studio

METHODS FOR ZERC DEVELOPMENT

The developer will use waterfall methodology in ZERC development. The method is made up of five major stages shown on figure 1.3



Reasons for using waterfall methodology

- ✓ Waterfall mode is so simple to use with minimal resources and this makes it suitable for ZERC development because it is not a complex one.
- ✓ With waterfall model, planned phases can never overlap
- ✓ Makes project management easier since all processes and plans are clearly indicated from analysis up to maintenance phase.
- ✓ It is much easier in measuring project progress as there will be a clearly defined end and start periods.

1.7 JUSTIFICATION AND RATIONALE OF THE SYSTEM

It is a recommendation for ZESA organization have a robust system in place to detect fraud, eliminate delays in reimbursements and otherwise, the company can potentially lose hundreds of thousands of dollars. Company expenses will be processed effectively in such a way that clear organisation expenditure reports will be revealed on all financial periods. At the same time shortening approval cycles, and enforce policies that eliminates fraudulent activities as well as elimination of misuse of company funds by managerial boards.

1.8 CONCLUSION

To sum up, the proposed system, if implemented, will facilitate in shortening the company's reimbursement cycles considerably, ensuring strict implementation of policy and take steps to prevent reimbursement fraud. Also, other financial systems of the company will be facilitated by the proposed software in coming up with worthy financial reports.

CHAPTER 2: PLANNING PHASE

2.1 INTRODUCTION

According to Cervo (2015), the way toward contemplating the exercises required to accomplish a coveted objective is what is called planning. So the entire chapter will be revealing the significance for carrying on with ZERC development after going through an effective feasibility study. This will reveal the workability of the project, benefits will be weighed against costs and if advantages outweigh costs the project will be feasible, or else the researcher will abandon software development. Moreover, clear schedules of the project plan will be clarified and diagrammatically rendered under project work plan.

2.2 BUSINESS VALUE OF THE PROPOSED SYSTEM

The business value concept refers to significance to be brought by the proposed Expense Reimbursements centre when implemented by ZESA company (Zobel, 2013). The improvement and the execution of the system will work an extraordinary arrangement in enhancing the organization's reimbursements cycles in a robust manner in place to detect fraud, eliminate delays in reimbursements.

I, MANAGERIAL VALUE

Zesa Expense Reimbursement Centre (ZERC) will deliver expense report audit trails and eliminate fraudulent reimbursements. The system will facilitate finance managers and department managers by automating workflow enforcement and ensuring claimants to comply with business travel and expense policies. As a result, this increases control and visibility of company expenses through sophisticated expense indication through the use of data visualization technology to be designed by the system programmer. So the ZERC will be part of ZESA's decision support softwares.

II. SHAREHOLDER VALUE

This is the worthiness to be appreciated by ZESA investors and other affected parties such as donors as they possess shares in the company (Marakas, 2011). So ZERC will bring transparency on ZESA's expenses and showing how organization's funds are actually utilized

in carrying out business operations. So the proposed system will help managerial team in valuing shareholders' interests while making financial decisions. Therefore, the greater the investor value, the superior it is for ZESA Holdings company. This can be achieved by exercising proficient resolution in minimizing company expenses by the upcoming system to boost ZESA's financial position, in so doing snowballing value of shareholders.

- limit cash outflows which may occur in unmanaged travel trips and fraudulent reimbursements
- minimizing company expenses through restricted travel amounts and limiting travel trips in ZESA departments

2.3 ANALYSE FEASIBILITY

According to Bradley (2010) viability study has to be undertaken by business professionals on a proposed software as an examination and assessment tool for deciding if it is technical, monetary and social and operational plausible to depend on the proposed system. The ZERC need to be assessed verifying whether ZESA has the capacity of meeting the system's prerequisites economically. It likewise decides how valuable or handy the implementation of the windows-based software will provide. The investigation incorporates the accompanying;

2.3.1 TECHNICAL FEASIBILITY

Matti (2014) denoted that feasibility study is done to check whether ZESA can deal with finishing of the task or project with its specialized technical ability. This will include checking whether the required technology and resources (Software and hardware), manpower, system debuggers, testers and developers are available or not.

Hardware requirements

Table 12.1 hardware requirements

| Quantity | Item Title | Specifications |
|----------|-----------------|---------------------------------------|
| 2 | Computer | + 2.3 GHz processor, COREi5 and above |
| 1 | Hard drive disk | 90 GB HDD or higher |
| 1 | RAM | 4GB |

The developer has to build own computer utilizing the mention hardware components and specifications in order to produce a more efficient and reliable development computer. From

these, it is clear that the proposed system project is technically feasible.

Software requirements

Software is a program crucial and essential for the computer to function in order to perform desired tasks (Marakas, 2011). ZERC system calls for the following requirements:

Table 2.2 software requirements for ZERC

| Quantity | Name | Specifications |
|----------|--------------------------|-------------------------------|
| 1 | Windows operating system | Windows 10 |
| 1 | Microsoft Visual studio | 2017 community |
| 1 | Xampp server | Version 1.7.7 |
| 1 | Browser | Google chrome, Microsoft edge |
| 1 | Metro Framework | v1.4.0 |

Other requirements

Table 3.2 other requirements

| Service | Description |
|------------|--|
| Bulky SMSs | 640 Token |
| Internet | Wireless Fidelity or Econet Zim Broadband services |

ZERC requires the above software tools. Each of the mentioned above technologies are freely available and the skills required are manageable. The system designer has the capability to utilise Visual studio c# language to come out with the required software.

Apart from the mentioned technologies, the developer will need to access short message services (SMS) through BulkySMSweb services. From the mentioned software requirements, it is clear that technically the Zesa Expene Reimbursement Centre development is realistic since technological requirements are reasonably priced.

2.3.2 ECONOMIC FEASIBILITY

Economic feasibility is any examination which seeks after in observing that inside the spending requirement set, evaluating if the undertaking can be effectively expert giving positive advantages to ZESA organization (Gries, 2014). In this manner Cost-Benefit-Analysis ought to be taken to check whether the task is monetarily practical and furthermore based on its income projections and speculation analysis will be completed. The new ZERC

is said to be financially doable if the advantages to be determined will exceed the expenses of actualizing it.

The following is the actual cost of the required technologies for the software development task to be completed and achieve the objectives.

2.3.3 TECHNICAL FEASIBILITY

Technical feasibility is carried out to see if the organization can handle completion of the project with its technical expertise (O'Brien, 2011). The section seeks to investigate if ZESA Holdings have technical capabilities and infrastructure to operate the new system. This include computer literate employees, presence of IT infrastructure for ZERC system support as well as system maintenance knowledge.

The proposed system is technically feasible since the users and managerial board are computer-literate which means adaptation will be easy after a simple training so that these users will be familiar with the system. Fortunately, the company has the required workforce from computer science department to maintain and support the system.

COSTS FOR HARDWARE REQUIREMENTS

Table 2.4 cost of hardware requirements

| Technology | Item Name | Item Specifications | Cost (USD) |
|-----------------|--------------------------------|---------------------------|-------------|
| Computer | HP ProBook 430 Corei5 G3 6200U | 2.3 GHz processor, Corei5 | \$ 1,929.99 |
| Hard drive disk | Seagate HDD | 90 GB HDD | \$ 104.50 |
| R.A.M | 4 GB DDR3 | 4GB | \$ 133.54 |

COST OF BULKY SMS AND INTERNET SERVICES

Table 2.5 cost of other requirements

| Service | Provider | Bundle | Cost (USD/ Ecocash) |
|-------------------|-------------------|--------------------|---------------------|
| Bulky SMS | iHUBCLOUD Pvt Ltd | 640 Token | \$ 10 |
| Internet Services | Econet | 2GB monthly bundle | \$ 35 |

All of the mentioned costs of hardware and SMS services are affordable. This makes the planned project economically viable.

COST-BENEFIT ANALYSIS

Cost-benefit analysis relates to instruments used for putting in comparison system development costs and those costs cut by system utilisation (Butt, 2012). Under this section, there will be clarification of evaluation between alternatives of development and ways to deliver the finest tactic to attain paybacks for ZERC development. This information will be analysed by ZESA administration to see if the projects in worth carrying on other wise abandon if the cost exceed the derived benefits. This section seeks to provide a flawless view of predicted expenses and benefits which are likely to be derived due to ZERC development.

DEVELOPMENT COSTS FOR ZERC

Development costs refer to expenditures which arise in the system development process. They include research, hardware and software costs as well as labour (Butt, 2012)

Table 2.6 development expense

| Item Type | Name of items | Specifications | Cost (USD) |
|-------------------|----------------------------------|--|---------------------------|
| Computer | HP ProBook 430 Corei5 G3 6200U | 2.3 GHz processors, Corei5 | \$ 1 929.99 |
| Hard drive disk | Seagate HDD | 90 GB HDD | \$ 104.50 |
| RAM | 4 GB DDR3 | 4GB | \$ 133.54 |
| Bulky SMS | iHUBCLOUD Bulky SMS | 640 Token | \$ 10.00 |
| Internet Services | Econet | 2GB monthly bundle | \$ 35.00 |
| Labour | Programmer, Analyst | C# skills | \$ 250.00 |
| Server | HP DL380 G7 - REFURBISHED SERVER | 2 x Xeon Six Core 2.67ghz RAM: 16gb HDD: 2 x 146gb SAS Types: 3u Rackmount RAM & HDD: Upgradable | \$ 2 550.00 |
| Total | | | <u>\$ 4 376.03</u> |

OPERATIONAL COSTS

As noted by Olivier (2017), any expenses arising due to operation of a system within the organisation, including maintenance and resource acquisition costs are called operational costs. Table 2.7 shows anticipated operational costs for ZERC.

Table 2.7 Anticipated operational costs for ZERC

| Explanation | Quantities Needed | Prices/ costs |
|--------------------------------|---|--------------------|
| Magnetic Back-up tapes | 1 x 4 | \$ 200 |
| On-job-Training | (once till system upgrade) | \$ 150 |
| Back-up server | Dell PowerVault 124T 2U LTO-2-L Tape Backup Autoloader PV-124T 200/400GB-R | \$ 99 |
| Bulky SMS | 1 080 | \$ 100 |
| Server computer | 1 (purchased once) | \$ 2 550.00 |
| Maintenance and repair service | After every 6 months | \$ 550 |
| Total | | \$ 3 649.00 |

TANGIBLE BENEFITS TO BE BROUGHT BY ZERC

Any paybacks with money value which accumulates as a result of ZERC software operation are referred to as tangible benefits (Olivier, 2017). Below is a list of anticipated tangible benefits.

- Elimination of fraudulent expense claims by employees
- Managing travel expenses
- Enforcing company expense policies to minimize unnecessary expenses
- by minimising paperwork storage, stationary fees and expenses will drop significantly

Table 2.8 tangible benefit

| Tangible benefit | USD value (\$) |
|----------------------------------|-----------------------|
| Reduced stationary costs by ZERC | 320 |
| Estimated Saved expenses | 40 000 |
| Labour reduction | 7 000 |
| Total | 47 320 |

INTANGIBLE BENEFITS

Intangible benefits relates to resultant benefits to ZESA Holdings as it implements the proposed Expense Reimbursement Centre. The benefits take in:

- Perfection serving ZESA Holdings Company to accomplish business objectives because ZERC system will be delivering accurate expense accounts and decision making will be easy and quick for the administration to carry out.
- Shortened reimbursements cycles which will in turn boost employees' motivation at work
- Elimination of fraud committed by employees from falsifying the numbers on expense reports

The table below is the cost and benefit comparison table (cost-benefit analysis), it weighs the benefits to be derived after implementing ZERC over its overall costs.

Table 2.9 cost benefit analysis table

| | (USD) | (USD) | (USD) |
|--|-----------------|-------------------|-------------------|
| | \$ | \$ | \$ |
| BENEFITS.: | | | |
| Tangible Benefits | | | |
| Reduced stationary costs by ZERC (\$) | | | 2320 |
| Saved expense estimate (\$) | | | 40 000 |
| Labour reduction (\$) | | | 7 000 |
| | | | |
| Intangible Benefits | | | 2 500 |
| Total benefits.: | | | 51 820.00 |
| | | | |
| COSTS | | | |
| Costs of development | | | |
| Hardware requirements and other services | 4 376.03 | | |
| | | (4 376.03) | |
| Operational cost | | | |
| Total operational cost | 3 649 | | |
| | | (3 649) | |
| Total Cost | | | (8 025.03) |
| BENEFITS/LOSS | | | 43 794.97 |

The positive figure shown reflects that the benefits to be derived after launching Zesa Expense Reimbursement Centre outweigh its costs. So the project team and managements have to proceed with the system development.

2.3.3 SOCIAL FEASIBILITY OF ZERC

The analysis aiming to analyse after identifying such impacts in order to comprehend the scale and reach the project's social impacts (O'Brien, 2011). ZESA Expense Reimbursements Centre will seek to mitigate these impacts, to such an attainable extent and completely taking into consideration every aspect in the green light decision.

ZESA currently is utilizing several computer systems in all of its departments; therefore, the proposed ZERC will be designed with catchy graphical user interfaces in such a way that users will accept it. The issue is also attainable through integrating the system with readily available related software systems available at the company. The proposed systems will be programmed and designed to be compatible with the available computers so that users will enjoy perceived ease of use (PEOU) apart from ease of use (EOU) after product launch. This will ensure co-operation from the intended ZESA users and management team.

2.3.4 OPERATIONAL FEASIBILITY

This is concerned with matters whether the proposed ZERC will be utilized after development and implementation phase (Rex, 2013). The software will eliminate resistance from the users through full managerial project support. Since the employees are currently stressed with long winded reimbursements cycles, the users will enjoy utilizing ZERC since it will shorten the reimbursements cycles and reduce times of their travel and subsistence forms approvals. The response time of employee claims will be shortened. Users and managerial team will be deeply involved in the development, requirements gathering, planning and designing stages of the ZERC development phases.

The above mentioned factors will eliminate resistance towards the proposed system. So, user involvement in all aspects of the project proceedings is a vital factor to the success of the system implementation and acceptance by users.

2.4 RISK ANALYSIS

Risk Analysis is a convenient technique in ascertaining and handling potential difficulties that may be encountered in the ZERC launch and operation phases at ZESA company Charles (2012). Below are some of the probable perils which might affect the project:

2.4.1 TECHNICAL RISKS

This refers to possible risks which may arise as the ZERC's functionality fails to meet full requirements of the managerial team and the affected parties on the system interfaces. The ZESA IT department might find it challenging in maintaining and configuring the system due to its complexity, as well as restoration from sudden system crashes. The former might result in potential loss of expenses data and other stored information.

Therefore, ZERC requires full support from both the developer and the ZESA Holdings IT team. Incremental backup strategy has to be maintained time to time to evade data loss. The company will need to purchase magnetic backup tapes. Moreover, system monitoring is a prerequisite to conquer the identified risk. User involvement has to be maintained throughout the project (Tony, 2013).

2.4.2 ECONOMIC RISKS

System development and operation can be affected by micro and macro-economic conditions facing Zimbabwe. Persistent rise in Ecocash charges and exorbitant foreign currency charges (USD) might cause in inability of the developer to purchase the exact hardware components and afford broadband and SMS services. ZESA may also find it financially unbalanced to afford regular backup tapes, servers and computers procurement.

However, economic risk can be evaded by planning a flexible budget. Some of the hardware requirements can be acquired through eBay where there are affordable prices. Since ZESA Holdings is a government parastatal it can apply for subsidies and other ways to fund the project from the Zimbabwe government

2.4.3 OPERATIONAL RISK

Potential menaces might occur due to ZERC logical errors and other system loop holes. McKinnon and Roddy (2012). This renders the system unreliable due to falsifying data visualizations, calculation errors and improper data entries. The software may also fail to produce dependable audit trails as required by the auditors and ZESA managerial team. Moreover, resistance from the users is a serious risk which might at any time arise during software engineering process or after implementing ZERC.

So this can be mitigated through module testing, system testing and code analysis. The project will be anchored by expert system debuggers and testers alongside with users. User involvement remains a prerequisite in ensuring system success.

4.3.4 SOCIAL RISK ANALYSIS

According to Marakas (2011), social risks relates to violations to human rights, work environment decrepitude or causing harm to peoples social lives, making the ZESA organization to be unsustainable in the long run is a serious social risk.

Nevertheless, the revealed societal perils will not result in from the use of Zesa Expense Reimbursement Center

2.5 STAKEHOLDER ANALYSIS

Stakeholder analysis refers to influential technique of become aware of members or clusters that have the probability of being affected by the action of employing ZERC system and also the level of impact that the system has on these parties. It makes sure that all matters that might be affecting the parties are well address.

2.5.1 MANAGERS

ZERC system will help finance managers to eradicate reimbursement fraud committed by employees from falsifying the numbers on expense reports, submitting fraudulent bills in collusion with vendors as employees find many avenues to commit fraud.

The ZERC will facilitate finance managers and department managers by automating theirs workflows and ensuring that employees comply with business travel and expense policies. Managers are concerned with expense control and visibility of company expenses through well managed reimbursements approvals.

2.5.2 EMPLOYEES OR CLAIMANTS

Since the current system is resulting long-winded repayment procedure that delays reimbursements, ZESA employees are much concerned with having a well-designed system that will eliminate repayment delays. Reimbursement cycles run into several weeks, and sometimes even months before approvals which results in some employees demotivated at work.

So, the introduction of Expense reimbursement system will effectively shorten reimbursements cycles and eliminate large number of claim approvers and making the process easier.

2.5.3 INVESTORS AND SHAREHOLDERS

ZESA Holdings investors are fretful on maximising company profits and maintenance of their share values. Investors seek to limit cash outflows which may occur in unmanaged travel trips and fraudulent reimbursements

This can be achieved by exercising proficient resolution in minimizing company expenses by the upcoming ZERC system to boost ZESA's financial position, in so doing snowballing value of shareholders. Minimizing company expenses through restricted travel amounts and limiting travel trips in ZESA departments (Piper, 2013)

2.4 WORK PLAN FOR ZERC DEVELOPMENT

Defined goals and processes to be accomplished are referred to as work plans. Work plan clearly reflects how the processes in developing ZERC project will be progressing upto implementation. Work plan is necessary for resource allocation which is a crucial factor for every software project.

System developer is going follow waterfall model to develop ZERC. Gant (2012) denotes that a gantt chart is a typical of bar-chart used that is used illustrates a project calendar.

Table 2.10 work schedule

| ZERC Development periods | Dates estimations | Week |
|-----------------------------------|--------------------------|-------------|
| Initialization period | 12-Aug-2018 | 1 |
| Viability study | 19-Aug-2018 | 1 |
| Analysis chapter | 26-Aug-2018 | 1 |
| Design period | 02-Sept-2018 | 2 |
| System implementation period | 16-Sept-2018 | 2 |
| Installation period | 30-Oct-2018 | 1 |
| System evaluation and Maintenance | 07-Nov-2018 | 1 |

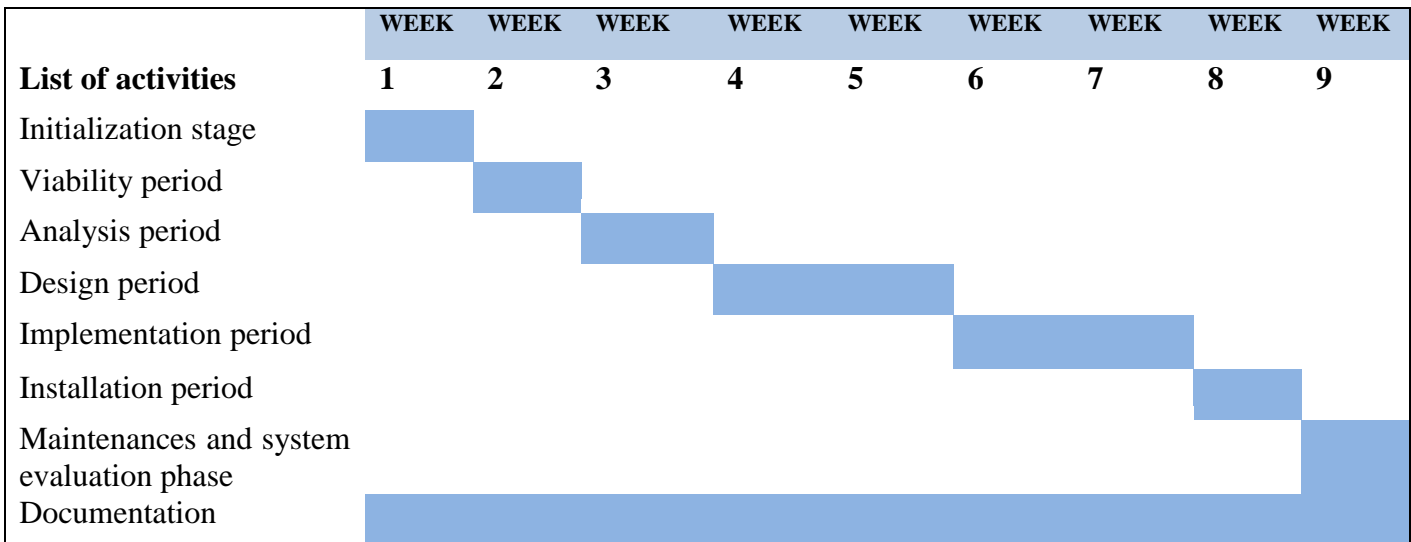


Figure 2.1 gantt chart for ZERC work plan

2.4 CONCLUSION

To sum up, after the developer went through feasibility investigations, attainability contemplates, including money saving advantage investigations, the outcomes have been uncovering that the venture for ZERC development is for all intents and purposes suitable. Work plan plainly showed the period through which the entire ZERC development stages will take and furthermore empowering to think of an arrangement to do every one of the stages. This has brought the developer to next chapter (three) for system analysis. In the accompanying section (part 3), an exhaustive examination of the present framework will be completed with the end goal to confirm its qualities and shortcomings.

CHAPTER 3: ANALYSIS PHASE

3.1 INTRODUCTION

The aim of this stage is for obtaining a comprehensive and full understanding of ZESA Holdings requirements as demarcated in previous chapters (one and two). An intensive current system assessment will be done at this stage by the utilization of looking at information that was acquired from different strategies of bringing information at ZESA Holdings. The whole methodology will include info and yield forms that are engaged with the present system which is process-demonstrating. All the client requirements are ought to be tended to in this part through full clarification of the proposed ZESA Expense Reimbursement Centre's (ZERC) objectives and including data flow inside the system.

3.2 INFORMATION GATHERING

According to Laudon, J. (2010) data gathering methodologies are techniques utilized for fetching factors in a targeted area of interest. Researches were carried out to derive expense reimbursement cycles information that concern ZESA Holdings' current system in order to improve its functions, mitigate its challenges and totally these are going to express and define new system preferences to be picked by the users. This is indicated in the following paragraphs.

3.2.1 INTERVIEWS

An interview relates to a discussion or dialog where queries are asked and responses are given. Marakas, G. M. (2011). The conversation will have the interviewer asking questions and the interviewee responding to the questions asked. Interviews were conducted by the system developer and respondents were picked vigilantly from ZESA Holdings finance, IT, Human resources as well as from the managerial personnel to give responses regarding the current software's processes. The interviewees had the ability to produce appropriate data and the information was relevant since they were familiar with the current system operations, strengths, weaknesses and processes. These were done face-to-face with the respondents at ZESA Company.

Interviews were conceded effective at the company due to two-way communication dialogs. Respondents were unrestricted in the process of providing answers concerning the current system, and utilizing gestures and postures. This helped them to give free expressions on how

the actually require pertaining current Expense Reimbursement system. Employees were complaining due to numerous processes that were involved in the reimbursements cycles. The processes extent to about three weeks before one is reimbursed. Managers were irritable because of the work-loads involved, which are, signing claim forms (paper based) which mostly took most of their occupational time.

The table below shows some of the results depicted from interviews which were carried out at ZESA Holdings.

Table 3.1 interview discoveries

| Stakeholder | Issues revealed |
|-----------------------|--|
| Employee or claimants | Complaining of reimbursement cycles which run into several weeks, and sometimes even months before reimbursed which results in some employees demotivated at work. |
| Managers | Current system is associated with reimbursement fraud committed by employees from falsifying the numbers on expense reports, submitting fraudulent bills. |
| Finance managers | Concerned about automating theirs workflows and ensuring that employees comply with business travel and expense policies. |

Drawbacks

Interviews were conducted successfully, however some of the open response questions produced vague responses as a result of poor interpretation of questions. Apart from that, interviews took so long to be completed; the interviewer devoted three days to get in touch with some of the affected parties.

3.2.2 OBSERVATIONS

Observation is looking individuals as they behave. There's a chance of simply looking or to participate whereas perceptive the participants behaviour at the same time learning regarding the current system. Observations were carried out first-hand information about the existing Expense Reimbursement system was obtained. Piles of expense claim forms were seen which took much of managers' productive time. The process need to be automated

Observations carried out by the developer give smart insights into how the managers square measure behaving and interacting with the current system. The developer was able to note some of the factors that were taken for granted by participants in the process of filling their claim forms which could possibly deprive the financial position of ZESA Holdings in the long run.

Drawbacks

Although the process of acquiring information through observation was successful, it affected the behaviour of department managers who were involved hence what the developer was observing.

3.3 ANALYSIS OF EXISTING SYSTEM

ZESA Holdings' current Reimbursement system is associated with very long reimbursement cycles which stretch to at least three weeks before employees' reimbursements are authorized. This is due to numerous processes involved. The existing system is associated with paper based support forms where employees fill in their claims in the claim form, submit to the department for a signature. The form is sent back to the employee and forwards to the head of department (HOD) for verification approval. Claimants have to wait for 48 hours before collecting forms from the HOD's office. At this stage, upon approval by HODs, the form is handed over to finance manager for verification and authorization as well as capturing written information into the computer system. Authorized claims are forwarded to the cash administrator (cash office) through the computer based system. ZESA cash administrator authorises reimbursements and sets repayment dates. All disapproved claim forms are piled up and distributed back to claimants with hand written memos on them. The whole process can take up to three weeks before one is reimbursed.

3.4 PROCESS ANALYSIS

As noted by Warkentin(2010) process analysis means an exploration technique that aids to escalate the efficiency and usefulness of methods and processes. This seeks to assess how the processes involved in current ZESA Expense Reimbursement System achieve its and goals. This segment identifies and reviews every single unit of the existing system, together with the processes involved, contributing or affected parties, data flow and other process-related factors. Therefore, it facilitates to point out impending developments contained by the

process, easing re-engineering or new system development initiative.

The following process diagram shows overview of current system process flow.

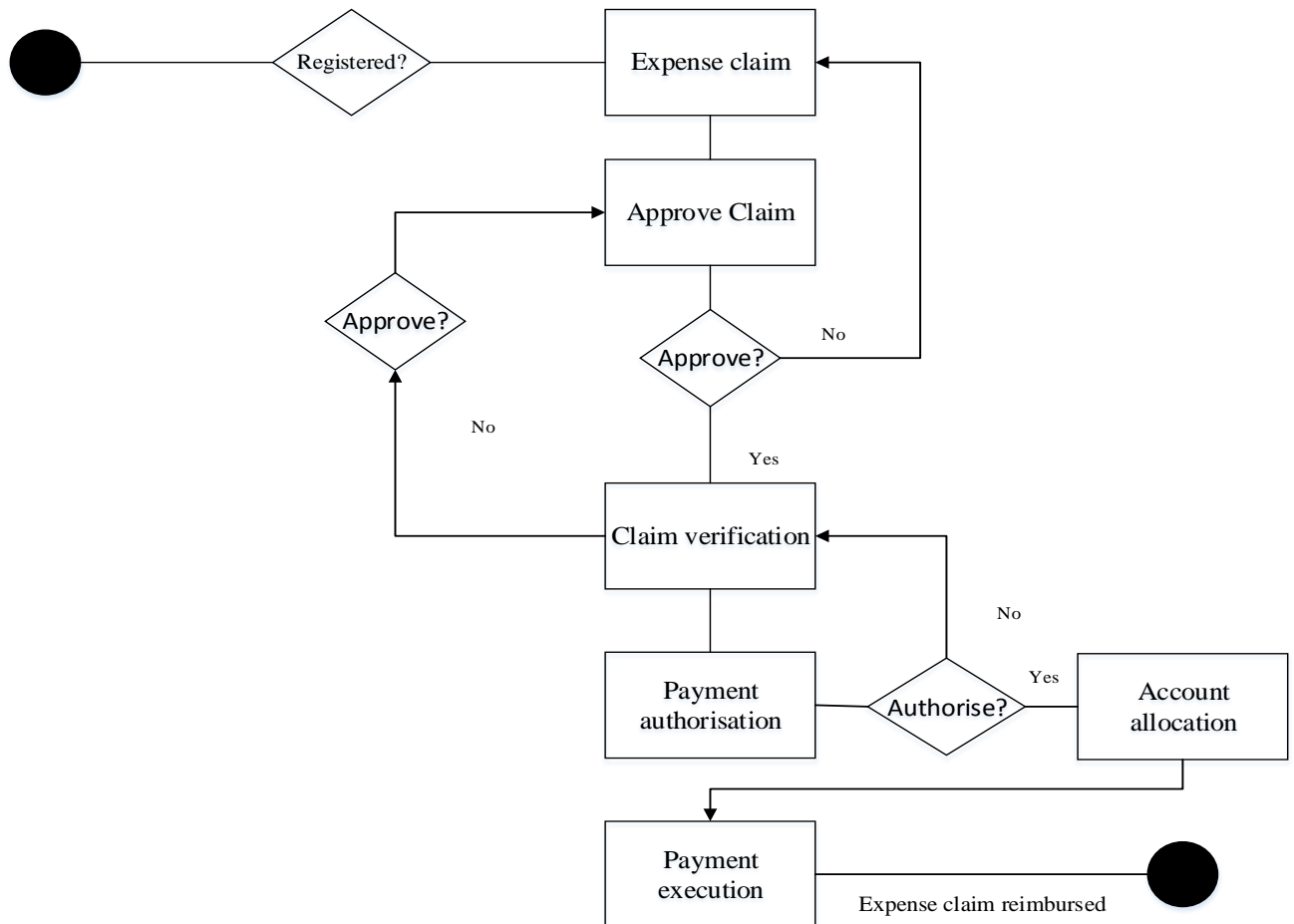
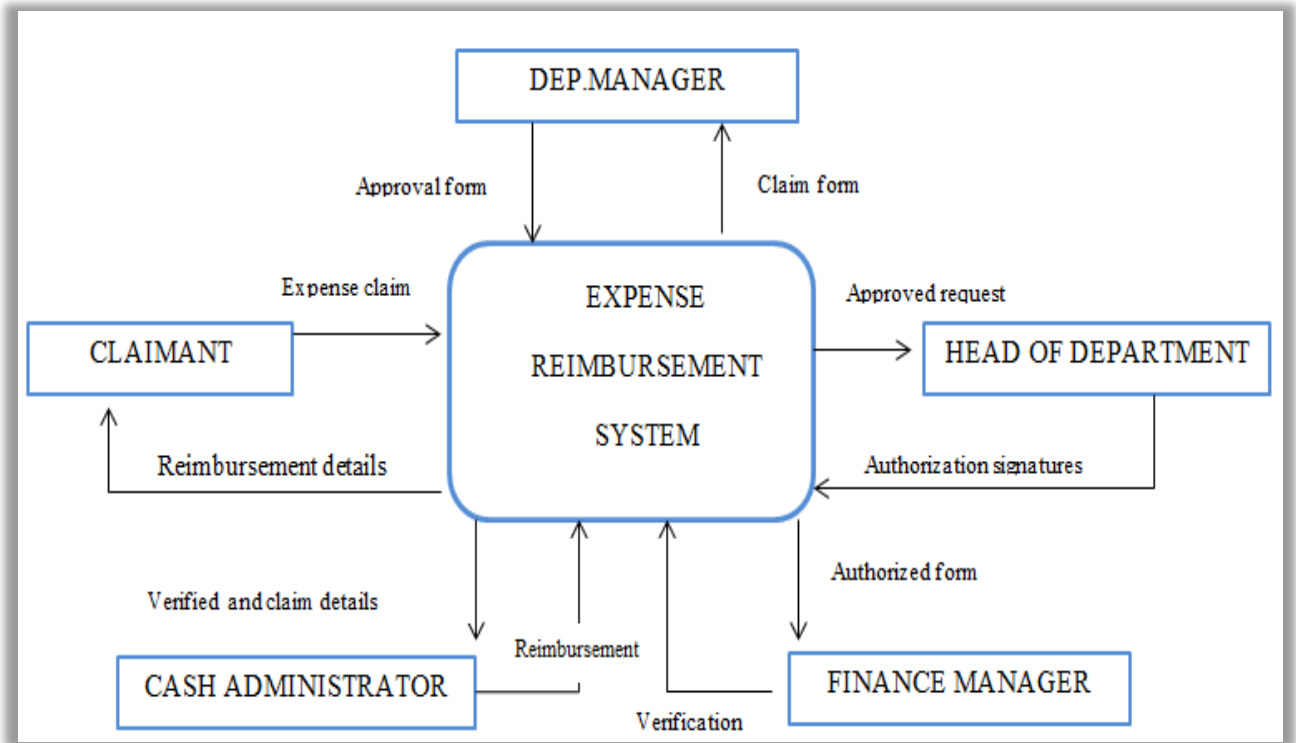


Figure 3.1 Activity Diagram of current system

3.5 DATA ANALYSIS

Data analysis is the way towards assessing information utilizing investigative and consistent thinking to analyze every part of the information gave. Laudon, J. (2010). This type of examination is only one of the numerous means that must be finished when leading a software project research. Information about current ZESA Expense Reimbursements system obtained from different sources will be assembled, assessed, and after that broke down to come out with a conclusion.



KEY

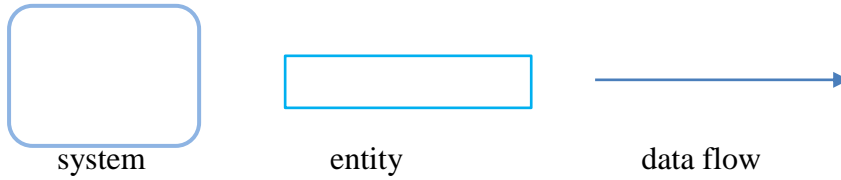


Figure 3.2 Current ZESA Expense Reimbursement System Context Diagram

Figure 3.3 shows the dataflow diagram of current ZESA expense reimbursement system.

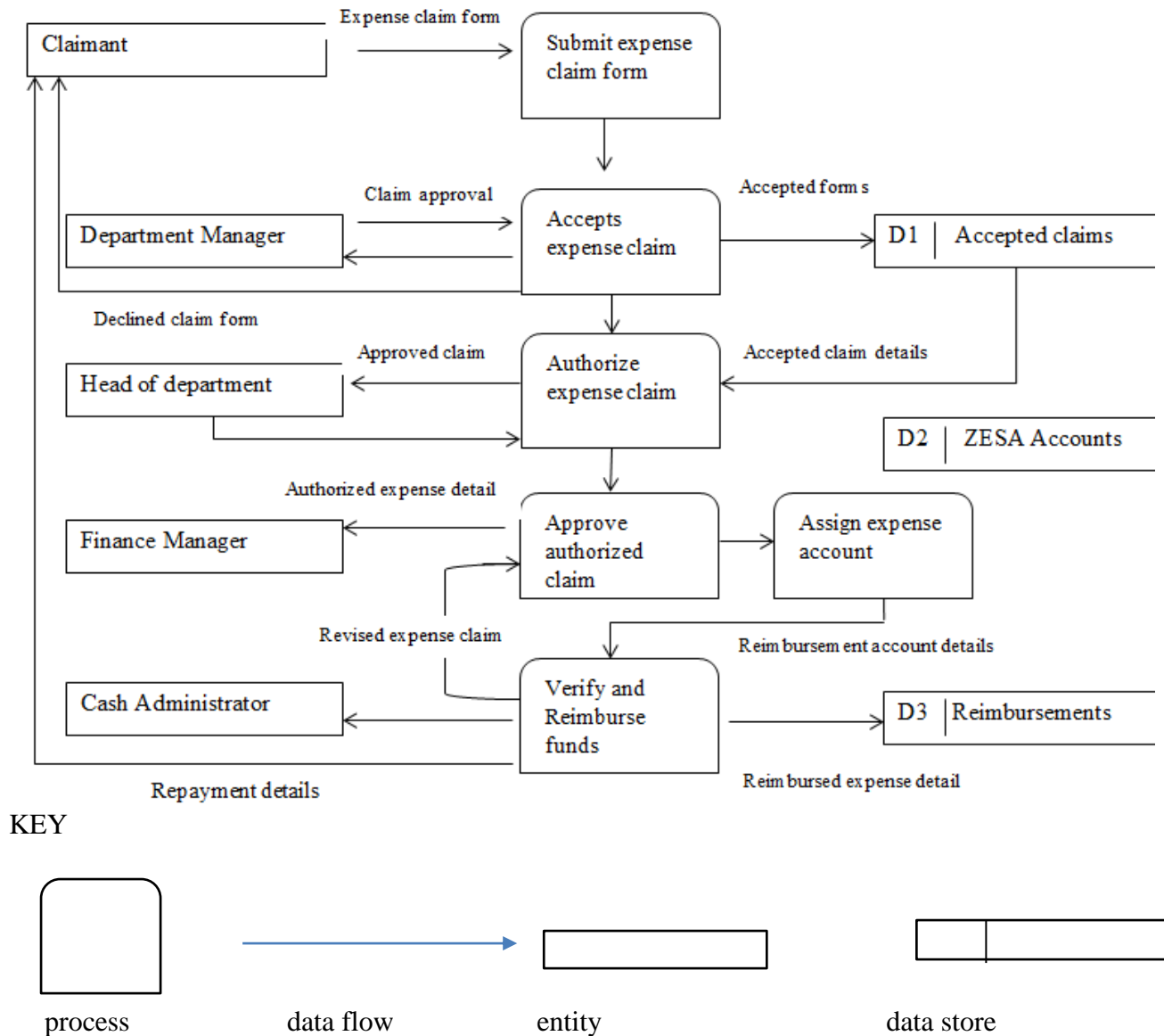


Figure 3.4 DFD of the current system

3.6 WEAKNESSES OF CURRENT SYSTEM

ZESA Holdings' current reimbursements system comprises the following weaknesses:

- Employees commit fraud by tempering or making alterations on the claim forms signed by department managers
- Prone to calculation blunders because it is the finance manager who work out calculations

from the document submitted by the claimant.

- Poor feedback on claim approval status
- The system relies on manual processes which are unswervingly increasing ZESA's stationary expenses
- The system consumes a lot of time since it involves manual processes of submitting and signing of claim forms
- The system is associated with the misplacing of forms submitted by claimants

3.7 EVALUATE ALTERNATIVES

There are options which could also have been considered as an alternative to the development of this system, such alternatives are to be revised now in this section:

1. Improvement
2. Outsource
3. Development

3.7.1 OUTSOURCE

According to Matti (2014), outsourcing mentions definite handling of processes of business IT services to an outside or external service provider. It usually happens if an organization is incapable to manage the service as the tasks are complex and abilities needed are limited because of the company's size (usually small). However, outsourcing is not recommended for ZESA Holdings in the process of obtaining new Expense reimbursement system, and the reasons are as follows.

- Risk of uncovering ZESA private information. As the company outsources Expense Reimbursement system, the process implicates exposing company bank accounts, IP addresses, server information which increases the risk of revealing confidential data of the organization to the developers.
- Reduce Quality Control. Outsourcing companies and some freelancers may often be motivated by profit rather than a job well done. That means the work you send out may come back quickly, but will lack the standard and quality that customers have come to expect from your products or services.

As depicted by the above drawbacks, it is not a wise approach for ZESA to outsource the proposed software.

3.7.2 IMPROVEMENT

Improvement takes into consideration the process of altering the existing Expense Reimbursement software aiming to improve the existing functionality and workflow structures (Matti, 2014). Functional and non-functional features can be reproduced to come up with an advanced version of the system.

However, complete computerized system is a necessity because the current system already has weaknesses which need to be completely eliminated. This measure is inappropriate, no system upgrade or improvement is needed because already the system has operational blunders henceforth persistence of the existing complications.

3.7.3 DEVELOPMENT

It is wiser for ZESA to engage system development because in the development environment is conducive, hardware and software required are readily available. C Sharp developers are voluntarily open to engage the project development and they possess the required skills.

Table 3.2 comparison of in-house versus outsourcing

| Costs involved | In-house development | Outsourcing |
|-----------------------------|-----------------------------|--------------------|
| Labour costs | No | Yes |
| Licence costs | No | Yes |
| Hiring or pay for equipment | No | Yes |

The table above clearly justifies in-house development from other strategies of coming up with the Expense reimbursement system. No additional costs since all requirements are readily available, which are, labour, hardware and software.

The developer has the capacity to develop new system, because from the mentioned software requirements in the previous chapter (chapter two), it is clear that the proposed system project is technically feasible because the systems and services are available and affordable by the organization. Moreover, all of the mentioned costs of hardware and SMS services are affordable. This makes the planned project economically viable.

Other advantages

- ✓ **Stability:** Maintaining an in-house team means ZESA software development projects will probably be more stable. In-house developers are much less likely to quit on halfway through the project or to misinterpret a critical project requirement.
- ✓ **Control:** Doing development in-house gives ZESA Holdings complete oversight and control of how the project is conducted

3.8 REQUIREMENTS ANALYSIS

The following functions must be delivered by the proposed ZESA Expense Reimbursement system so as to resolve or mitigate problems in the current system and also to achieve predetermined objectives.

3.8.1 FUNCTIONAL REQUIREMENTS

These are the necessities which define system features and functions; these explicitly satiate user requirements. The use case diagram below elaborates couple of actions that the proposed ZESA system can execute in association with stakeholders, in which each and every case shown provides noticeable and valued outcome to actors and other participants.

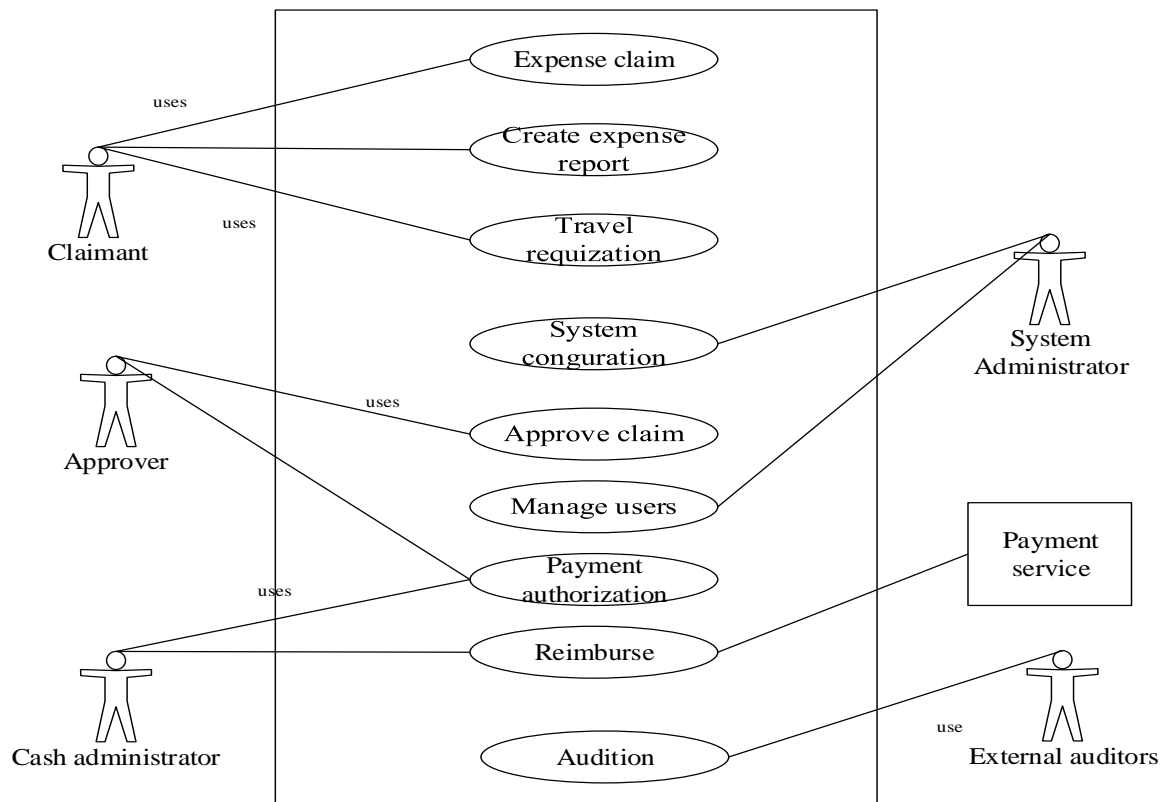


Figure 3.4 use case diagram

As shown on the diagram above, the system that will enable a claimant (employee) to create electronic expense claims. It must speed up the managers' tasks in preparing, approving and submitting cash advance requests and expense reports to finance department. Also enable the claimant to create expense feedback to account for the funds when the trip is complete through attaching receipts and other support documentation to the worksheet and forward to the preparer for processing. Receipts will be verified to eliminate fraud. Finally, the system automatically compute and analyse overall company expenses on monthly basis and annually. Audition reports are produced to keep track of all the transactions

3.8.2 NON-FUNCTIONAL REQUIREMENTS

Non-functional requirements are at times referred to as system qualities. They can be divided into two (2) categories which are:

- a. Performance qualities- which are usability and security.
- b. Evolution qualities-maintainability, testability; these features will be set in the building of the Expense Reimbursement centre. These are elaborated in the table below

Table 3.3 functional requirement

| Non-Functional requirements | |
|------------------------------------|--|
| Security | <p>Login requirements - access levels.</p> <p>Password requirements - length, special characters, expiry, recycling policies</p> <ul style="list-style-type: none"> • Inactivity timeouts – durations, actions |
| Audit | <p>Audited elements – business elements will be audited</p> <p>Audited fields – information fields will be audited</p> <p>Audit files characteristics - before image, after image, user and time stamp.</p> |
| Usability | <p>Good Graphical user interfaces are important in such a way that quick operation will be handled by the user as system functions are clear and well presented on the system. This also aid to a lessening in error or mistake costs.</p> <ul style="list-style-type: none"> • Command line interface to be excluded |
| Maintainability | <p>Will conform to current systems architecture and ZESA standards</p> <p>Conform to design standards at the company</p> <p>Conform to coding standards</p> <ul style="list-style-type: none"> • To exclude new design patterns |
| Reliability | <p>Robustness- The system must quickly recover from failures with no data losses.</p> |

3.9 CONCLUSION

To sum up, in the wake of system evaluation with information acquired from different procedures of bringing information at ZESA Holdings, figuring out what should be incorporated on the framework and surveying the software’s usefulness, it's been discretionary to keep on building up an independent framework to tackle the made reference to issues. In the following chapter (4), proper planning of the proposed framework will be prepared.

CHAPTER 4: DESIGN PHASE

4.1 INTRODUCTION

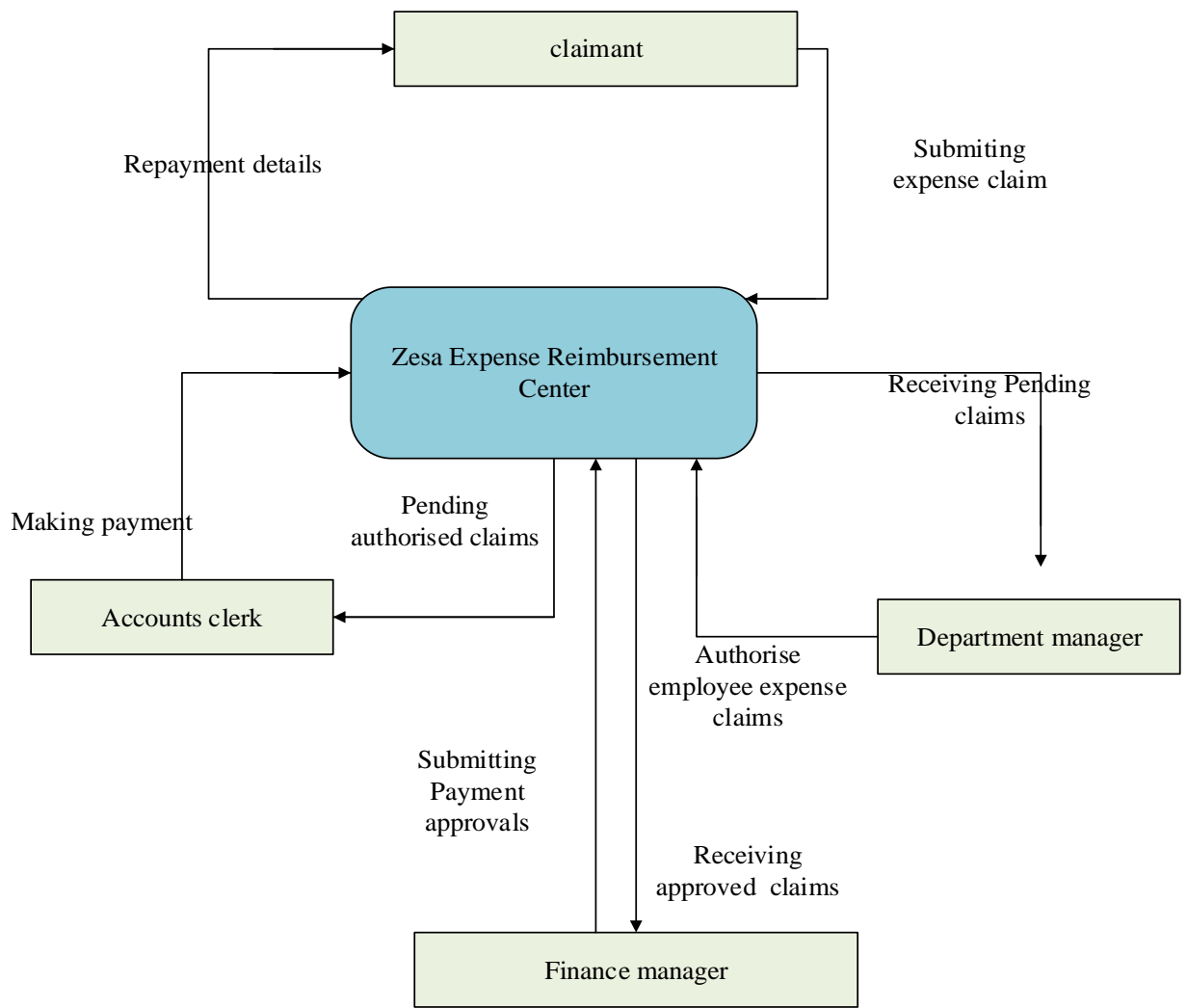
Design phase is a procedure of coming up with graphic illustrations which shows specifications as required by users and association between a couple of components of the system. In this chapter, graphical schemes will help to explain the proposed Zesa Expense Reimbursement Centre's specifications. This phase consists of units which high spot collaborative interface that users will encounter when accessing the system (Auer, 2010). The proposed system's requirements and objectives will be altered and transformed to comprehensive physical modules.

4.2 SYSTEM DESIGN

System design is described as plans of representing engineering of the proposed ZESA Expense Reimbursement Centre and the way in which data will be put on show on system interfaces (Auer, 2010). The following context and data flow diagrams represent information flow of the proposed system.

4.2.1 CONTEXT DIAGRAM

As noted by Fennelly (2012), context Diagram is diagram that describes the borderline between the software, share of software, and its situation showing the objects or entities which perform with it. This diagram may be an extraordinary level recites of a system. The following is the proposed ZERC context diagram.



Key



System



Entities



Data flow

Figure 4.1 ZERC context diagram

ZERC SYSTEM DATA FLOW DIAGRAM

Data flow diagram (DFD) refers to a graphical portrayal of the "stream" of information through a system, demonstrating its procedure angles. A DFD is frequently utilized as a fundamental advance to make a review of the software without broadly explicated. The figure below shows the dataflow diagram of proposed ZESA expense reimbursement system.

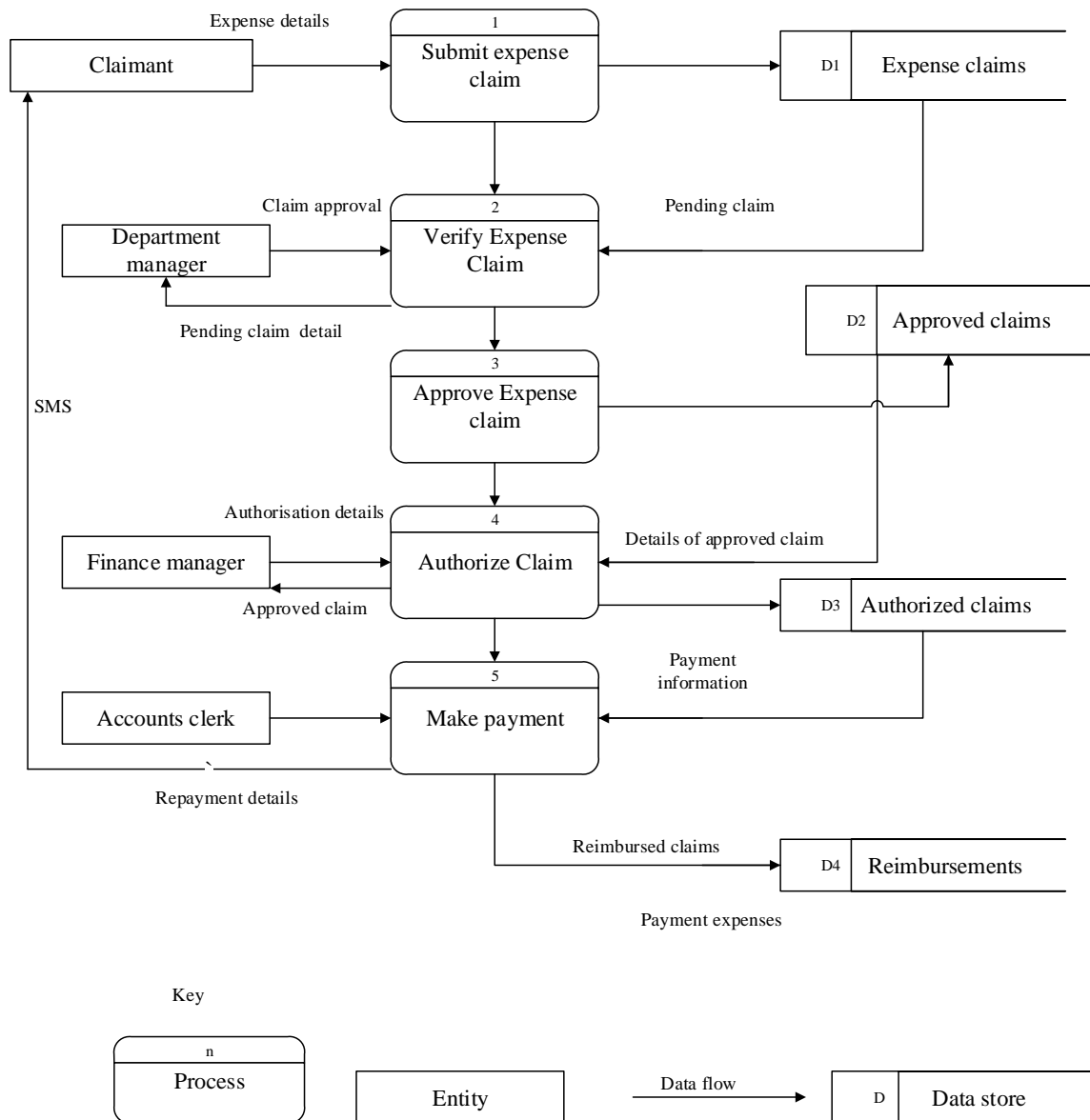


Figure 4.2 ZERC data flow diagram

How the proposed ZESA Expense Reimbursement system will work in terms of:

USABILITY- This refers to the simple attribute of software use, easy to understand and learn. So in this context the ZERC will be utilised at ZESA Company achieving outlined aims, target and objectives thereby delivering user satisfaction, efficiency and effectiveness

(Matti, 2014). This will be achieved through system functional and non-functional requirements inclusion.

SOFTWARE MAINTAINABILITY- This is characterized as how much an application is comprehended, repaired, or improved. Therefore programming viability is essential since it is roughly 75% of the cost identified with a task constitutes the ZERC project to be successful. The developer will achieve maintainability attribute by allowing the software bugs to be corrected with source code granted to the maintenance team. This also refers to as software editing to achieve maintainability.

SOFTWARE RELIABILITY

Reliability refers to the likelihood of failure free for ZERC activity for a predetermined timeframe in a predefined situation. Programming Reliability is likewise an essential factor influencing entire ZERC dependability at the company.

SOFTWARE FLEXIBILITY

Flexibility is one of the properties that show if the software product is easy to make alternations on it in order to suit the required software environment (Tedre, 2014). Adaptable programming can without much of a stretch adjust to client prerequisite as well as condition changes amid the product development period or after the product is conveyed at ZESA Holdings.

- ✓ ZESA expense Reimbursement Centre will consist, but not limited to, mentioned four quality attributes.

4.3 ARCHITECTURAL DESIGN

Architectural design is a developing group of package and hardware technology standards in a move to make a system or platform; it elaborates how a system will run on those platforms and what technologies it is compatible with. This design will show how all the hardware technology required to come up with Zesa Expense Reimbursement Centre will be set up.

4.3.1 HOW SOFTWARE AND HARDWARE INTERACT

The system will be installed on desktops or laptop machines running windows 8.1 or 10 for ZERC maximum performance. Also the operating system makes the system compatible to the servers with dot Net Framework 7.1. Registered employees, expense claims, as well as reimbursements details will be stored in MySQL server database. Expense reports are printed out using a dedicated document printer that will be connected to client computers through point to point connection. Network switches will provide dedicated links to the client machines requesting services from the system.

4.4 PHYSICAL DESIGN

Physical design tends to more noteworthy insights about how innovation will be utilized in the new Zesa proposed software. Physical plan speaks to a particular specialized arrangement. For example, Diagrams must be changed over that guide the starting point, stream, and handling of information in a framework into an organized framework outline that would then be able to be separated into littler and littler units for transformations to guidelines written in C Sharp programming language.

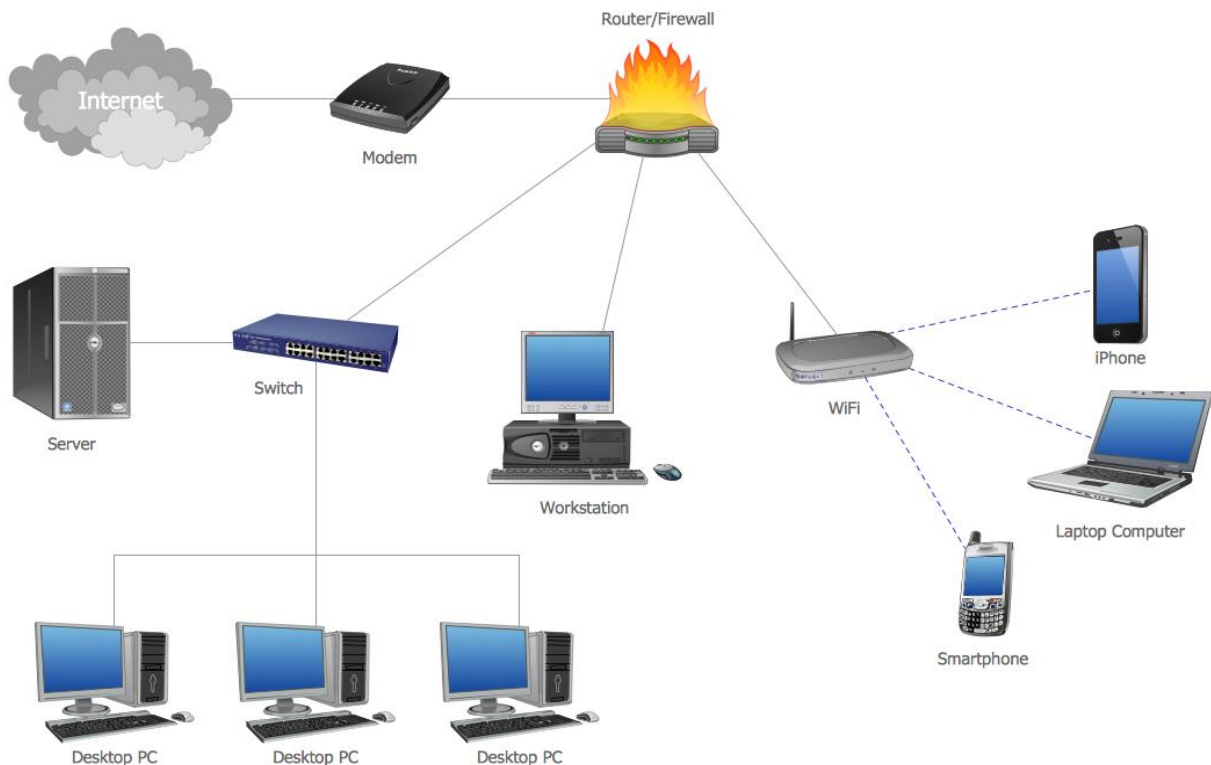


Figure 4.2 Physical design

As shown on figure 4.2 the ZERC will be operating on windows machines networked by a central switch for resource sharing. Additional services will be offered by workstation computer to client computers. All services requests are forwarded via a firewall routed to the internet. Smart phone devices access a web portal through wifi routers-firewall then main server. Xampp server holds databases for ZERC receiving request via Hyper Text Transfer Protocol.

4.5. DATABASE DESIGN

Database design is the association of information as per a database demonstrate. The designer figures out what information must be put away and how the information components interrelate. With this data, Zesa Holdings can start to fit the information to the database demonstrate. It involves database configuration includes grouping information and distinguishing interrelationships (OMG, 2011). ZERC users will be fundamentally brought together on the database upon all involved processes.

ZERC database schemas on figure 4.4

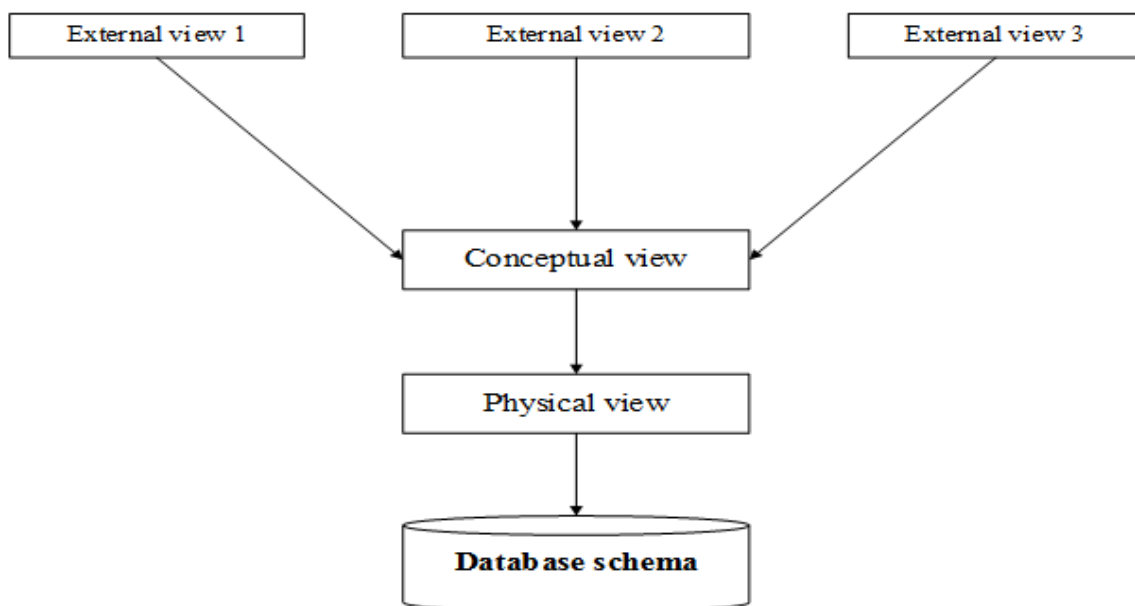


Figure 44.4 ZERC database schema

Table 4.1 database design (external, logical and physical view)

| | |
|------------------------|---|
| External schema | This is the level that determines and makes it easier for the client's association with the database. It is done via interfacing in a manner that the client will control without skill required |
| Logical schema | This methodology includes the recognizable proof of the entities and their connections. An entity relationship (ER) will be developed to demonstrate the discoveries of the logical design. |
| Physical | Is the most minimal level of specialization which characterizes how information is put away. The physical database is then made utilizing the outcomes that were gotten from the logical database design. |

Tables The following are database tables for proposed ZERC. Each table has columns, data type for holding categorised information and length of table values

Table 4.2 Employees table

| Columns | Data type | Explanation |
|----------------|------------------|--------------------|
| EC_number | Varchar(25) | Unique identifier |
| First_name | Varchar(35) | Employee name |
| Surname | Varchar(35) | Employee last name |
| Department_no | Varchar(35) | Foreign key |
| Access_code | Varchar(35) | Password field |
| Bank_account | Varchar(35) | Foreign key |

Table 4.3 Departments table

| Columns | Data tpe | Explanation |
|----------------|-------------|---------------------------------|
| Department_no | int (4) | Unique identifier of department |
| Departmen_name | Varchar(25) | Name of department |
| Description | Varchar(25) | function |

Table 4.4 Employees Bank Accounts table

| Columns | Data tpe | Explanation |
|-------------|-------------|---------------------------|
| Bank_ID | int (4) | Unique identifier of bank |
| Bank_Name | Varchar(25) | Name of bank |
| Branch_code | Varchar(25) | Bank branch code |
| Branch_name | Varchar(25) | Branch name |
| EC_number | Varchar(23) | Foreign key |

Table 4.5 Travel requisition claims table

| Columns | Data type | Explanation |
|-----------------|-------------|-------------------------------------|
| Trip_number | int(4) | Unique identifier of travel expense |
| Employee_number | Varchar(15) | Trip claimant |
| Purpose | Varchar(25) | Travel purpose |
| Start_date | Varchar(25) | Begin date |
| End_date | Varchar(25) | End of trip |
| Total_cost | Float () | Expense amount |
| | | |

Table 4.5 Reimbursements table

| Columns | Data tpe | Explanation |
|-----------------|-------------|-------------------------------|
| Paid_Date | Date() | Reimbursed date |
| Employee_number | Varchar(15) | Traveller |
| Purpose | Varchar(25) | Description of expense |
| Expense_code | Varchar(25) | Foreign key for expense types |
| Total_Amount | Float () | Expense amount reimbursed |
| | | |

ENHANCED ENTITY RELATIONSHIP DIAGRAM FOR ZERC

EER is a high-level data model that incorporates the extensions to the original ER model (David, 2010). EER models is a helpful tool for designing ZERC database with high-level model. With its enhanced features, the developer can plan databases more thoroughly by delving into the properties and constraints with more precision.

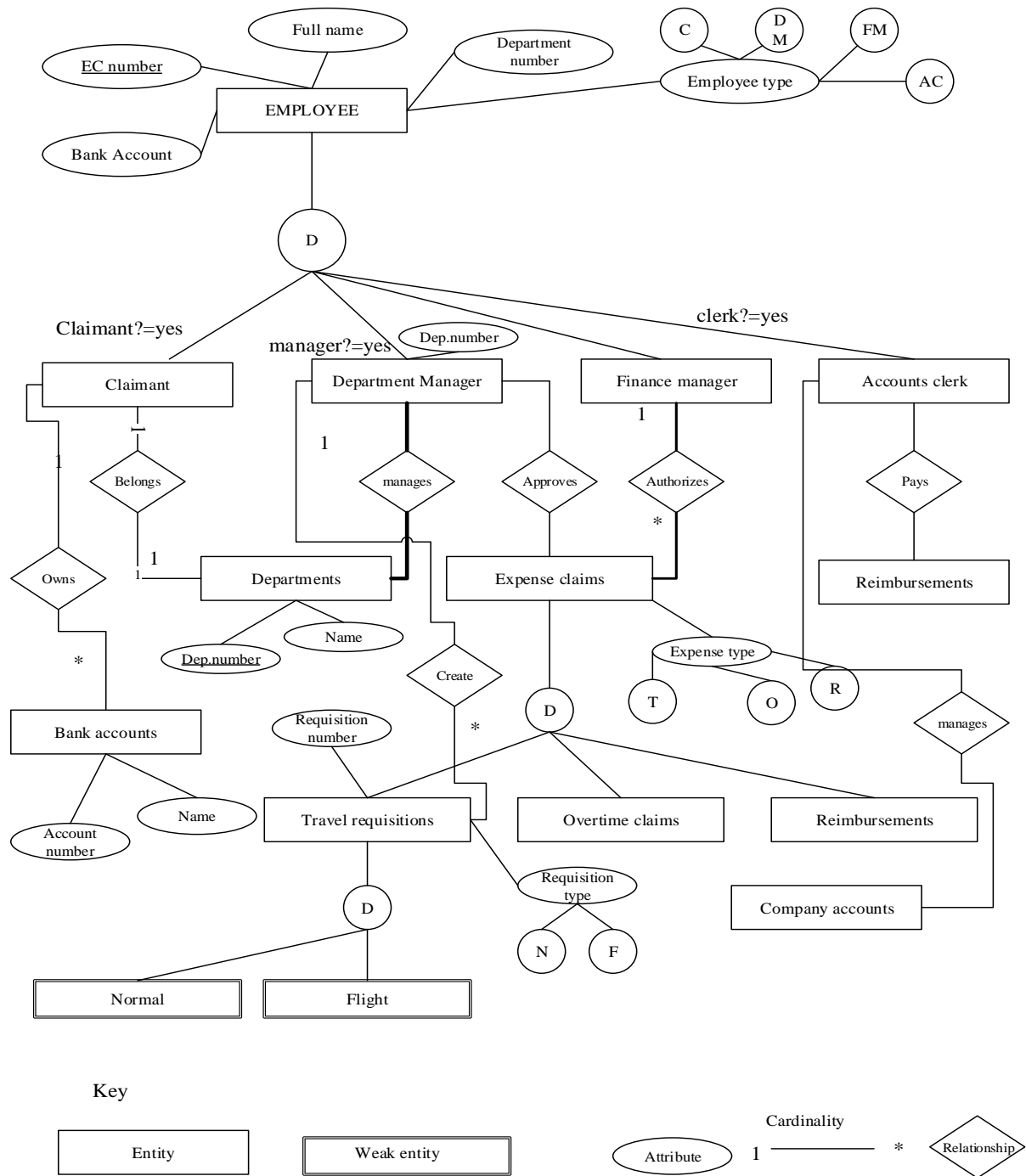


Figure 4.5 ZERC enhanced entity relationship

4.6 PROGRAM DESIGN

Program design is the process that an organization uses to develop a program. It is most often an iterative process involving research, consultation, initial design of the Zesa Expense Reimbursement Centre

SEQUENCE DIAGRAM

According to OMG (2011), sequence diagram is a type of interaction diagram because it describes how—and in what order—a group of objects works together. These diagrams are used by ZERC software developer and business professionals to understand requirements for the proposed Zesa expense Reimbursement centre.

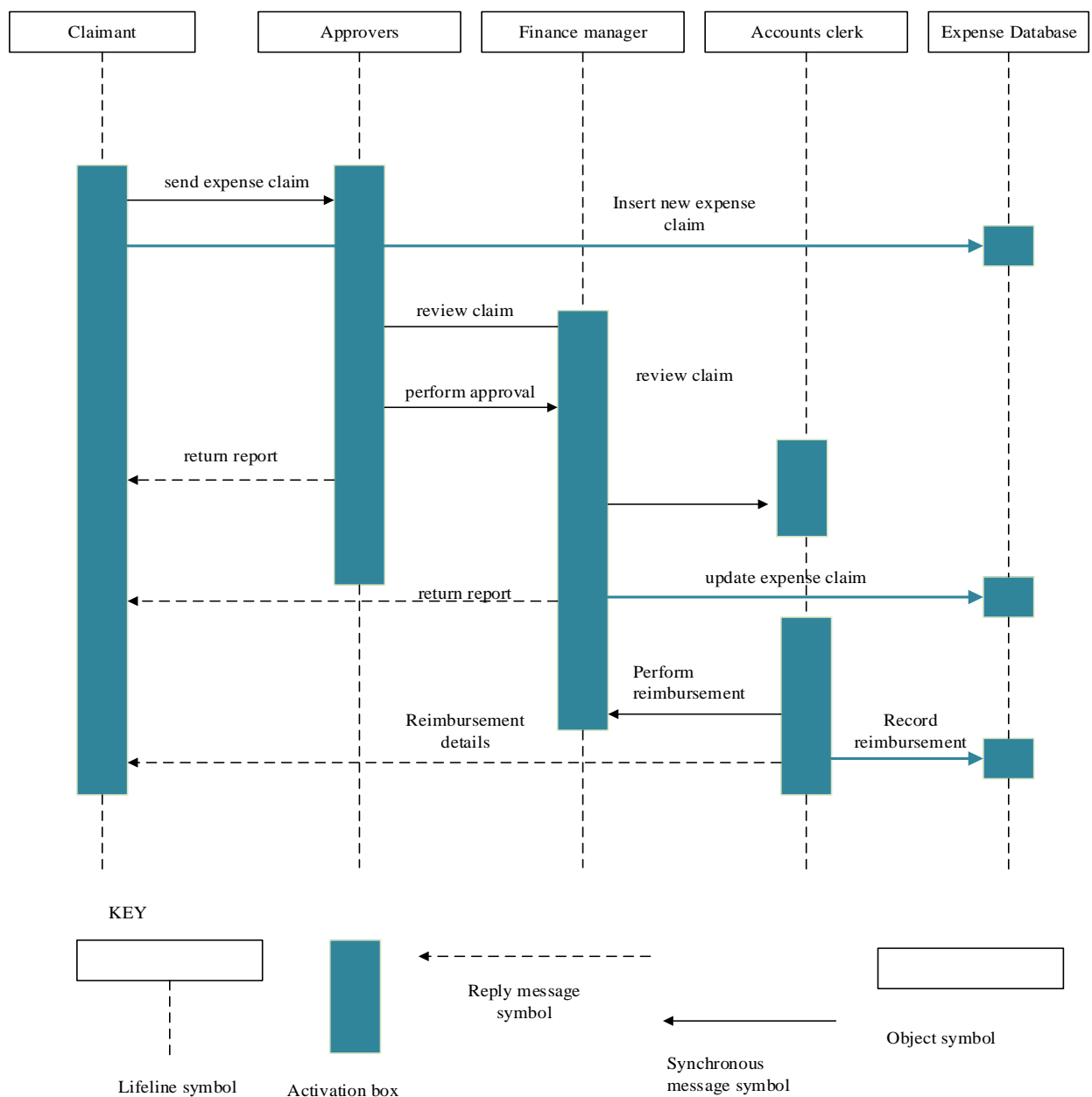


Figure 4.6 ZERC sequence diagram

4.7 INTERFACE DESIGN

An interface configuration is connected with giving a nice and user friendly UI in this manner focusing on convenience. The basic purpose of the interface design is to make the PC and user or entity relationship to be made as fundamental as could be normal considering the present situation without neglecting the target capability which is proficient by fulfilling customer and ZESA Holdings' system requirements. Interface setup is fundamentally focused on assemblies for making ZERC legitimate.

4.7.1 MENU DESIGN

Menu design is a rundown of choices or directions displayed to the client of a PC or correspondences system (Zobel, 2013). A menu may either be a framework's whole UI, or just piece of a more intricate one. It designate in what manner different classes inside the proposed ZERC toil so they are crucial for system navigation. Claimants, department manager, Finance manager and Accounts navigate the ZERC using menus

4.7.1.1 MENU DESIGNS

The diagrams below shows main menu interface designs of the proposed ZESA system.

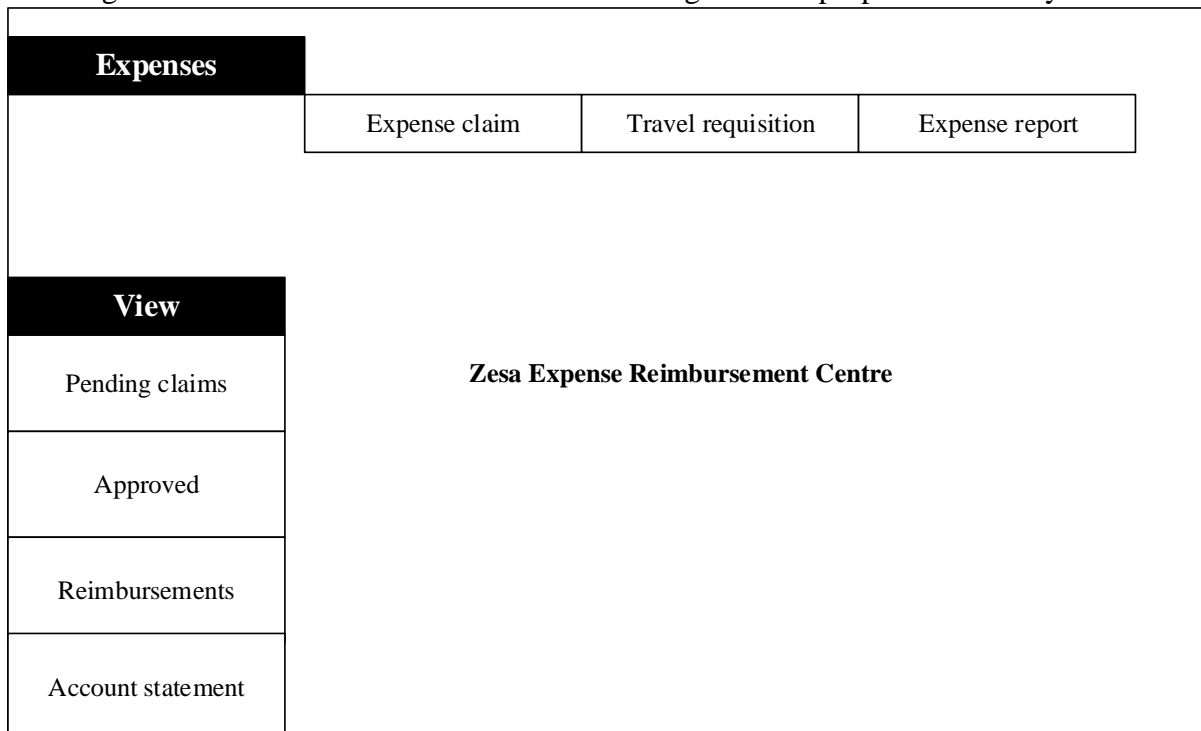


Figure 4.7 Employee Main menu design

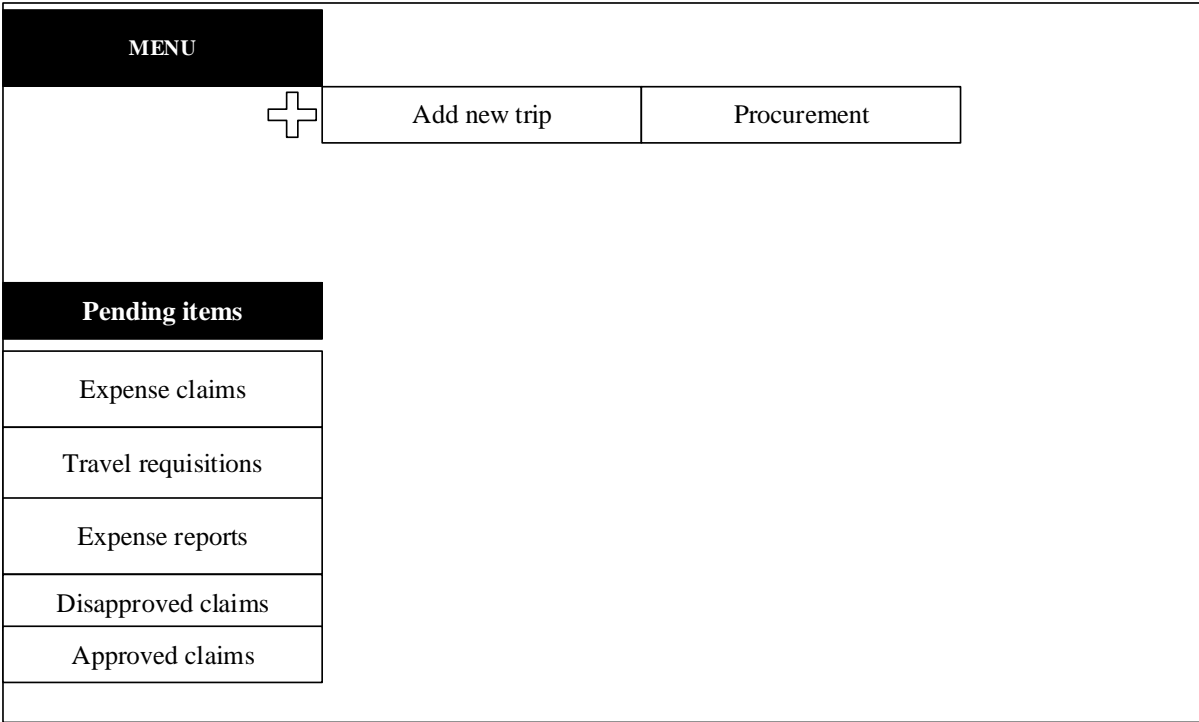


Figure 4.8 Department Manager menu design

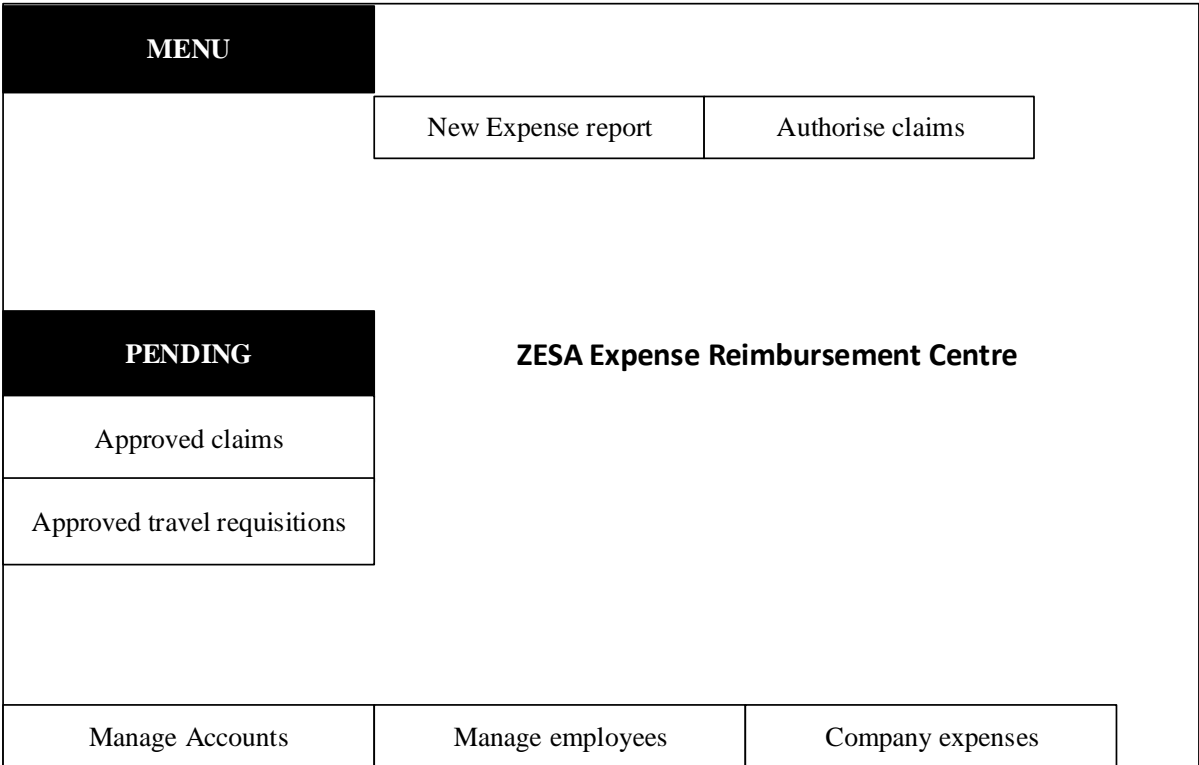


Figure 4.9 Finance Manager menu design

| | | |
|--------------------------------|--|----------------|
| MENU | | |
| | New report | Add account |
| PENDING | | |
| Authorised claim | ZESA Expense Reimbursement Centre | |
| Authorised travel requisitions | | |
| Awaiting reimbursements | | |
| Bank reconciliation | Bank statements | Reimbursements |

Figure 4.11 Accounts clerk menu design

4.7.1.2 SUB-MENUS

A Sub-menu is a secondary menu available through another menu, especially one that branches off the first from main ZERC main menus.

| |
|---------------------|
| Context Menu |
| Pending approvals |
| Rejected claims |
| New trips |
| |
| Notifications |
| Add new user |
| Change password |
| Logout |

4.7.2 INPUT DESIGN


| EXPENSE CLAIM | | | |
|---------------------------------------|----------------------|--|----------------------|
| Claim date | <input type="text"/> | Description | <input type="text"/> |
| Claimant | <input type="text"/> | Amount | <input type="text"/> |
| Department | <input type="text"/> |  | |
| Expense date | <input type="text"/> | | |
| <input type="button" value="Submit"/> | | Receipt | |

Figure 4.12 Expense claim input form

| Travel requisition | | | |
|---------------------------------------|----------------------|--------|----------------------|
| Claim date | <input type="text"/> | Begin | <input type="text"/> |
| Claimant | <input type="text"/> | Ending | <input type="text"/> |
| Department | <input type="text"/> | | |
| Description | <input type="text"/> | | |
| Breakfast | <input type="text"/> | Lunch | <input type="text"/> |
| Dinner | <input type="text"/> | fuel | <input type="text"/> |
| | | Other | <input type="text"/> |
| TOTAL | \$ 00.00 | | |
| <input type="button" value="Submit"/> | | | |

Figure 4.13 travel requisition input form

| | | |
|-----------------------|---------------------------------------|----------------------|
| Expense report | | Travel number |
| | | <input type="text"/> |
| Sender | <input type="text"/> | |
| Expense date | <input type="text"/> | |
| Amount | <input type="text"/> | |
| Purpose | <input type="text"/> | |
| | <input type="submit" value="Submit"/> | |

Figure 4.14 Expense report input form


4.7.3. OUTPUT DESIGN

Output design (OD) is build up the for ZERC to yield reports or results that meets the end clients necessities (Kroenke, 2011). The fundamental focus of the OD is to provide reports headway levels back to the claimant and approvers after sending electronic data along lines of approval workflows. OD show an eventual outcome of the data done by the ZESA users.

Table 4.9 Expense claims

| Expense claims | | | | | | |
|-----------------------|------------|--------------|--------|-----------|----------|----------|
| Claimant | Claim date | Expense date | Amount | Purpose | Progress | Approved |
| ZE0054 | 03-06-2018 | 03-05-2018 | 75.50 | Fuel cost | Pending | No |
| - | - | - | - | - | - | - |
| | | | | | | |

| Claimant | Claim date | Expense date | Approval number |
|----------------------------|------------|--------------|-----------------|
| ZE0042 | 04-08-2018 | 31-07-2018 | P700D88 |
| Purpose | Approver | Amount | |
| Purchase of engineer's kit | R.Mutema | \$75.00 | |

 Approve for reimbursement


receipt
 

Figure 4.15 Pending claims output form

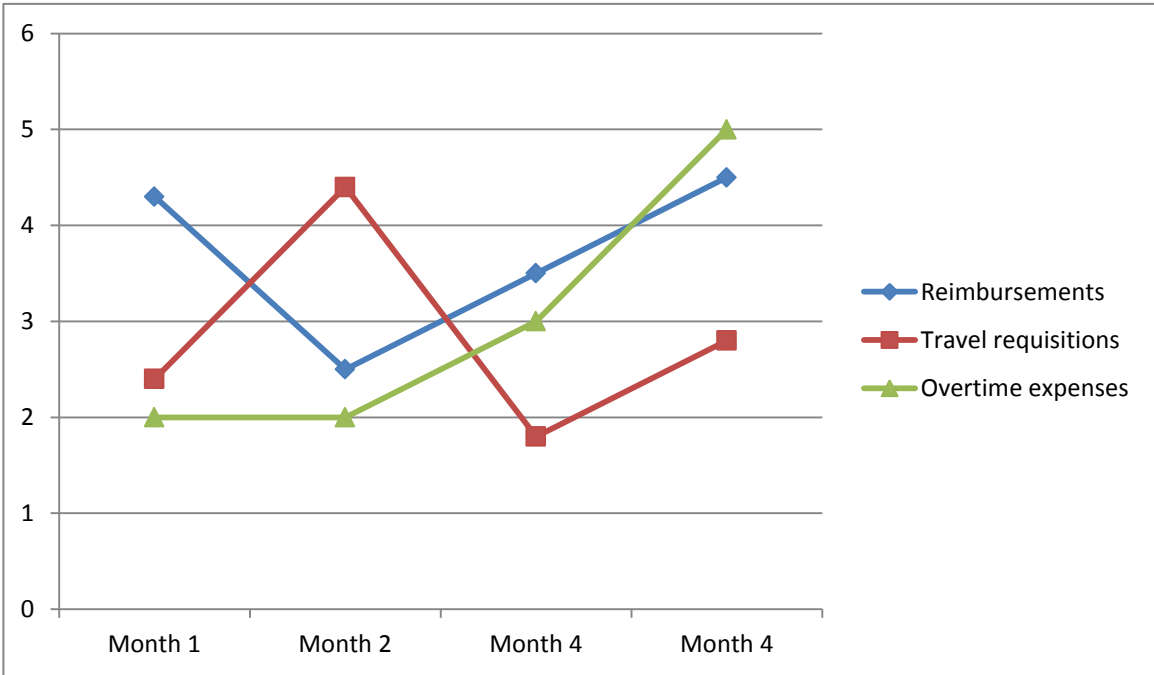


Figure 4.16 Monthly and annual expenses review

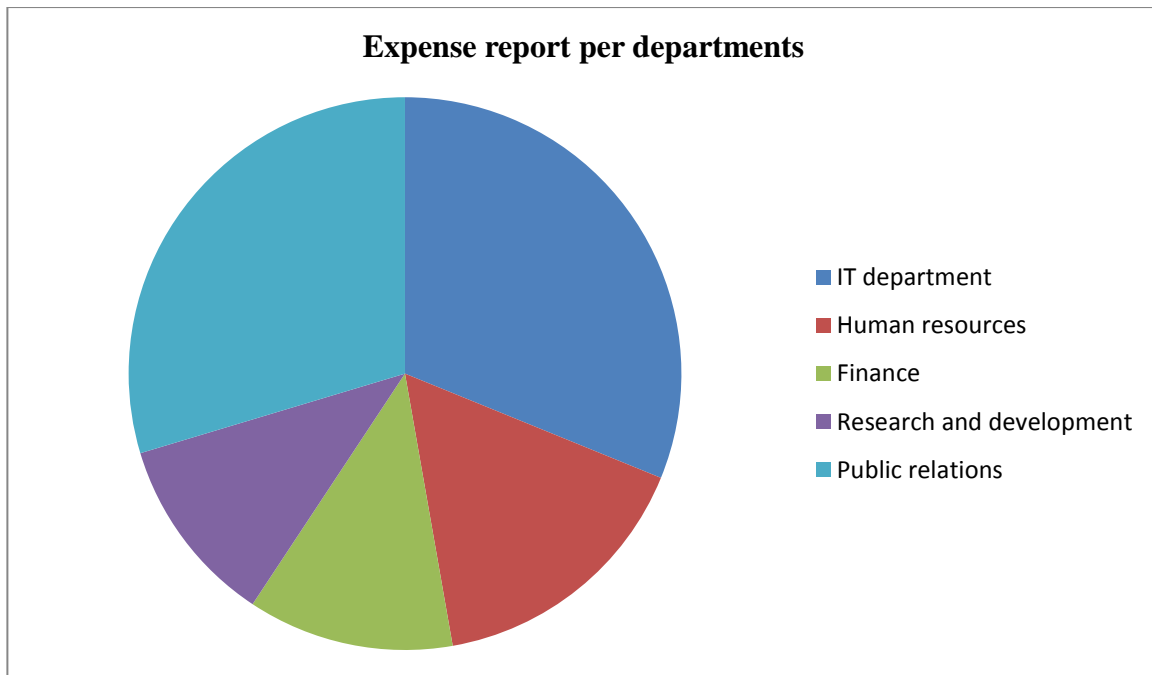


Figure 4.17 Expense report per departments

4.8 PSEUDO CODE

A pseudo code is a dialect used to make programs. This is additionally upheld on the way that a pseudo code is utilized for depicting the first rule of a calculation. It is basically for individuals to understand what really a system will do. Below is the pseudo code of ZESA Expense reimbursement Centre intentional for human perusing instead of machine perusing (Zobel, 2013).

Start the application

Algorithm for Claimant Login

If (User ID) and (Password) is Valid then

Claimant Main form.

Else

Display the message Username and Password doesn't match

End

Algorithm for Adding New expense claim (reimbursements)

Start
if (all fields are complete) send request to department manager
else
 Display the message incomplete expense details
End

Algorithm for Approvals

Algorithm for Deleting User s record Start
if (all requirements available & company policy not violated)
 Send approved to finance manager
Else
 Send back as rejected
End

Algorithm for reimbursing by accounts clerk

if (claim has been approved and amount stated are not falsifying)
 reimburse
else
 disapprove
End

4.9 SECURITY DESIGN

A program writing concept, which implies that the product has been structured from the establishment to be secure is known as security design. Vindictive practices (such as hacking) will be underestimated and care is taken to limit affect fully expecting security vulnerabilities. When a security vulnerability is found necessary measures must be proposed for ZERC development process. These measures incorporate:

4.9.1 PHYSICAL SECURITY

The framework can be secured physically using security gatekeepers to protect the premises (Lawrence, 2012). There is have to utilize criminal bars on every one of the entryways and windows so as to safe protect the equipment in which the framework will keep running from burglary. He data centre comprises of electric secure doors with biometric authentication systems to prevent unauthorised access to ZESA data centre.

4.9.2 NETWORK SECURITY

Network security is concerned with the following; unauthorized access, malicious use, faults, tampering, destruction, and disclosure. Network security design is the process of designing a network so that it includes measures that prevent the problems mentioned above.

This can be achieved through:

Segmenting ZESA network. Proper network segmentation has long been a foundation of network security architecture best practices. In this past this was primarily accomplished by layering physical hardware with Access Control List (ACL) policies.

Network hardening. Network hardening requires a systematic review of your network; the security team needs to spot everything from unnecessary modules and open ports, to poorly secured networked printers.

4.9.3 OPERATIONAL SECURITY

Operational security refers to a strategy used in risk management that enables a manager to view operations or projects from the perspective of competitors or enemies. His will be done by ZESA IT department through:

- Identification of Critical information

- Analysis of Threats: A Threat comes from an adversary – any individual or group that may attempt to disrupt or compromise a friendly activity.
- Analysis of Vulnerabilities
- Assessment of Risk:
- Application of Appropriate OPSEC Measures

4.10 CONCLUSION

In conclusion, design phase has led to the coming up of the interfaces of the proposed Zesa Expense Reimbursement Center, that is, the methods by which the users will see it. This stage has being clearly spread out subsequently to the extent how to make, plan the gear and the framework. Because of the considerable number of exercises up-to this stage, it has been made feasible for the coding stage to be initiated.

CHAPTER 5: IMPLEMENTATION PHASE

5.1 INTRODUCTION

Implementation is a procedure of guaranteeing that the information system designed is operational Matti (2014). This stage of Zesa Expense Reimbursement Centre development comprises of the system coding, testing, validation, installation and maintenance. It is the final stage of waterfall development cycle and users are additionally familiarized with the system, the software itself will be tried ensuring it to meet all user requirements (non-functional and functional) and making sure that loop holes are eliminated before the software is conveyed to the users. Testing procedures will be revised few times thereby ensuring purging of blunders and loop holes before it is implemented at ZESA Holdings (Zobel, 2013). This phase will highlight how the system will be implemented.

5.2 CODING

Fennelly (2012), denoted that coding is a process where the system developer will be using C# programming language to write the ZERC program. The developer will be giving specific instructions to the computer to function as per required by Zesa Holdings. The codes will be produced in modules and functions to achieve full system functional requirements as well as non-functional requirements. So, this is the actual creation of the ZERC software.

5.3 SYSTEM TESTING

According to Morris (2012), software testing is a standard which has to be applied together with anything that has to do with specifications. This measure is imposed so as to ensure that key functional and non-functional requirements have been assessed exhaustively before ZERC is installed on machines so that any errors, which include logical and runtime bugs, will be spotted and rectified quickly. System testing explores the whole software to identify and report errors. Software testing can be sectioned as unit, integration, system and acceptance testing.

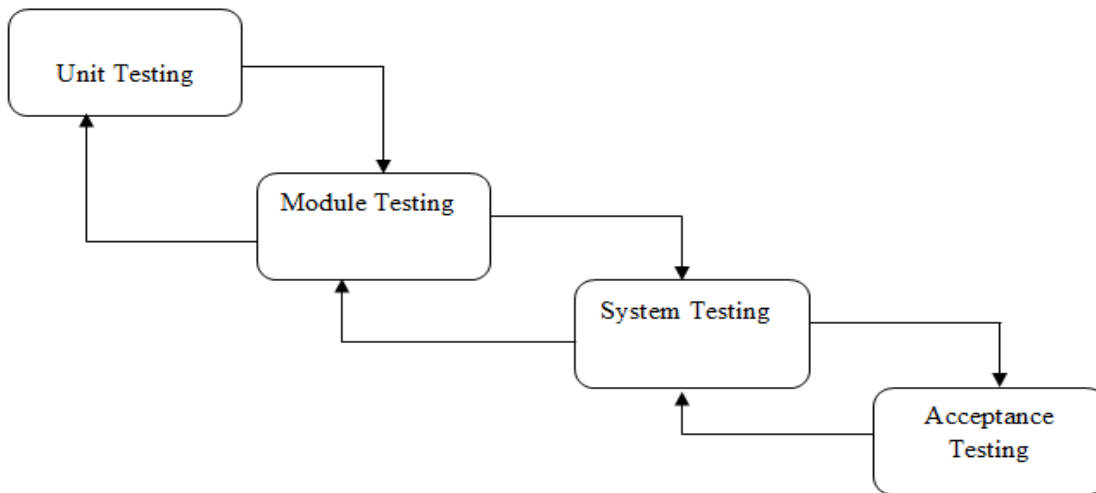


Figure 5.1 Types of software testing

5.3.1 SYSTEM UNIT TESTING

Unit testing is a technique by which discrete components of ZERC will be tested and evaluated to see if they work to meet required predefined functionality or objectives. Unit testing is practised for the following motives:

- To spot errors induced all through programming or coding
- To correct identified errors so as to improve system's full capacity meet its purpose.

ZESA Holdings will conduct the process of unit testing to spot logical and runtime bugs

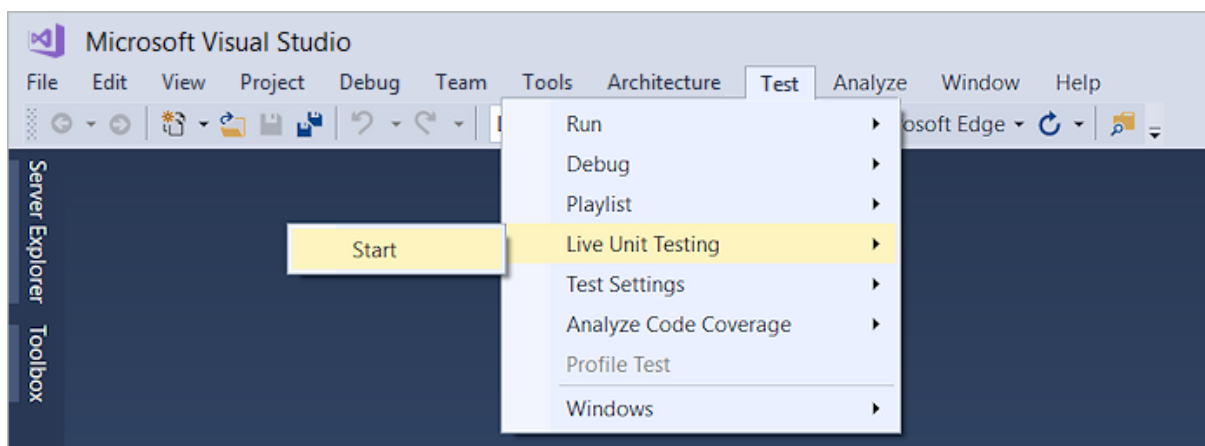


Figure 5.2 unit test

So, unit testing comes in two forms: White and black box.

- White Box – This denotes to a way which the trial of the system is handled in the inner rationale, that is, the C# code. In Visual Studio it is done as show on figure 5.2 White box will be carried out by the developer

- Black box - technique in which the interior structure, outline or usage of the thing being tried isn't known to the analyser. These tests can be non-functional, however typically functional (Fennelly, 2012). So the testing will be done by an employee who is not familiar with the system and who has no knowledge about it.

Employees are not supposed to have more than one overtime claim with a similar date. The test is portrayed on Figure 5.3 a

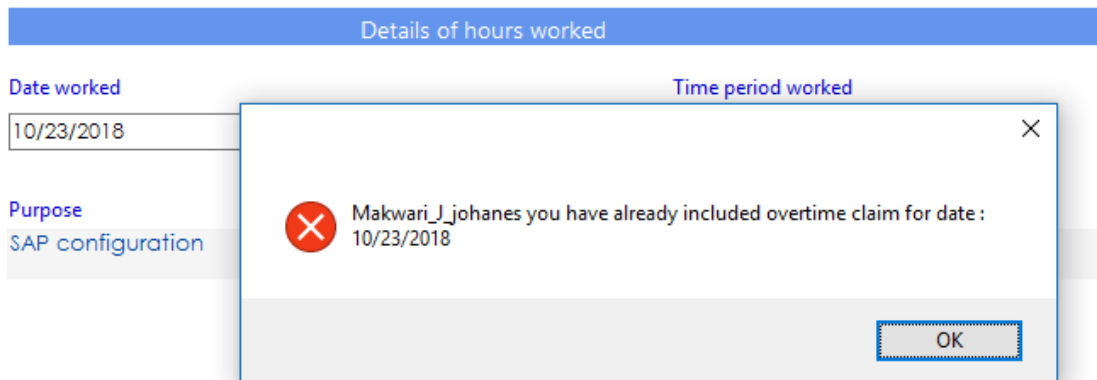


Figure 5.3 (a) Testing system if it meets ZESA overtime claim policies

Testing and valuating overtime period inputted by a claimant, ZESA requires overtime claims to be of at least an hour of the worked date. This is shown on figure 5.3(b)

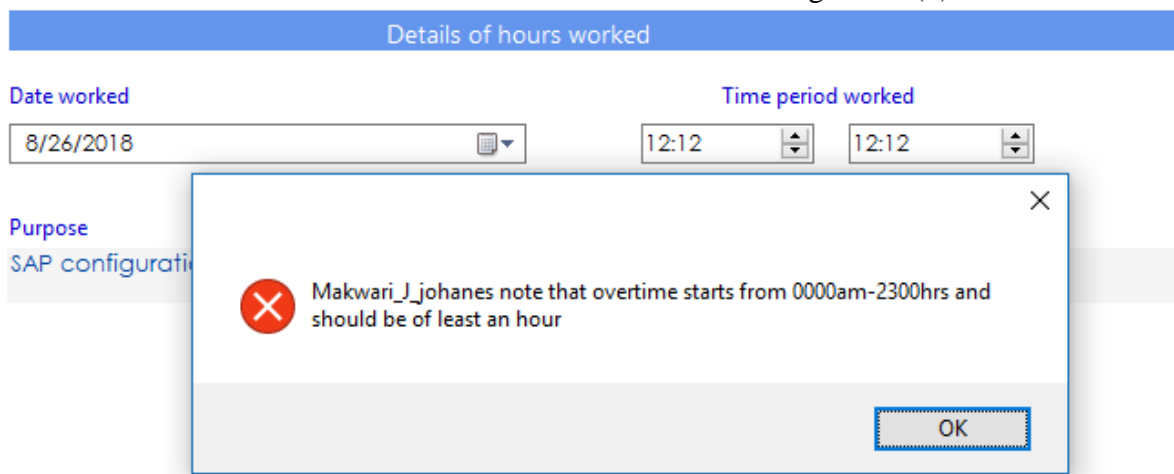


Figure 5.3 (b) Testing system if it meets ZESA overtime claim policies

5.3.5: SYSTEM TESTING

As noted by Tedre (2014), system testing refers on wether the processes included discrete modules will work silmultenously according to developer and client prospects. It evaluates the whole system to identify the errors in module interconnections and interreletions.

5.3.6 SYSTEM SECURITY TESTING.

This is achieved through authentication, whereby authentication merely ensures that the user is exactly the one who he is claiming to be, trying to access ZERC system services.

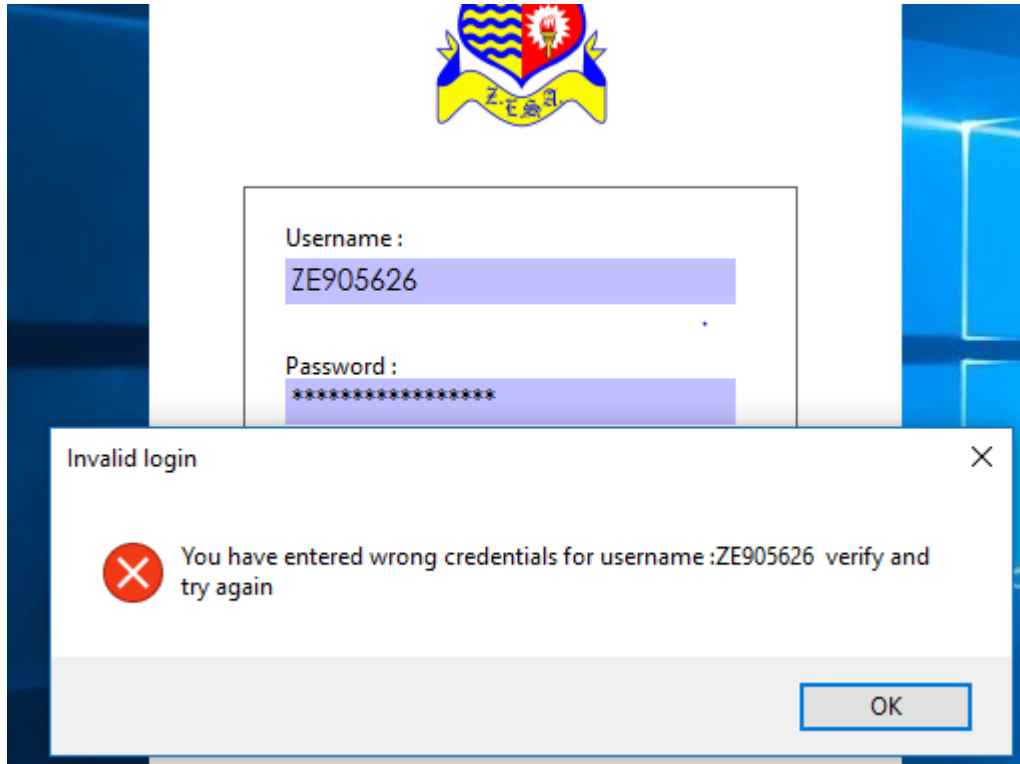


Figure 5.4 user authentication

5.3.7 SYSTEM MODULE TESTING

Module testing points to a systematic way of separating the whole software into segments (modules), which will be examined individually (Zobel, 2013).. Greater or major part of the modules are tried by the programmer to guarantee proper system working as required. So the reason for module testing is to evaluate system functions individually.

OVERTIME EXPENSE PROCESSING label1
10/23/2018

Gross wages **Expense summary**

Profile:
Andrew Emp M

| | |
|---------------------------------|-----------------|
| Regular pay | 40050 |
| Hourly rate | 10 |
| Overtime rate | 15 |
| Total hours worked (this month) | 7 |
| Overtime wages | 210 |
| (hours) Add: 7 | |
| Gross pay: | \$ 40260 |

Account allocation Due
 10/23/2018

Authorize Desire_F_Manager

The stated business purpose of the expense claim is valid.
 All expenditures within the report are in compliance with compan policy.

Approval action

Figure 5.5 Processing employee mid-month overtime expense claim

Welcome Makwari_Clerk_Johanes 400 Accounts 10/23/2018 1:45:09 PM

Bank reconciliation Main Business Account For period 10/23/2018

Acc.Number **1006663788367** Issue NO **4000288100**

Opening Balance **39998231.79**

| Bank statement lines | | | | Internal record of transactions | | | | |
|----------------------|-----------------|-------------------|--------|---------------------------------|-------------------|----------------|--------|-----------|
| TransactionDate | Reference | Payee | Amount | Receipt_no | Claimant | Expense_type | Amount | Checked |
| 10/22/2018 | RQ2110188214647 | Makwari_J_johanes | 120 | ER16101811563... | Makwari_J_joha... | Reimbursement | 101.40 | Checked |
| 10/22/2018 | RV17 | Makwari_J_johanes | 230.98 | RQ21101882146... | Makwari_J_joha... | Overtime | 120 | Unchecked |
| | | | | RV17 | Makwari_J_joha... | Travel_expense | 230.98 | Unchecked |

RV17

| | | | |
|------------------------------|--------------------|--|----------------|
| Cash Bal as per b/s. | 39998231.79 | Internal transaction balance | 452.38 |
| Items marked | 1 | Items cleared | 2 |
| Amount | 230.98 | Amount | 169.39 |
| Date : | 10/22/2018 | Uncleared balances | -282.99 |
| Bank transaction amount | 350.98 | <input type="button" value="Reconcile"/> | |
| Internal transaction balance | 452.38 | | |

Match found

| | | |
|-------------------|----------------|--------|
| RV17 | Travel_expense | 230.98 |
| Makwari_J_johanes | | |

Figure 5.6 trying or testing bank reconciliation module

5.3.8. SYSTEM ACCEPTANCE TESTING

This testing technique is applied so that the intended end users execute the procedure aiming to figure out if the produced system is satisfactory. Each and every function is evaluated and this is on account of user involvement which is a key element to system improvement and to avoid resistance from intended clients.

- Data output testing- This consists of ZERC software testing so as to yield required reports to a claimant after submitting a request. This is shown on figure 5.7

The screenshot shows a web application interface. At the top left, there is a button labeled 'Create new claim'. Below it, there is a section titled 'Recent rejected List' with a red header. This table contains two rows of data:

| Receipt_no | Claim_date | Purpose | Total | Status | Issue |
|-----------------|------------|---------------------------|-------|----------|----------------------|
| ER1610181154550 | 10/16/2018 | Gweru City park parkin... | 6 | Rejected | false claim |
| ER1610185314771 | 10/16/2018 | Meal expenses | 0.7 | Rejected | verify amount stated |

Below the 'Recent rejected List' is a section titled 'Submitted requests' with a blue header. This table contains five rows of data:

| Receipt_no | Claim_date | Purpose | Total | Status |
|------------------|------------|-----------------------------------|--------|------------|
| ER1610181154550 | 10/16/2018 | Gweru City park parking ticket | 100 | Rejected |
| ER16101811563363 | 10/16/2018 | Business trip meals | 101.40 | Paid |
| ER16101811581190 | 10/06/2018 | Fuel expenses vehicle Reg AAB ... | 3 | Authorized |
| ER1610185314771 | 10/16/2018 | Meal expense | 14 | Rejected |
| ER1610185533124 | 10/16/2018 | Parking charges | 0.9 | Pending |

Figure 5.7 ZERC data output testing for submitted requests

So, acceptance testing was carried out for client needs, prerequisites, and business forms directed to decide if the software fulfils the acknowledgment criteria and to empower the client, users or other approved element to decide if to acknowledge ZERC. As a result, all the objectives have been met, as well as user satisfaction and users tended to accept the system.

5.3.9. SYSTEM VERSUS OBJECTIVES

The designed ZESA Expense Reimbursement Centre was tried in contrast to all predefined objectives. This was carried out for determining whether the system is meeting targets of the scheme, which are, aim of the system (chapter 1: 1.4 Aim) and objectives (chapter 1: 1.5 Objectives). Along these lines is the answer whether the problem identified from ZESA Holdings have been tended to.

To begin with:

- To develop a system that will enable a claimant (employee) to create and submit expense claims and cash advance request to the finance department.

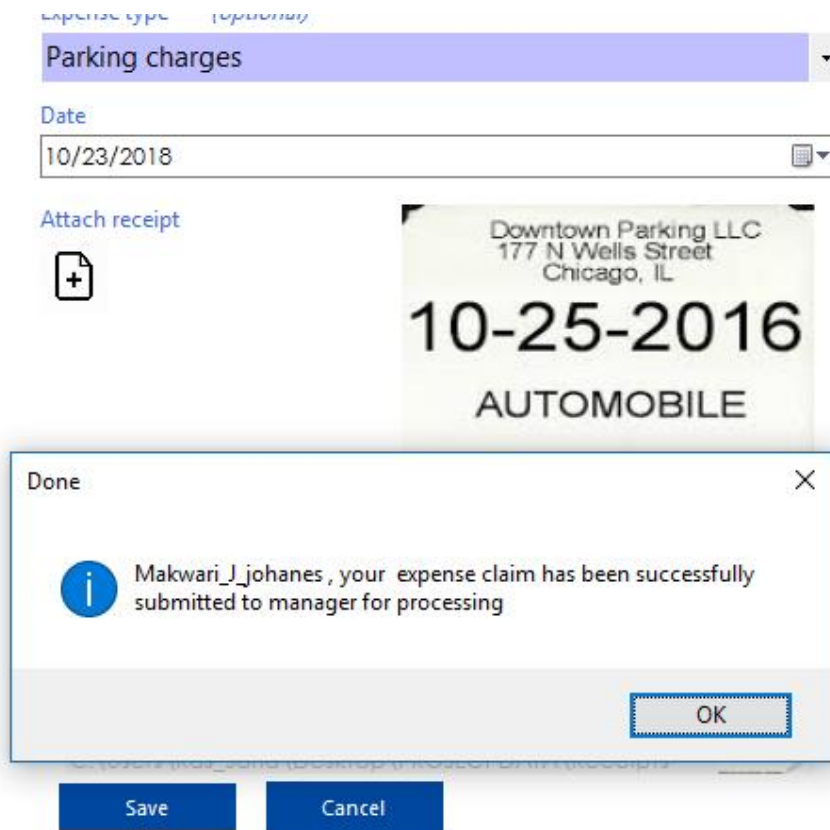


Figure 5.8 Submit expense claims

- To facilitate managers in preparing, approving and submitting cash advance requests and expense reports to finance department.

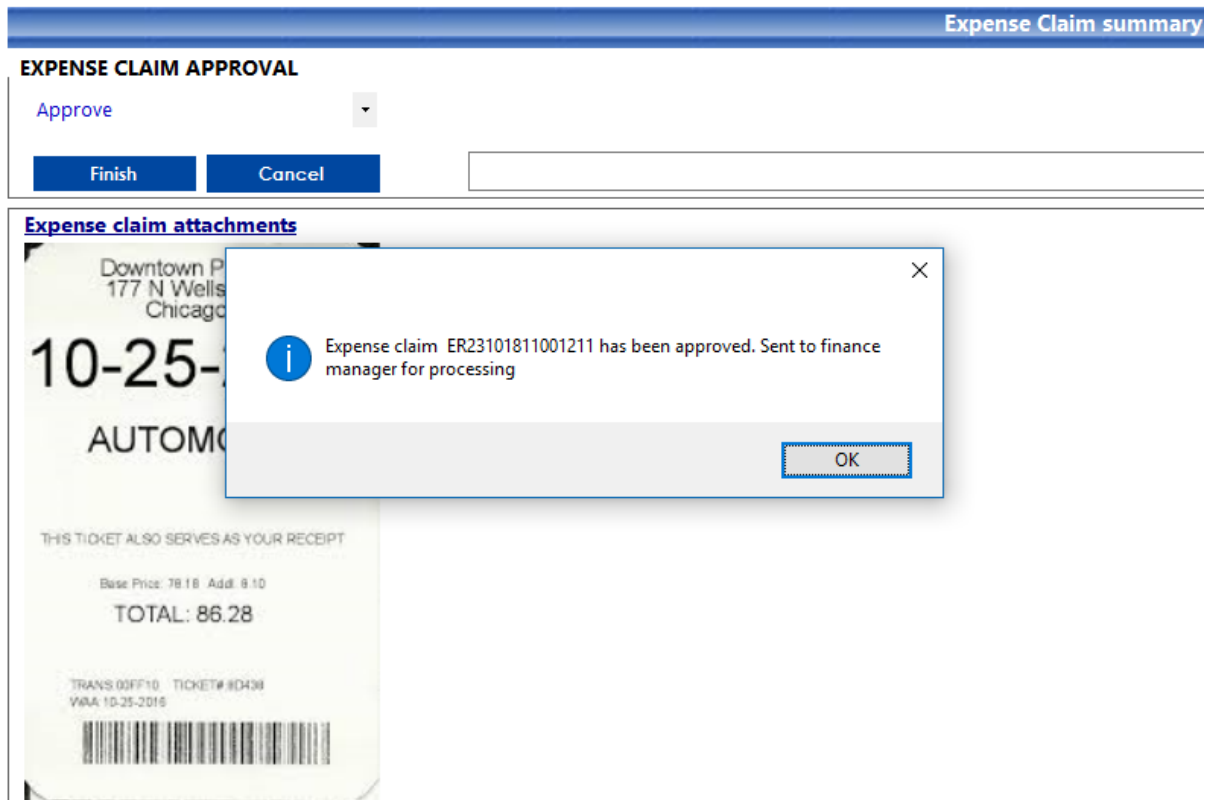


Figure 5.9 Submitting expense requests to finance department for payment authorization

- To develop a system that enables managers to approve and sends cash advances approvals to cash administrators or office.

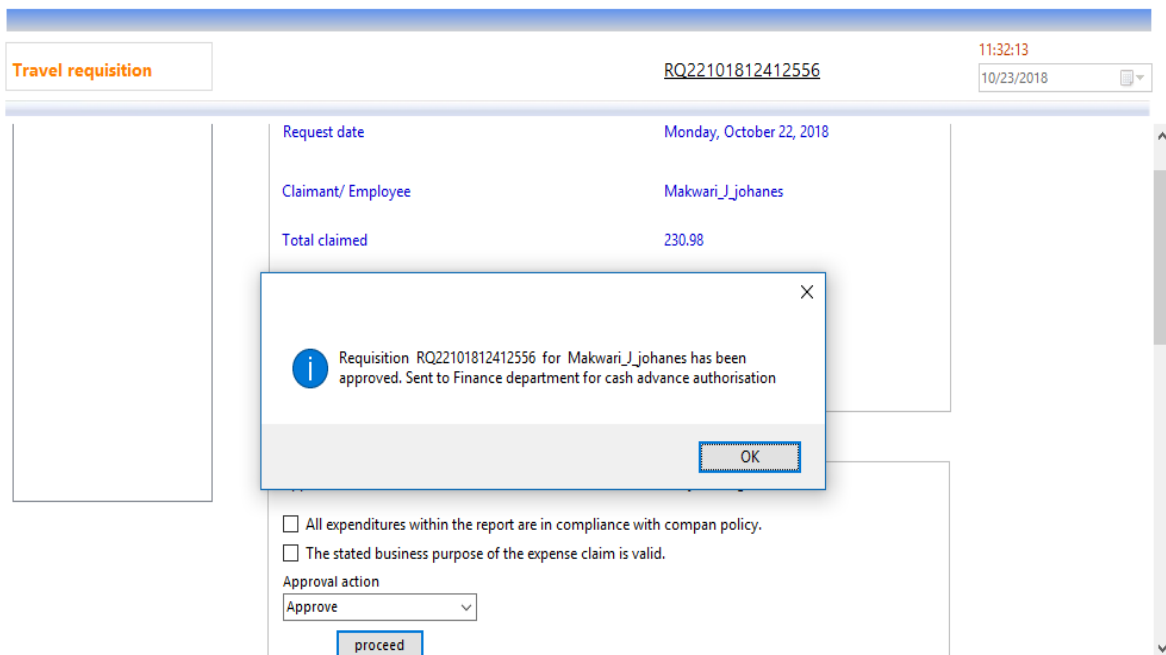


Figure 5.10 Approving and sending cash advance requests for finance manager

- To enable system feedback for approvals to the claimant through system notifications and short message service (SMS).

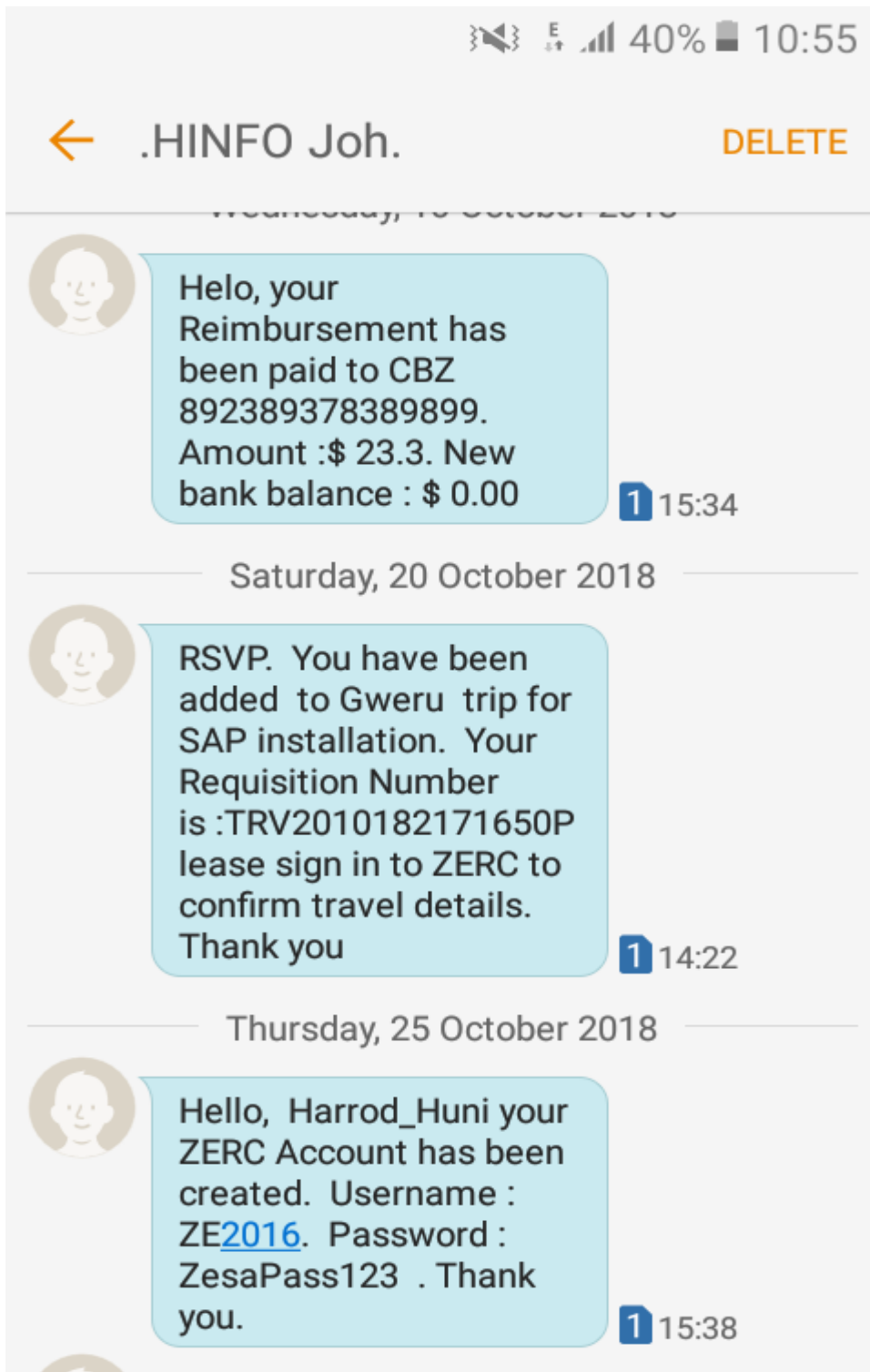


Figure 5.11 Short message service (SMS).

- To enable the claimant to create expense feedback to account for the funds when the trip is complete through attaching receipts and other support documentation to the worksheet and forward to the preparer for processing.

Purpose: Microsoft Conference

Statement: K-2014-05-08-7786

Pay Period: 5/1/2014 to 5/31/2014

Expense Report

Employee Information

| | | |
|---------------------------|-------------------|-------------------------|
| Name: Joey Santana | Position: Manager | SSN: 123-3234-2342 |
| Department: HR | Manager: BM | Employee #: HR-77867622 |

| Date | Account | Description | Housing | Transport | Fuel | Meals | Entertainment | Misc | Total |
|-----------|---------|---------------|----------|-------------|----------|----------|---------------|------------------|--------------------|
| 5/1/2014 | 234452 | Business trip | \$223.00 | \$1,322.00 | \$0.00 | \$200.00 | \$310.00 | \$133.00 | \$2,188.00 |
| 5/2/2014 | 234453 | Business trip | \$123.00 | \$3,322.00 | \$0.00 | \$200.00 | \$320.00 | \$22.00 | \$3,987.00 |
| 5/3/2014 | 234452 | Business trip | \$223.00 | \$7,322.00 | \$0.00 | \$203.00 | \$320.00 | \$133.00 | \$8,201.00 |
| 5/12/2014 | 234452 | Business trip | \$0.00 | \$3,322.00 | \$200.00 | \$203.00 | \$320.00 | \$0.00 | \$4,045.00 |
| | | | \$569.00 | \$15,288.00 | \$200.00 | \$806.00 | \$1,270.00 | \$288.00 | |
| | | | | | | | | Subtotal: | \$18,421.00 |
| | | | | | | | | Advances: | \$10,000.00 |
| | | | | | | | | TOTAL: | \$8,421.00 |

Date, Signature Employee

Date, Signature Manager

1 of 1

Figure 5.12

- To develop a system that automatically compute and analyse overall company expenses on monthly basis and annually.

Reimbursement by department

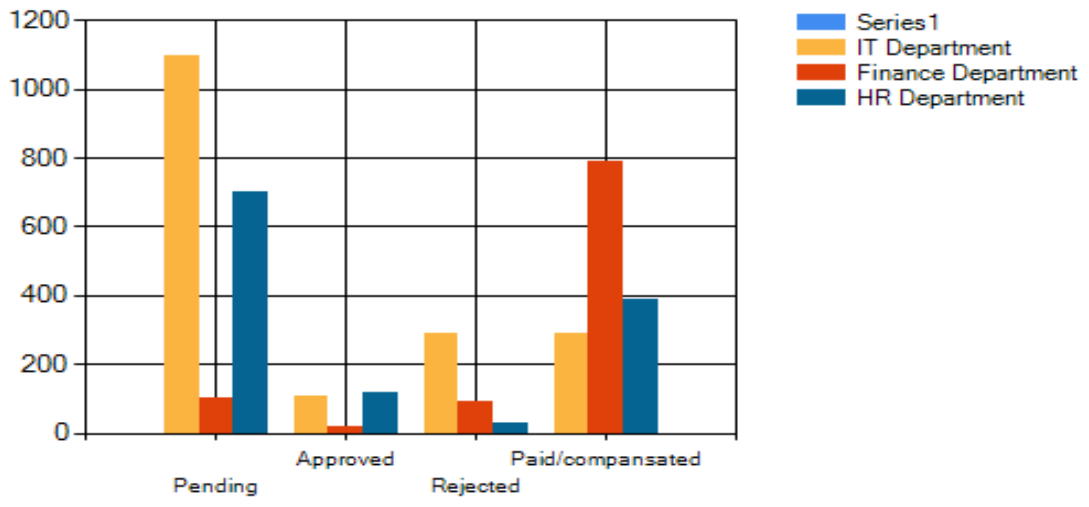


Figure 5.13 analyse overall company expenses on monthly basis through bank reconciliation

EXPENSE TRENDS

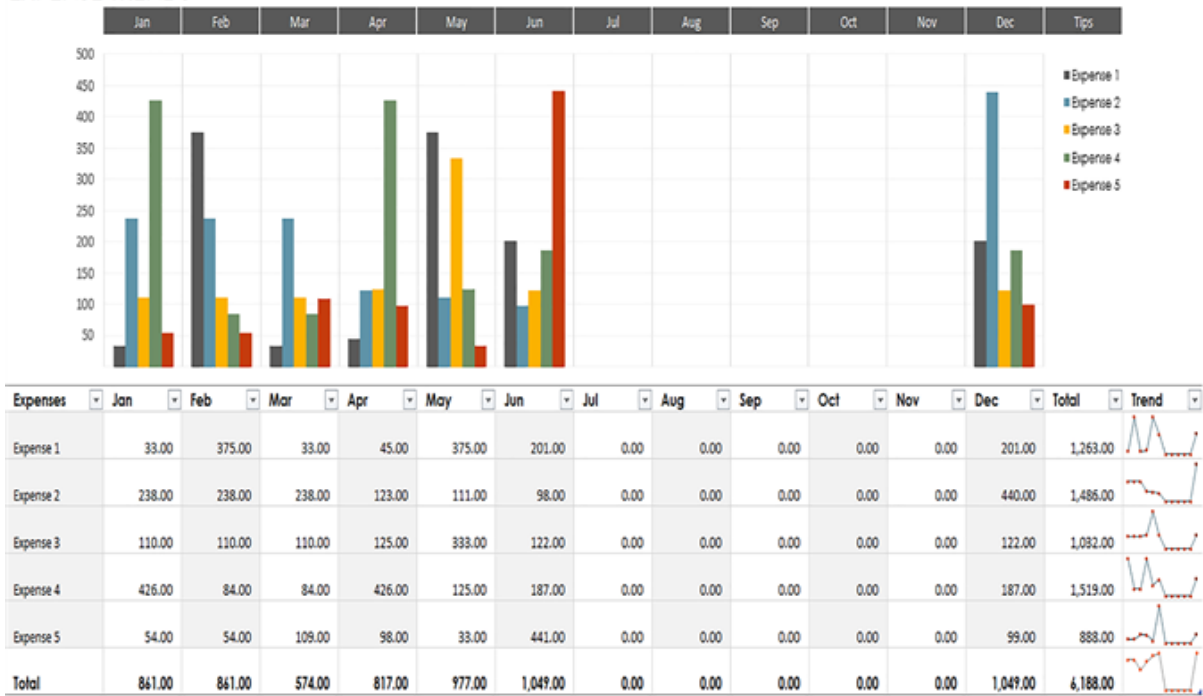


Figure 5.14 Zesa Holdings reimbursement trends

5.4 INSTALLATION

Installation is setting up of the designed system in preparation for execution (Black, 2013). . This phase summaries directions of the approaches that will be used to implement Zesa Expense Reimbursement Centre and assure its running to provide an obliged functions to ZESA Holdings claimants and managerial team. Table 5.1 has list of some operation to be conducted during ZERC installation.

Table 5.1 Installation operations

| |
|---|
| Making sure that necessary system requirements are met |
| Creating or updating program files and folders |
| Adding configuration data such as configuration files, Windows registry entries or environment variables(.Net Frameworks) |
| Making the software accessible to the user, for instance by creating links, shortcuts |
| Configuring components that run automatically, which are Windows services |

5.4.1 USER TRAINING FOR ZESA EXPENSE REIMBURSEMENT CENTRE

According to Matti (2014) , user training encompasses a preparation on how Zesa users will be equipped with before getting started with the new software (ZERC). Each user in the company must be equipped with the knowhow of new system utilization. The managerial team should also be trained to understand approval workflows of the new system. User training is important for the following reasons heighed on Figure 5.2 for Zesa Holdings employees.

| |
|---|
| Should be provided to employees to enable them to do their own problem solving. |
| The training will be designed to help the users with fast mobilization for the organisation approval work flows |
| The training will involve how to operate, troubleshoot the system problem, determining whether a problem that arose is caused by the equipment or software. |
| To give employees a chance to acclimate to any new processes and work out any problems with the system before it is implemented. |

Figure 5.15 Importance of user training

So, by coaching staffs from Zesa Holdings’ different departments on in what manner to use the Expense reimbursement system will reduce whichever uncertainties, misinterpretations, unnecessary mistakes and complications.

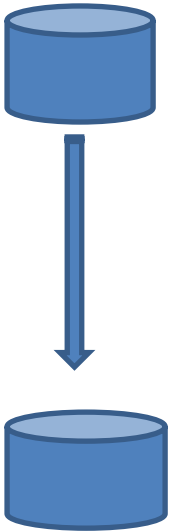
5.4.2 DATA MIGRATION

As noted by Laudon (2013), data migration is the process of relocating information to another device from one storage device. In this perspective, Hierarchical Storage Management (HSM) can be referred to data migration. This technique will be done by copying data from existing Zesa servers to utilize new serves for maximum efficiency of the new system.



Type of data migrations to be engaged for ZERC implementation is shown on figure 5.12

Table 5.3 Storage migration

| TYPE | EXPLANATION | STEPS INVOLVED |
|--|---|---|
| <p data-bbox="204 972 434 1003"><u>Storage migration</u></p>  | <p data-bbox="458 972 989 1261">The process is used as an optimal time to do data validation and reduction by identifying obsolete or corrupt data from Zesa existing servers. The process involves moving blocks of storage and files from one server system</p> | <ul data-bbox="1013 972 1441 1646" style="list-style-type: none"> • Identify the data format, location, and sensitivity • Backup all data • Assess staff and migration tool • Execution of the data migration plan • Testing of new ZERC system • Conduct a full audit of the system and data quality to ensure everything is correct once the data migration process has completed |

Data migration will be done at ZERC implementation for the following reasons:

- Utilization of new serves for maximum efficiency of the new system.

5.4.3 CHANGEOVER STRATEGIES FOR ZERC IMPLEMENTATION.

Changeover is apprehensive by way of an even shift from one computer system to another and moderating interruptions to business processes during conversion of the system. There are several conversion strategies available in system implementations which are to be explained and the developer will utilize the best after examining the risks and factors concerning the existing system.

Direct conversion- As noted by Mohd (2010), direct change refers to a complete shift from the old system to the new one. Zesa will have to abandon the use of its existing system and adopt the new ZERC for its expense claim approval workflows.

However, the problem with this technique is that if something goes wrong with the new ZERC it will be impossible to revert back to the old system.

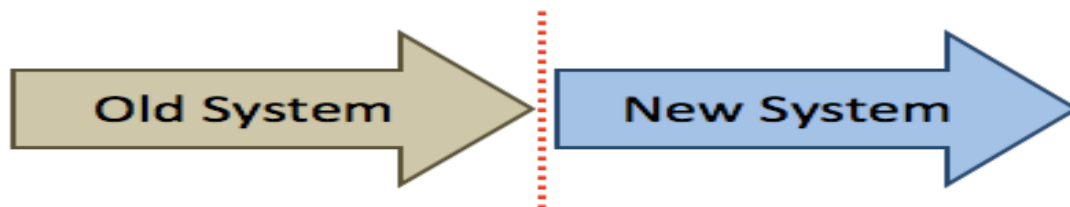


Figure 5.16 Direct changeover strategy

Pilot Changeover- According to Gries (2014), pilot conversion is whereby the new ZERC will be tried out at analysis site before introducing it company-wide and to the operational servers. However, this conversion strategy is limited to the test site. The system's capacity weighed as there will no full exposure to large amounts of data traffic and might be risky when later installed on company-wide site where every user will be accessing it. This might result in later realisation of system failure, longer throughput and response times.

Parallel changeover – In this changeover strategy, both new and existing software will be working alongside with the other for a quantified time period. Therefore Zesa Holdings may perhaps decide on to progressively accept the new ZERC or straightaway finale the earlier software



Figure 5.17 Parallel changeover

Recommended changeover method for ZERC implementation

✓ Parallel changeover

Merits

- Parallel changeover makes it easier to spot minor or small errors on the new designed ZERC.
- IT team will have the ability to fix and correct any problems found in the new system before terminating the operation of the previous one.
- It is much easier for the developer to carry out ZERC user training at Zesa Holdings for since both softwares will be available for utilization throughout the era of training.
- Minimized business activity interruption

5.5 SYSTEM MAINTENANCE

Maintenance is the adjustment of a software after implementation to remedy deficiencies, to enhance execution or other attributes. A corporate view of software preservation is that it purely encompasses fixing imperfections on the system. The following maintenance strategies will be utilised for Zesa Expense Reimbursement Centre.

5.5.1 SYSTEM CORRECTIVE MAINTENANCE

According to Black (2013), corrective maintenance is an errand performed to recognize, separate, and redress faults so that the failed system can be re-established to an operational condition inside the tolerances or breaking points built up for in-service operations. Corrective modifications will rectify blunders and mistakes in ZERC which might distress several modules in the system's design, logic or code as well as its functionality.

5.5.2 SOFTWARE ADAPTIVE MAINTENANCE

Adaptive Maintenance is elicited through deviations in the environment that the ZERC software lives in. So, an adaptive transformation will be prompted by variations to the operating system (OS), hardware (H/W), software needs as well as Zesa administrative business directions and strategies. These modifications to the environment can trigger changes within other parts of Zesa Expense Reimbursement Centre

5.5.3 SOFTWARE PREVENTIVE MAINTENANCE

Preventive Maintenance talk about modifications prepared so as to escalate the appreciative as well as the maintainability of Zesa Reimbursement system in the future. Precautionary modifications are motivated in reducing the future wear of the software. Reorganisation, enhancing code and bring up-to-date documentation are some of the collective precautionary modifications. Implementing preventive changes moderates unimagined effects the new ZERC might have in future, so this supports its scalability, stability, comprehensibility and maintainability.

Recommendations on maintenance strategies for ZERC implementation

- ✓ Corrective maintenance
- ✓ Adaptive Maintenance
- ✓ Preventive Maintenance

System preservation is an essential part of ZERC development life cycle; it is indispensable for system evolution as well as the software success. Maintenance on software goes beyond fixing “bugs”, which is one of the four types of software change. Updating the software environment, reducing its deterioration over time, and enhancing features to satisfy user needs are all examples of maintenance work. All these factors will reduce the chances of ZERC failure soon after launch and as well as in the future.

5.6 RECOMMENDATIONS FOR FURTHER DEVELOPMENT

Recommendation is the proposition with regards to the best strategy, particularly one set forward by a legitimate body (Rex, 2012). As time moves, Zesa employees have to submit their expense reimbursement claims via online and mobile (android) application. This development of mobile applications will further speed up the reimbursement cycles.

Other Recommendations:

- ✓ Define clear and transparent contribution, governance and communication processes during development.
- ✓ Make the most of effective software development technologies and formal methods
- ✓ Demand more transparency, so that customers and users can make more informed judgments about dependability

5.7 CONCLUSION

To sum up, the goals have been met and the software is finished and to be actualized, the venture can be said that it has succeeded. The changeover technique picked was the parallel changeover strategy since it helps to stay away from the loss of unique information dissimilar to the immediate changeover technique. Utilizing Parallel establishment there is simple assessment since the information is entered in both frameworks. It has been clearly highlighted that system preservation is an essential part of ZERC development life cycle for its survival in Zesa Holdings Organisation.

REFERENCES

- Allen, M.; Cervo, D. (2015). Multi-Domain Master Data Management: Advanced MDM and Data Governance in Practice. Morgan Kaufmann.
- Black, Rex (2013). Managing the Testing Process (2nd ed.). Wiley Publishing. ISBN 0-471-22398-0.
- Butt, J (2012) System Analysis and Design for beginners 2nd edition, Minnesota: McGraw Hill.
- Cooper, David (2014). Computer Studies For A Level (Second ed.). Coventry, United Kingdom
- David Gries (2014), The Science of Programming, Springer-Verlag
- David M. Kroenke (2011), Database Processing: Fundamentals, Design, and Implementation (1997), Prentice-Hall
- Dixit, J. B and Kumar, R (2012) Structured system analysis and design, New Delhi: Laxmi Publications Ltd, available at <http://books.google.com>,(accessed 02/08/18).
- Ehmer Khan, Mohd (2010). "Different Forms of Software Testing Techniques for Finding Errors" (PDF). IJCSI International Journal of Computer Science Issues. 7 (3): 12. Retrieved 12 Aug 2018
- Fennelly, Lawrence J. (2012). Effective Physical Security. Butterworth-Heinemann
- Gillham, B. (2008). Developing a questionnaire (2nd ed.). London, UK: Continuum International Publishing Group Ltd.
- Graham, B (2011) Developing a questionnaire, 2nd edition, New York: The Tower Building. available at <http://books.google.com>, (accessed 05/08/18).
- Halpin T, Morgan T (2013) Information Modeling and Relational Databases, 3rd edn., San Francisco, CA: Morgan Kaufmann
- Hambling, B (2010) Software testing 2nd edition, UK: British Information Society Limited, available at <http://books.google.com>, (accessed 08/10/18).

Justin Zobel (2013). "Algorithms" in Writing for Computer Science (second edition). Springer.

Kolawa, Adam; Huizinga, Dorota (2012). Automated Defect Prevention: Best Practices in Software Management. Wiley-IEEE Computer Society Press

Kroenke, David M. and David J. Auer(2010). Database Concepts. 3rd ed. New York: Prentice

Mesly, Olivier. (2017). Project feasibility – Tools for uncovering points of vulnerability. New York, NY: Taylor and Francis, CRC Press

Morris, J. (2012). "Chapter 1: Data Migration: What's All the Fuss?". Practical Data Migration (2nd ed.). BCS Learning & Development Ltd.

O'Brien, J. A., & Marakas, G. M. (2011). Developing Business/IT Solutions. In Management Information Systems (pp. 488-489). New York, NY: McGraw-Hill/Irwin.

Piper, Tony (2013). Cambridge International AS and A Level Computing Revision Guide. Delhi, India: Cambridge University Press

Tedre, Matti (2014). Science of Computing: Shaping a Discipline. CRC Press

Thareja P(2011), "Total Quality Organization Thru' People,(Part 16), Each one is Capable",FOUNDRY, Vol. XX

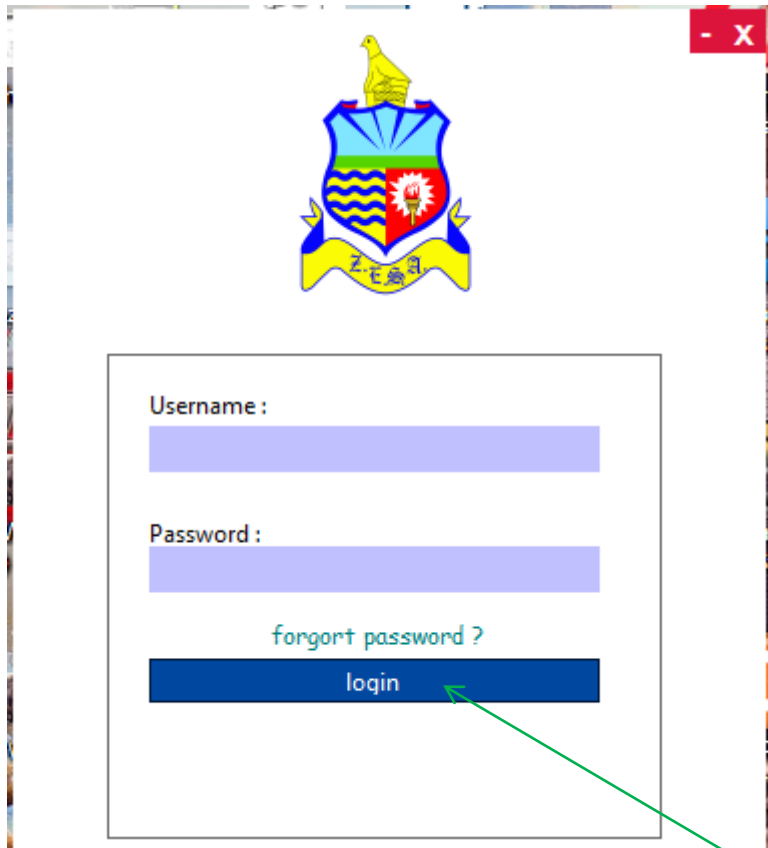
Warkentin(2010) 'E-Knowledge Networks for inter-organizational collaborative e-business': Logistics Information Management Journal.

APPENDICES

APPENDIX A: USER MANUAL

Login in

When the system is opened to it a prompt page will come up as shown below:



The image shows a login page with a crest at the top center. The crest features a yellow bird on top, a blue shield with a white sun and a red flower, and a yellow banner with the letters 'Z.E.S.' below it. Below the crest is a login form with the following elements:

- A label "Username:" followed by a light blue input field.
- A label "Password:" followed by a light blue input field.
- A link "forgot password?" in green text.
- A dark blue button labeled "login" with a green arrow pointing to it from the bottom right.

Fig A1.1 Login guide

The one to login has to fill in with **EC number** and a **password** then select **login** to get into the system.

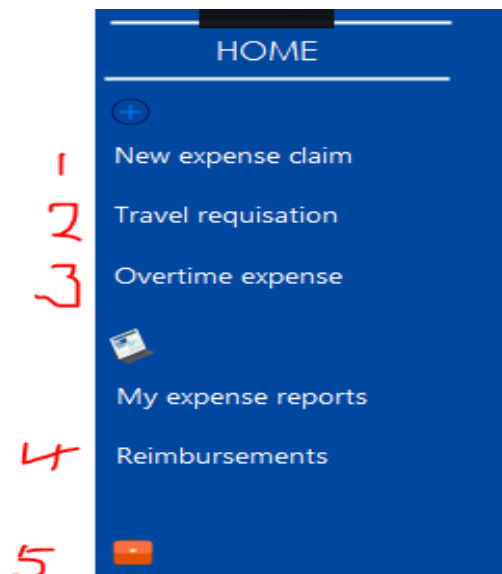
ASSISTANCE ON HOW TO SUBMIT AN EXPENSE CLAIM

Understand workflows



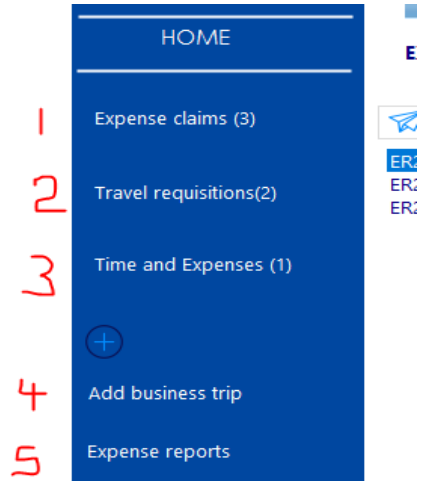
GETTING STARTED WITH MENU NAVIGATION

1. CLAIMANT MAIN MENU



1. Goes to creates reimbursement claim
2. Create trip expense report
3. Overtime claim
4. View your reimbursement expenses
5. Trip signing up

2. MANAGER or APPROVER MAIN MENU



1. Approve reimbursement claims
2. Approve travel requisitions
3. Overtime expense management
4. Create business trip for employees

Entering expense reports

To request reimbursement for work related expenses such as business trip expenses, relocation expenses, or tuition expenses, employees must enter and submit expense reports. Each expense report consists of a header record and detail records. Need following information to complete an expense report:

- Transaction date
- Business purpose
- Amount
- Expense type

Expense claim

Description

Amount (USD\$) :

Expense type

Expense Date

10/29/2018

Attach receipt

Overtime expense claim

Claimant has to fill in all respective fields

Staff details

Donald_Churu ze2015 Accounts

Details of hours worked

Date worked: 10/29/2018

Time period worked: 07:29 to 07:29

Purpose

Add

Added claim list

UNDERSTAND APPROVALS WORKFLOWS

Manager Approval: Approving expense reports

Managers can either approve or reject the reports. If a manager approves an expense report, the system changes the expense report status to indicate that it is ready for an auditor to review, if necessary, or ready for reimbursement. If the manager rejects an expense report, the system notifies the employee and the employee must revise and resubmit the report.

Status: Pending

Approver: Edify_Manager

Monday, October 29, 2018

200

All expenditures within the report are in compliance with compan policy.

The stated business purpose of the expense claim is valid.

Reimbursable expenses list: Gasoline for rental cars

Finish Cancel

Expense claim attachments

Manager should **verify** attached receipts and supporting proof of expense

PAYMENT AUTHORISATION

Finance manager: reviews for the following items:

- ✚ F.M should authorise approved expenses only
- Submission of legible, itemized receipts
- Submission of proper authorization and approval documentation
- Correct expense coding
- Expense is in accordance with ZESA Expense Policy missions

Expense reports will be returned to requestor for incorrect documentation and approvals

| Expense summary | |
|---|----------------------------|
| Claim code | RV178 Co. ZESA |
| Claimant | Makwari_J_johanes |
| Dep. | IT_Hardware_and_operations |
| Purpose | SAP system upgrading 2 |
| Starting | 10/17/2018 |
| Ending | 10/17/2018 |
| Amount | 330.00 |
| Expense progress | |
| Created on | Saturday, October 20, 2018 |
| Approved date | 10/22/2018 |
| Approver I.D | Edify_Manager |
| Reimbursement authorization | |
| <input type="checkbox"/> All expenditures within the report are in compliance with compan policy. _____ | |
| <input type="checkbox"/> The stated business purpose of the expense claim has been validated _____ | |

Finance manager should verify purpose of expense and take note of amounts submitted if the abide with ZESA Holdings travel policy

REIMBURSING EMPLOYEE EXPENSES

Accounts clerk

When the report status reaches the Reimbursement Process status, it is available for reimbursement processing. You run the Expense Report Reimbursement program (R20110) to generate the appropriate accounts payable or time card records. The system generates these records based on the reimbursement method that you specified in the employee group profile or the employee profile. After processing the expense report, the system notifies the employee.

Choose account with sufficient amount to reimburse a claim



| | |
|--------------------|----------------------------|
| Employee name | Andrew_Emp_M |
| Department | IT_Hardware_and_operations |
| Reimbursement Acc. | 30078383833 |
| Bank | CABS |
| | Hwange trip meals expense |

| | |
|----------------|-----------------------|
| Amount claimed | 70.45 |
| Choose account | Main Business Account |
| Acc.No. | 1006663788367 |

Finish by pressing the yellow button

GUIDANCE ON EXPENSE TRACKING

1. Choose department
2. Select expense type
3. Set dates range
4. Add to expense draft

Continue collecting as much records as you want

TRACK REIMBURSEMENT EXPENSES

| 1. Please select department | | 2. Expense type | | 3. Expense dates | |
|-----------------------------|-----------------|-----------------|--------|----------------------------|------------|
| IT_Hardware_and_operations | | Travel_expense | | 10/29/2018 | 10/29/2018 |
| ER29101893047467 | | | | | |
| Receipt_no | Claimant | Expense_type | Amount | Dep_no | |
| RV17 | Makwari_Johanes | Travel_expense | 230.98 | IT_Hardware_and_operations | |



Amount \$ 230.98

Add to draft after filtering record

Amount \$ 123.5

RECORDS FOR ALL DEPARTMENT EXPENSES FROM 10/08/2018 TO 10/29/2018

GENERATE EXPENSE REPORT ER29101893047467

| ReportNumber | Department | Expense_Type | Period | Total |
|------------------|----------------------------|----------------|-----------------------|--------|
| ER29101893047467 | Finance | Travel_expense | 10/29/2018 10/29/2018 | 252.09 |
| ER29101893047467 | IT_Hardware_and_operations | Travel_expense | 10/29/2018 10/29/2018 | 783.61 |
| ER29101893047467 | HR | Travel_expense | 10/29/2018 10/29/2018 | 123.5 |
| ER29101893047467 | HR | Travel_expense | 10/29/2018 10/29/2018 | 123.5 |

create report

Save final expense report from your draft list

HOW TO CREATE EBANK RECONCILIATION REPORT

Bank reconciliation is the process of matching the balances in an entity's accounting records for a cash account to the corresponding information on a **bank** statement. The goal of this process is to ascertain the differences between the two, and to book changes to the accounting records as appropriate

Click in **blue** highlighted rows to mark an internal record of transaction as **checked**

| Bank statement lines | | | | Internal record of transactions | | | | |
|----------------------|------------------|-------------------|--------|---------------------------------|------------------|----------------|--------|-----------|
| TransactionDate | Reference | Payee | Amount | Receipt_no | Claimant | Expense_type | Amount | Checked |
| 10/22/2018 | RQ2110188214647 | Makwari_J_johanes | 120 | ER16101811581190 | Makwari_J_joh... | Reimbursement | 86.28 | Unchecked |
| 10/22/2018 | RV17 | Makwari_J_johanes | 230.98 | RQ2110188214647 | Makwari_J_joh... | Overtime | 120 | Unchecked |
| 10/24/2018 | ER16101811581190 | Makwari_J_johanes | 86.28 | RV17 | Makwari_J_joh... | Travel_expense | 230.98 | Unchecked |
| 10/24/2018 | ER2410186385621 | Andrew_Emp_M | 23.00 | ER2410186140349 | Andrew_Emp_M | Reimbursement | 31.21 | Unchecked |
| 09/23/2018 | QSD67627782 | Null | 128.56 | ER2410186385621 | Andrew_Emp_M | Reimbursement | 23.00 | Unchecked |

RV17 review Return Modify Go To Check all ER2410186140349

Cash Bal as per b/s. **39998091.3**

Items marked 1 Match

Amount 230.98

Date : 10/22/2018

ank transaction amount **588.82**

ternal transaction balance **491.47** ⚠

Internal transaction balance **491.47**

Items cleared 1

Amount **67.99**

Uncleared balances **-423.48**

Match found

RV17 Makwari_J_johanes Travel_expense 230.98

Reconcile

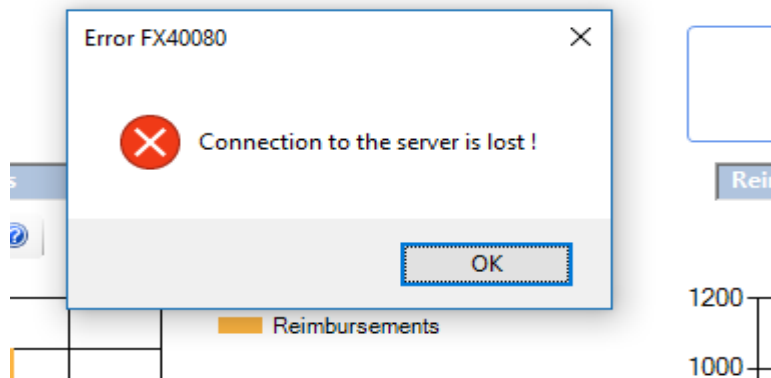
Proceed to reconcile statement when uncleared balances are \$0

SPECIAL INSTRUCTIONS FOR ERROR CORRECTION

ZERC system is fitted out with error coding to help the authorized users to resolve any difficulty during system operation. Therefore, one should pay attention to each error code in order to get assistance from the administrator. The following are some of the error codes in the system.

- In case of error “E0057x”, the user has to reinstall the software with **administrator** rights. The error reflects that the system cannot access its software or installation files because the disk is over-protected by administrator rights.
- Error “FX40080” requires administrator or user to check network connection on the host machine. This error does not allow the user to proceed saving the captured data.

ard



On logon, if the system displays a message “renew password” the user has to contact the administrator to reset his or her password in order to access the system. Passwords expire after every two months, this measure is for ensuring maintained system access security.

APPENDIX B: SNIPPET OF CODE

Submitting expense report

```
if (txtamoun.Text=="")
{
    MessageBox.Show(" " + lblname.Text + " please provide expense claim
figure", "", MessageBoxButtons.OK, MessageBoxIcon.Warning);
    txtamoun.Focus();
    return;
}
if (txtpurpose.Text.Length<=10)
{
    MessageBox.Show(" " + lblname.Text + " please provide sufficient
description for your reimbursement claim", "", MessageBoxButtons.OK,
MessageBoxIcon.Warning);
    txtpurpose.Focus();
    return;
}

decimal fgfg = 0;
decimal amoun = decimal.Parse(txtamoun.Text);
if (amoun <= fgfg || amoun<1)
{
    MessageBox.Show("" +lblname.Text+ " "+ "Your claim amount -$ " +
lblamoun.Text+ " cannot be reimbursed, too low. (Reimbursement figures $1.00-
$1000.00)", "Amount ($)", MessageBoxButtons.OK, MessageBoxIcon.Error);
    txtamoun.Focus();
    return;
} else if(amoun>=1000)
{
    MessageBox.Show("" +lblname.Text+" $ " +lblamoun.Text+ " is too huge
for employee claim. (Reimbursement figures $1.00-$1000.00) ", "Amount ($)",
MessageBoxButtons.OK, MessageBoxIcon.Error);
    txtamoun.Focus();
    return;
}

string ConString = @"Data Source=localhost;port=3306;Initial
Catalog=zesaexp;User Id=root;password=";
MySqlConnection con = new MySqlConnection(ConString);

MySqlCommand cmd;

FileStream fs;

BinaryReader br;

try

{
    if (lbllec.Text.Length > 0 && textpic.Text.Length > 0)

    {

        string FileName = textpic.Text;

        byte[] ImageData;

        fs = new FileStream(FileName, FileMode.Open, FileAccess.Read);

        br = new BinaryReader(fs);
```

```

        ImageData = br.ReadBytes((int)fs.Length);

        br.Close();

        fs.Close();

        string CmdString = "INSERT INTO reimb(Receipt_no, Dep_code,
Claim_date, Claimant, Purpose, Total, Status, imag, Expensedate) VALUES(@Receipt_no,
@Dep_code, @Claim_date, @Claimant, @Purpose, @Total, @Status, @imag, @Expensedate)";

        cmd = new MySqlCommand(CmdString, con);
    }
};

```

Reimbursing and sending SMS

```

    double newbankamoun;
    newbankamoun = double.Parse(lblbalance.Text) -
double.Parse(lblamoun.Text);
    lblnewbankamoun.Text = newbankamoun.ToString();

    double newempbankamoun;
    newempbankamoun = double.Parse(lblamoun.Text) +
double.Parse(lbllempbankamoun.Text);
    lblnewempbankamoun.Text = newempbankamoun.ToString();

    private async void ApiCall()
    {
        using (var client = new HttpClient())
        {
            string username = "*****";

            // Webservices token for above Webservice username
            string token = "916*****66f";

            // BulkSMS Webservices URL
            string bulksms_ws = "http://*****/index.php?app=ws";
            string destinations = lblphone.Text;

            // SMS Message to send
            string message = "Helo, your " + lblexpense.Text + " has been paid to
" + lbllempbankname.Text + " " + lbllempacc.Text +
            ". Amount :$" + lblamoun.Text + ". New bank balance : $ 0.00 . Reference
No." + this.Text;
            // send via BulkSMS HTTP API

            string ws_str = bulksms_ws + "&u=" + username + "&h=" + token +
"&op=pv";
            ws_str += "&to=" + Uri.EscapeDataString(destinations) + "&msg=" +
Uri.EscapeDataString(message);

            HttpResponseMessage response = await client.GetAsync(ws_str);
            response.EnsureSuccessStatusCode();

            using (HttpContent content = response.Content)
            {
                string responseBody = await response.Content.ReadAsStringAsync();
                //Console.WriteLine(responseBody + ".....");
            }
        }
    }

```